SPECIFICATIONS

JOHN WAYNE AIRPORT

Pavement Maintenance and Repair
Project No. 280-280-1400-P305
for
COUNTY OF ORANGE

APPROVED AS TO FORM:

By ____________________________
Deputy Counsel
Date 4-25-2019

APPROVED:

By ____________________________
Airport Director
Date 5-8-19
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SECTION I

BIDDING REQUIREMENTS
1. NOTICE INVITING BIDS
NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that the Board of Supervisors of the County of Orange, California ("COUNTY") will receive sealed bids up to 2:00 PM PST, Wednesday, the 5th day of June, 2019, in the office of the Clerk of the Board of Supervisors, Room 100, Robert E. Thomas Hall of Administration (Building 10), 333 W. Santa Ana Blvd., Santa Ana, California 92701, at which time said bids will be publicly opened and read in Room 169 on the first floor, for the following project:

Project Title: Pavement Maintenance and Repair
Project No.: 280-280-1400-P305
Location: John Wayne Airport (JWA), County of Orange, California

Delivery of the Bid to the correct address and room by the time specified above shall be the sole responsibility of Bidder. COUNTY shall return unopened any late Bids.

DESCRIPTION OF WORK: The project provides for the maintenance and repair of asphalt and concrete pavement on the airfield, and in vehicular traffic areas at JWA. The maintenance and repair includes pavement replacement, overlays, spall repair, slurry seal, seal coats, rubber removal, joint seal, repair of damaged underground utilities, adding bollards for safety, drainage and erosion control system repairs, and emergency repairs. The project also includes repair and reconstruction of underground utility structures. This would be "typical work" as determined by Section 20128.5.

CONTRACTOR PREQUALIFICATION: This project is open for bidding only to those firms that have been prequalified by John Wayne Airport. Bids submitted by firms not prequalified to bid this project will not be accepted. The prequalified contractors are:

1. All American Asphalt
2. Century Paving Inc.
3. Sully-Miller Contracting Company

All of said work to be performed in accordance with the complete contract documents as defined in the Agreement, including but not limited to the Agreement, General Conditions, drawings, specifications, and addenda, if any, which are available for purchase at ARC, 345 Clinton Street, Costa Mesa, CA 92626, telephone 949-660-1150. Contact ARC for the cost. Information regarding this bid is available by visiting the JWA Website at http://www.ocair.com/businessandemployment/bids/. Prospective bidders are responsible for obtaining the bid package details, and addenda, if any, by contacting ARC. For additional information, contact the Project Manager, Sean Lally at slally@ocair.com.

CONTRACTOR’S LICENSE CLASSIFICATION: For performance of this work, a current and active California Class A – General Engineering Contractor’s license is required of the Contractor at the time of bid.

Pursuant to California Public Contract Code Section 3400(b), where a material, product, thing, or service is designated by a specific brand or trade name followed by the words “or equal” in the
Contract Documents, requests for approval of an “equal” material, product, thing, or service shall be submitted prior to the date and time indicated below for submission of bidder questions.

**LABOR CODE NOTICE:** Pursuant to the provisions of Section 1773 of the Labor Code of the State of California, COUNTY has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in this locality from the Director of the Department of Industrial Relations for each craft, classification, or type of workman needed to execute the contract. Copies of the prevailing wage rates are on file at COUNTY’S principal office. Copies may be obtained from the State Office, Department of Industrial Relations, or from the Department of Industrial Relations website: [http://www.dir.ca.gov](http://www.dir.ca.gov). Contractor shall post a copy of such wage rates at the job site and shall pay the adopted prevailing wage rates. Additionally, Contractor shall comply with the provisions of Labor Code Section 1775 (Penalties for Prevailing Wage Violations) and 1813 (Forfeiture for Overtime Violations).

All contractors and subcontractors must comply with the requirements of Labor Code Section 1771.1(a), pertaining to registration of contractors pursuant to Section 1725.5. Bids cannot be accepted from unregistered contractors except as provided in Section 1771.1. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. After award of the contract, Contractor and each Subcontractor shall furnish electronic payroll records directly to the Labor Commissioner in the manner specified in Labor Code Section 1771.4.

In the performance of this work Contractors and subcontractors, in addition to the above-noted Labor Code sections, shall also comply with the requirements of Labor Code Sections 1774 (Minimum Prevailing Wage Rates), 1776 (Payroll Records), 1777.5 (Employment of Apprentices), and 1815 (Working Hours).

**BID SECURITY:** Each bidder must submit with its bid a satisfactory check certified by an acceptable bank or a bidder's bond made payable to the order of the County of Orange in an amount not less than 5 percent (5%) of the TOTAL BID AMOUNT proposed in the Bid Form, as a guarantee that the bidder will enter into the proposed contract if the same is awarded to bidder. In the event of failure to enter into such contract, the proceeds of the check will be forfeited or, in case of a bond, the full sum thereof will be forfeited to the County of Orange. Bidders shall leave their bids open for 90 days.

**BONDS:** The successful bidder to whom the contract is awarded shall be required to furnish a Performance Bond and a Labor & Material Payment Bond in an amount equal to 100 percent of the contract.

**SUBSTITUTION OF SECURITIES:** Pursuant to Section 22300 of the Public Contract Code of the State of California, the contract will contain provisions permitting the successful bidder to whom the contract is awarded to substitute securities for any moneys withheld by the County of Orange to ensure performance under the contract. An Escrow Agreement can be found in the Project Manual.

**PREBID MEETING:** Bidders are advised that on the 21st day of May, 2019 a pre-bid meeting will be held starting at 9:00 AM PST, at John Wayne Airport, Eddie Martin Building located at 3160 Airway Avenue, Costa Mesa, California.
BIDDER QUESTIONS: Bidders are advised that the final day JWA will consider bidder questions will be May 28th, 2019 at 3:00 PM PST. Bidders shall address all questions in writing to the Project Manager, Sean Lally at slally@ocair.com.

COUNTY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS OR TO WAIVE ANY IMMATERIAL IRREGULARITIES OR INFORMALITIES IN ANY BID RECEIVED.

BY ORDER OF THE BOARD OF SUPERVISORS OF ORANGE COUNTY, CALIFORNIA

DATED: ____________

ROBIN STIELER
Clerk of the Board of Supervisors
Orange County, California
2. INSTRUCTIONS TO BIDDERS
INSTRUCTIONS TO BIDDERS

1. SECURING DOCUMENTS

Drawings and specifications will be available for purchase at:

ARC Reprographics, Inc.
345 Clinton Street
Costa Mesa, CA 92626
949-660-1150

2. BIDS

To receive consideration, bids shall be made in accordance with the following instructions:

A. Bids shall be made upon the Bid Form contained herein. All items shall be properly filled in and numbers are to be stated both in writing and in figures. The signatures shall be in longhand. The completed form shall be without alterations, interlineations, or erasure marks. Unless called for, enclosures submitted with the Bid Form, such as bid clarifications or bid qualifications, may cause bid to be found non-conforming and may therefore be rejected.

B. Bids shall be submitted only upon the items of bid stated in the Contract Documents; bids upon other bases will not be considered. Bids that do not reference all addenda or that are not submitted on the prescribed forms may be rejected.

C. The County will determine the lowest bidder on the basis indicated on the Bid Form.

D. The County reserves the right to accept or reject bids on work and additives listed in the Bid Form in sum total or individually or in any combination unless the Bid Form makes specific provision to the contrary.

E. Unless called for, alternative bids will not be considered.

F. Modification of bids already submitted will be considered if received at the office designated in the Notice Inviting Bids by the time set for opening of bids. Telegraphic modifications will be considered, but should not reveal the amount of the original bid.

G. All contractors and subcontractors must comply with the requirements of Labor Code Section 1771.1(a), pertaining to registration of contractors pursuant to Section 1725.5. Bids cannot be accepted from unregistered contractors except as provided in Section 1771.1. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. After award of the contract, Contractor and each Subcontractor shall furnish electronic payroll.
records directly to the Labor Commissioner in the manner specified in Labor Code Section 1771.4.

Additionally, in the performance of the work called for in this project all contractors and subcontractors must also comply with the requirements of Labor Code Sections 1774 (Minimum Prevailing Wage Rates), 1776 (Payroll Records), 1777.5 (Employment of Apprentices), and 1815 (Working Hours).

H. Pursuant to the provisions of Sections 4100 through 4113 of the Public Contract Code of the State of California, every bidder shall in his bid set forth:

1) Name, Location of the place of business, and California contractor license number of each Subcontractor who will perform work or labor or render service to the bidder in or about the work in an amount in excess of one-half of one percent (0.5%) of the bidder's total bid.

2) The portion of the work, trade, or service which will be done by each such Subcontractor.

I. In the event that alternative bids are called for and Contractor intends to use different or additional Subcontractors on the alternative or alternatives, he shall fill out additional forms of the list of Subcontractors and shall identify such forms with relation to whether they apply to the base or alternative bids.

J. If the bidder fails to specify a Subcontractor for any portion of the work to be performed under the Contract in excess of one-half of one percent (0.5%) of the bidder's total bid, he agrees to perform that portion himself. The successful bidder shall not, without the consent of JWA either:

1) Substitute any person, firm, or corporation as Subcontractor in place of the subcontractor designated in the original bid.

2) Permit any subcontract to be assigned or transferred or allow it to be performed by anyone other than the original Subcontractor listed in the bid.

K. Bids shall be accompanied by a certified or cashier's check, or an acceptable bidder's bond from an admitted surety as specified by Public Contract Code Section 20129 for an amount not less than five (5) percent (5%) of the bid, made payable to the order of the County of Orange, California. Said check or bond shall be given as a guarantee that the bidder will enter into a contract if bidder is awarded the work, and in case of refusal or failure to enter into said contract, the check or bond, as the case may be, shall be forfeited to the County of Orange, California.

L. Before submitting a bid, bidders shall carefully examine the bid documents in their entirety, including but not limited to the Project Manual, the plans, and all other contract forms; shall visit the site of work; and shall fully inform themselves
as to all existing conditions and limitations and include in the bid a sum to cover the cost of all items included in the contract.

M. Bids, and modifications thereof, if any, shall be delivered to the office of the Clerk of the Board of Supervisors, Room 100, Robert E. Thomas Hall of Administration, (Building 10) 333 W. Santa Ana Blvd., Santa Ana, California, 92701, on or before the day and hour set for the opening of bids in the Notice Inviting Bids, enclosed in a sealed envelope, and bearing the title of the work and the name of the bidder.

3. MODIFICATIONS AFTER BID OPENING

A modification that is received from an otherwise successful bidder to whom the contract will be awarded which make the terms of the bid more favorable to the County will be considered at any time it is received and may thereafter be accepted.

4. WITHDRAWAL OF BIDS

Bids may be withdrawn by written or telegraphic request received from bidders prior to the time set for opening of bids.

5. INTERPRETATION OF DRAWINGS AND DOCUMENTS

Should a bidder find discrepancies in or omissions from the plans, drawings, details, or specifications, or should he be in doubt as to their meaning, the bidder shall at once notify JWA in writing. Should it be found that the point in question is not clearly and fully set forth, a written Addendum will be issued, and posted on the JWA website and with ARC Reprographics. The County will not be responsible for any oral instructions.

6. ADDENDA

Any Addenda or information issued during the time of bidding, or forming a part of the documents loaned to the bidder, for the preparation of his bid, shall be covered in the bid and shall be made a part of the Contract.

Addenda, if any, will be available at ARC Reprographics referenced in the Notice Inviting Bids, and on the JWA Website at http://www.ocair.com/businessandemployment/rfpsrfqs.htm. It is the bidder’s responsibility to check for and obtain addenda, and to acknowledge all addenda on the Bid Form. JWA will make every effort to issue addenda not less than 72 hours prior to the stated bid due time and date. In the event it becomes necessary to issue an addendum less than 72 hours prior to the stated bid due time and date such addendum, at the discretion of JWA, may include an extension of the bid due time and date.

7. OPENING OF BIDS

Bids will be publicly opened and read, at the time and place set in the Notice Inviting Bids.

8. AWARD OR REJECTION OF BIDS
A. The award of the Contract, if it is to be awarded, will be to the lowest conforming and responsible bidder complying with these instructions and the Notice Inviting Bids.

B. The Board of Supervisors reserves the right to reject any and all bids or waive any informalities, irregularities, or technicalities in the bids received or in the bidding if, in its sole judgment, it is determined to be in the best interest of the County to do so.

9. BONDS

The successful bidder to whom the contract is awarded will be required to furnish a Faithful Performance Bond and a Labor and Material Payment Bond, each in an amount equal to 100% of the contract price in accordance with the Bid Documents.

10. BIDDER’S OBLIGATIONS

Before submitting a bid, Bidders shall carefully examine the plans and specifications, shall visit the site of work, and shall fully inform themselves as to all existing conditions and limitations, and shall include in the bid a sum to cover the cost of all items included in the contract. Bidders are also required to fully inform themselves of the conditions relating to the construction and labor under which the work will be performed, and the Contractor must employ, so far as possible, such methods and means in the carrying out of his work as will not cause any interruption or interference with any other contractor.

11. BIDDERS INTERESTED IN MORE THAN ONE BID

No person, firm, or corporation shall be allowed to make or file or be interested in more than one bid, as prime Contractor for the same work. A person, firm or corporation who has submitted a sub-proposal to a bidder, or who has quoted prices on materials to a bidder, is not hereby disqualified from submitting a sub-proposal or quoting prices to other bidders.

12. BIDS TO BE LEFT ON DEPOSIT

Unless otherwise required by law, a bid (opened), and all parts thereof, must be left open by the bidder for the number of days indicated in the Notice Inviting Bids.

13. NONCOLLUSION AFFIDAVIT

A. Pursuant to Public Contract Code, Section 7106, each bidder must execute the Noncollusion Affidavit contained herein and submit it with the bid.

B. The County may require that the Contractor secure from its proposed Subcontractor(s) a Noncollusion Affidavit(s) prior to awarding any subcontract.

14. SUBSTITUTIONS

Where the Contract Documents specify a material, product, thing, or service by one or more brand or trade names followed by the words “or equal”, and a bidder wishes to request
approval for use of an “or equal” material, product, thing, or service, the bidder shall request such approval by the day and time indicated for submission of bidder questions in the Notice Inviting Bids.

15. CONTRACTOR’S LICENSE

No bid may be considered from a Contractor who, at the time the bids are opened, is not licensed to perform the project in accordance with Division 3, Chapter 9, of the Business and Professions Code of the State of California (see California Business and Professions Code, Section 7000, et seq). If the project involves Federal funding, the bidder must be properly licensed at the time of award (Public Contract Code 20103.5).

Refer to the Notice Inviting Bids for information on project Federal funding, if any, and contractor licensing requirements.

16. PREBID MEETING AND JOB WALK

Refer to the Notice Inviting Bids for prebid meeting information.

17. BID PROTESTS

Bidders have 5 business days from the date of the Notice of Intent to Award a Contract in which to file a protest concerning JWA’s determination of the lowest responsive, responsible bidder. Protests received after the 5 business day deadline may be rejected. JWA will issue a written response to a timely protest within 10 business days of its receipt. If the protestor wishes to appeal JWA’s decision, the protestor must submit a written appeal to JWA within 3 business days from the protestor’s receipt of JWA’s decision. Within 15 business days of a timely appeal, JWA will conduct a third-party review of all materials in connection with the protest and provide a written decision, which shall be final and is not subject to further administrative appeal.

18. BIDDER QUESTIONS

Refer to Notice Inviting Bids, or addenda, if any, for final day and time JWA will consider bidder questions.

END OF INSTRUCTIONS TO BIDDERS
3. BID FORM
BID FORM

TO THE BOARD OF SUPERVISORS, COUNTY OF ORANGE, CALIFORNIA:

BIDDER (FIRM NAME) __________________________________________

LOCATION (CITY) ___________________________________________

The undersigned hereby proposes and agrees to provide any and all materials, labor, tools, equipment, management, supervision, incidentals, and other services and requirements including insurance, Faithful Performance Bonds, Faithful Labor and Material Bond, and overhead and profit, in accordance with the plans, drawings and specifications on file at the Administrative Offices at John Wayne Airport, for the following unit price contract:

Project: Pavement Maintenance and Repair

Project No: 280-280-1400-P305

Location: John Wayne Airport, County of Orange, California

The County will determine the lowest bidder based on the total bid amount at the time of the bid opening.

The Board of Supervisors reserves the right to award a contract based on the base bid, or any combination of the base bid, allowances, and/or additive and/or deductive bid items, if any, after determination of the lowest bidder.

BID DETAIL

BASE BID:

Total Bid Amount (Items 1 through 129):

________________________________________________________________________dollars

($___________________)
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>Description</th>
<th>Technical Specification No</th>
<th>Section/Plan No</th>
<th>ESTIMATED QUANTITY</th>
<th>UNIT</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
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<tr>
<td>1</td>
<td>Demolition and Removal of Asphalt (Including Curbs)</td>
<td>Non-Airfield Spec 1</td>
<td></td>
<td>250 CY</td>
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<td>2</td>
<td>Demolition &amp; Removal Of PCC (Including Curbs)</td>
<td>Non-Airfield Spec 1</td>
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<td>250 CY</td>
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<td>Surface Prep., Excavate &amp; Dispose (Replacement Pavement Construction – Subgrade Preparation)</td>
<td>Non-Airfield Spec 2</td>
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<td>1,000 CY</td>
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<td>4</td>
<td>Bridging Aggregate - In Place</td>
<td>Non-Airfield Spec 2</td>
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<td>5</td>
<td>Pre-paving Herbicide Application, (Weed Control, Spray Herbicide)</td>
<td>Non-Airfield Spec 6, 13</td>
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<td>6</td>
<td>Aggregate Base In Place</td>
<td>Non-Airfield Spec 2, 5, 10</td>
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<td>1,000 CY</td>
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<td>7</td>
<td>Crack Sealing In Asphalt Pavement</td>
<td>Non-Airfield Spec 3, 6</td>
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<td>40,000 LF</td>
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<td>8</td>
<td>Asphalt Concrete, Installed for Non-Airfield Pavements</td>
<td>Non-Airfield Spec 4, 5, 6</td>
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<td>9</td>
<td>Portland Cement Concrete, Installed for Non-Airfield Pavements</td>
<td>Non-Airfield Spec 11</td>
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<td>200 CY</td>
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<td>10</td>
<td>High-molecular-weight Methacrylate Resin</td>
<td>Non-Airfield Spec 12</td>
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<td>2132 GAL</td>
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<td>11</td>
<td>Rubberized Emulsion-Aggregate Slurry</td>
<td>Non-Airfield Spec 8</td>
<td>8.1</td>
<td>2,000 SY</td>
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<td>12</td>
<td>Slurry Seal Coat</td>
<td>Non-Airfield Spec 7</td>
<td>7.1 – 7.3</td>
<td>20,000 SY</td>
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<td>13</td>
<td>Dust Cap Slurry Seal***</td>
<td>Non-Airfield Spec 7</td>
<td>7.4</td>
<td>2,000 SY</td>
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<td>Geotech Fabric - Subgrade Reinforcement</td>
<td>AASHTO M288-99 Class 2</td>
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<td>15</td>
<td>Saw Cutting - PCC Pavement 1” to 6” Thick</td>
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<td>1,000 LF</td>
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<td>16</td>
<td>Raise or Lower Covers, Frames, or Grates Of Existing Manholes &amp; Storm Inlets to Grade</td>
<td>Non-Airfield Spec 6</td>
<td>6.1.4</td>
<td>10 EA</td>
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<td>17</td>
<td>AC Curb Installed</td>
<td>Non-Airfield Spec 6</td>
<td>6.2.11</td>
<td>800 LF</td>
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<td>18</td>
<td>Exploratory Drilling, 4&quot; Diameter, 24&quot; Deep Asphalt Pavement</td>
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<td></td>
<td>5 EA</td>
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<tr>
<td>19</td>
<td>Install PCC for Sidewalk (Repairs 4&quot; Thick)</td>
<td>Non-Airfield Spec 9, 11</td>
<td>11.3.7</td>
<td>1,000 SF</td>
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<td>Concrete Wheel Stop Installed</td>
<td>Non-Airfield Spec 9</td>
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<td>21</td>
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<td>11.3.7</td>
<td>300 LF</td>
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<td>22</td>
<td>PCC Swale Installed 6&quot; Thick</td>
<td>Non-Airfield Spec 11</td>
<td>11.3.7</td>
<td>500 CY</td>
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<td>ITEM NO.</td>
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<td>Technical Specification No</td>
<td>Section/Plan No</td>
<td>ESTIMATED QUANTITY</td>
<td>UNIT</td>
<td>UNIT PRICE</td>
<td>TOTAL</td>
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<tr>
<td>23</td>
<td>Repaint Roads &amp; Parking Lot Pavement with Reflective Glass Beads 4&quot; Stripes</td>
<td>Non-Airfield Spec 9</td>
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<td>LF</td>
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<td>28</td>
<td>Repaint Roads &amp; Parking Lot Pavement with Reflective Glass Beads Symbols &amp; Markings</td>
<td>Non-Airfield Spec 9</td>
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<td>1,000</td>
<td>SF</td>
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<tr>
<td>29</td>
<td>New Paint Roads &amp; Parking Lot Pavement with Reflective Glass Beads 4&quot; Stripes (Two coats)</td>
<td>Non-Airfield Spec 9</td>
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<td>1,000</td>
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<tr>
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## JOHN WAYNE AIRPORT
### PAVEMENT MAINTENANCE AND REPAIR
#### PROJECT NO. 280-280-1400-P305

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## JOHN WAYNE AIRPORT
### PAVEMENT MAINTENANCE AND REPAIR
#### PROJECT NO. 280-280-1400-P305

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<tr>
<th>ITEM NO.</th>
<th>Description</th>
<th>Technical Specification No</th>
<th>Section/Plan No</th>
<th>ESTIMATED QUANTITY</th>
<th>UNIT</th>
<th>UNIT PRICE</th>
<th>TOTAL</th>
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**NOTE:** MOBILIZATION AND DEMOBILIZATION COMBINED WILL BE PAID AT 8% OF THE TOTAL JOB ORDER AMOUNT OR $500, WHICHEVER IS HIGHER.

***UNIT PRICES FOR THESE LINE ITEMS INCLUDES ALL COST ASSOCIATED WITH NIGHT WORK AS SPECIFIED IN THE GENERAL REQUIREMENTS PARAGRAPH 1.11, AND SECURITY REQUIREMENTS AS SPECIFIED IN THE GENERAL REQUIREMENTS PARAGRAPH 1.12.

Footnotes:
1. Job orders written for 0 to 50 TN will be paid at the unit price bid for item 69.
2. Job orders written for 51 to 200 TN will be paid at the unit price bid for item 70.
3. Job orders written for 201 to 2000 TN will be paid at the unit price bid for item 71.
4. Minimum dimensions of repair will be 3'-0" by 12'-6" for item 98.

**TOTAL BID AMOUNT, ITEMS 1 THROUGH 129** $
As required by California State Law, the General Contractor bidding will hereinafter state the subcontractor who will be the subcontractor on the job for each particular trade or subdivision of the work in an amount in excess of one-half of one percent of the General Contractor's total bid and will state the firm name and principal location of the mill, shop, or office of each, as well as the contractor license number of each. If a General Contractor fails to specify a subcontractor or if it specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of one percent, it agrees that it is fully qualified to perform that portion itself and that it shall perform that portion itself.

<table>
<thead>
<tr>
<th>Division of Work or Trade</th>
<th>Name of Firm or Contractor</th>
<th>Location (City, State)</th>
<th>Contractor License Number</th>
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NOTE: If alternate bids are called for and Contractor/Bidder intends to use different or additional subcontractors on the alternates, it must provide a separate list of subcontractors for each such alternate.

The undersigned hereby certifies that it has an appropriate license, issued by the State of California, to provide this work; that such license will be in full force and effect throughout the duration of construction; and that any and all subcontractors to be employed on this project will be licensed in the State of California for the portion of the Work that will be accomplished by said subcontractors.

Dated: ________________, 2019

The above bid includes Addenda Number(s): ________________.

Bids that do not reference all addenda, or that are not submitted on the prescribed forms may be rejected.
Enclosed herewith:

- Bidder's Bond
- Noncollusion Affidavit

Official Name of Firm (Print or Type)

____________________________________

By (Signature and Title)

State License Number and Classification

____________________________________

Address

____________________________________

City, State, Zip Code

____________________________________

Telephone   Fax
If this bid is made by a partnership or a corporation, the following additional information is required:

A. If made by a partnership, the name and post office address of each member of the partnership must be shown.

<table>
<thead>
<tr>
<th>Name</th>
<th>Name</th>
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<tbody>
<tr>
<td>Address</td>
<td>Address</td>
</tr>
<tr>
<td>City, State, Zip Code</td>
<td>City, State, Zip Code</td>
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B. If made by a corporation, the person signing the proposal will give the name of the state under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing the proposal as an agent will file evidence of its authority to do so and that the signature is binding to do so and that the signature is binding upon the firm or corporation.

Corporate Charter made in: ____________________________________

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<th>Name</th>
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<th>Name</th>
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JOHN WAYNE AIRPORT
PAVEMENT MAINTENANCE AND REPAIR
PROJECT NO. 280-280-1400-P305

BIDDER'S BOND
(Not necessary if certified or cashier's check accompanies bid.)

We, the undersigned principal and surety, our heirs, executors, administrators, successors, and assigns are jointly and severally held and firmly bound to the County of Orange, a public entity and agency, in the principal sum of ($__________________) to be paid and forfeited to said Authority if the bid of the undersigned principal for the County of Orange work titled “Pavement Maintenance and Repair”, Project No. 280-280-1400-P305, shall be accepted and the proposed contract awarded to said principal, and said principal shall fail or refuse to execute the Agreement governing the project in accordance with such bid as accepted and to furnish the bonds required in connection therewith with seven (7) days after award, and in the form required; otherwise, this obligation to be void.

Witness our hands this _____ day of __________________, 2019.

_________________________________
Principal

By: __________________________________

_________________________________
Title

_________________________________
Surety

By: __________________________________

Attorney in Fact

(Seal)
NONCOLLUSION AFFIDAVIT
(To be Executed by Bidder and Submitted With Bid)

State of California )
) ss
County of Orange )

__________________________________________, being first duly
sworn, deposes and says that he or she is __________________________ of
__________________________________________ the party making the foregoing
bid, the bid is not made in the interest of, or on behalf of, a ny undisclosed person, partnership,
company, association, organization, or corporation; that the bid is genuine and not collusive or
sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a
false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with
any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the
bidder has not in any manner, directly or indirectly, sought by agreement, communication, or
conference with anyone to fix the bid price of the bidder or any other bidder, or fix any overhead,
profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage
against the public body awarding the contract of anyone interested in the proposed contract; that
all statements contained in the bid are true; and, further, that the bidder has not, directly or
indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or
divulged information or data relative thereto, or paid and will not pay, any fee to any corporation,
partnership, company association, organization, bid depository or to any member or agent thereof
to effectuate a collusive or sham bid.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true
and correct. Subscribed at ______________________________ on __________________________.

________________________________________
(Signature)

NOTARY TO AFFIX SEAL
AND CERTIFICATE OF
ACKNOWLEDGMENT

State License No. Classification Exp. Date

________________________________________
Address

________________________________________
City, State, Zip Code

Telephone Fax
SECTION II
CONTRACT FORMS
4. AGREEMENT
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AGREEMENT

This Agreement (“Agreement” or “Contract” as hereafter referred) made and entered into the _____ day of ________________, 2019, by and between the County of Orange, State of California, hereinafter referred to as “COUNTY,” and ____________________________, hereinafter referred to as “CONTRACTOR.”

TERMS AND CONDITIONS

County and Contractor, for the consideration hereinafter set forth, mutually agree as follows:

1. CONTRACT DOCUMENTS

   A. The complete Contract includes the following documents (collectively the “Contract Documents”):

      1. This Agreement;
      2. General Conditions;
      3. General Requirements;
      4. Project specifications:
      5. Project drawings:
      6. Contractor’s Bid Form with unit prices;
      7. Performance Bond;
      8. Labor and Material Payment Bond;
      9. All modifications and amendments to the foregoing, respectively.

   B. The complete Contract Documents comprise the sole agreement between the parties as to the subject matter therein. Any representations or agreements not specifically contained therein are null and void. Any amendments to any Contract Documents must be made in writing and signed by both parties. The Contract Documents are complimentary, and what is called for by any one shall be as binding as if called for by all.
2. **SCOPE OF WORK**
   A. Contractor shall perform, provide and furnish all labor, management, supervision, permits, tools, equipment, scaffolding, utilities, installed and consumable materials, testing devices, warehousing, incidentals and each and every item of expense necessary for the supply, fabrication, handling, hauling/transportation services, receiving and unloading, installation, construction, testing, evaluation, quality control, plans and schedules to accomplish those items and matters set forth in the Base Bid described therein, (aggregately the “Work” unless otherwise referred) in accordance with the specifications and drawings and as necessary for the following:

   Project: **Pavement Maintenance and Repair**

   Project No.: **280-280-1400-P305**

   B. All Work shall be in strict accordance with the provisions of the Contract Documents. In performing the Work and this Agreement, Contractor shall coordinate with and report to John Wayne Airport (“JWA”) project management, construction management, and project controls staff.

   C. **General Description of Work:**

   The project provides for the maintenance and repair of flat civil facilities and drainages on the airfield, and in vehicular traffic areas at JWA. This would be “typical work” as determined by Section 20128.5. The proposed contract contains various line items with estimated quantities for work associated with pavement maintenance and repair. Individual job orders will be written for each job with a cost based upon unit prices in the contract. All work under this contract will be for pavement maintenance and repair at JWA.

3. **CONTRACT AMOUNT**

   County agrees to pay an amount not-to-exceed the sum of **One Million Two Hundred Thousand dollars ($1,200,000.00)**, (hereinafter the “Contract Sum”), paid according to this agreement and the unit price set forth in the Contractor’s Bid Form and subject to additions and deductions, if any, as hereinafter provided in this Agreement or elsewhere in the Contract Documents.

4. **CONTRACT AWARD DATE AND TIME OF COMPLETION**

   The Contract will commence the day that the County by its Board of Supervisors votes to approve the award of the Contract (“Contract Award Date”). The Contractor shall complete all Work within the number of calendar days set forth in the Job Order issued for the specific work. All Job Orders shall be issued within
365 calendar days of the Contract Award Date which hereinafter shall be referred to as the “Time of Completion.”

The Contractor shall perform and complete all Work in strict accordance with the Contract Baseline Schedules for each Job Order described in, and required under, Section 2 - SCHEDULE of the General Requirements.

A. The Contractor shall submit, for County’s approval, Performance Bond, Labor and Material Payment Bond, and Insurance Certificates within 7 calendar days of the Contract Award Date. County will review each document for acceptance by County within 14 calendar days. Failure to file the acceptable Bonds or Insurance Certificates within the prescribed time shall be just cause for the forfeiture of the Bid Guaranty and may constitute a material breach of this Contract. The time required for submission and review of the bonds and insurance certificates is included within the Time of Completion. The Contractor shall not be entitled to any compensation or time extension for its failure to submit bonds and insurance within the time prescribed above.

B. The Contractor shall also submit the following documents for County’s approval:

1) Within 7 calendar days following the issuance of a Job Order:
   a) Contractor’s Job Order-Specific Safety Plan
   b) Construction Execution Plan for each Job Order
   c) Proposed Baseline Contract Schedule for each Job Order
   d) Quality Control Plan

Failure of the Contractor to submit any of these documents in an acceptable form as determined by County and within the prescribed time(s) may constitute a material breach of the Contract.

C. Excepting mobilization, Contractor may not perform any Work at or on the Project site prior to written approval by County.

5. LIQUIDATED DAMAGES

Time is of the essence in the Contractor’s performance of the Contract.

In accordance with California Government Code Section 53069.85, Contractor agrees to forfeit and pay to County liquidated damages in the amount of One Thousand Dollar ($1,000.00) per day for each working day that the Work is delayed beyond the time allowed in any Job Order, and such sum may be deducted from any payments due to or to become due to the Contractor. Contractor’s liability for
liquidated damages shall terminate upon Completion, as the term “Completion” is defined by California Public Contract Code Section 7107(c).

6. **PAYMENTS**

A. Applications for payment must be submitted via Primavera Unifier Project Document Management System in the manner and form approved by County. The County shall review and approve each application for payment. Each application for payment must include:

1) A copy of the approved Job Order in which the contractor is requesting payment;

2) A status report indicating the work that was performed during the billing period. Report shall include date work performed, location of work, and a description of the work with actual quantities.

3) Any other administrative documentation required under the Contract Documents.

The submittal of the above documents shall be a condition precedent to the County’s obligation to process each monthly application for payment.

B. Within 30 days following County’s approval of the Contractor’s undisputed and properly-submitted application for payment, County shall pay to the Contractor a sum equal to 95 percent of the value of all the undisputed Work covered by the application for payment, less the total amount of any stop notices, liens, non-conforming work and/or wage violations. The determination of the value of the Work shall be taken from the Current Contract Schedule and jobsite verification of actual Work completed. Payments shall not be considered as County’s acceptance of any part of the Work.

C. The value of Work completed may include material delivered and stored on the site and not yet incorporated into the Work, County, at its discretion may authorize payment up to 95 percent of the value of those delivered materials. With respect to material delivered and stored off the site, JWA, at its discretion may authorize payments up to 95 percent of those materials, if the following conditions are satisfied: (1) the Contractor furnishes satisfactory evidence that it has acquired title to such material and it will be utilized for the Work; (2) the material is stored in a bonded and insured location acceptable to the County and is segregated from any material that is not intended for use on the Project; and (3) the Contractor provides a consent of surety. Such payments shall be made on submission of itemized requests by the Contractor. The amount or amounts not paid shall be
retained by the County (the “retention proceeds”) for application on final payment as hereinafter provided.

D. Pursuant to California Public Contract Code Section 20104.50, if JWA fails to make any progress payment within 30 calendar days after receipt of an undisputed and properly submitted payment request from the Contractor, then JWA shall pay interest to the Contractor equal to the rates set forth in subdivision (a) of Civil Procedure Code Section 685.010.

E. The retention proceeds, to the extent they are unencumbered, shall be paid to Contractor within 60 calendar days after completion as defined by California Public Contract Code Section 7107. For purposes of this Agreement, the term “encumbered” includes but is not necessarily limited to amounts determined by the County associated with pending stop notices, wage violations by Contractor, and uncompleted punch-lists.

F. Nothing in this Contract shall prejudice the right of County to withhold any additional amount of payment to the Contractor to cover: any Work-related claims of the County against the Contractor, or to cover Work-related offsets against the Contractor as permitted by California law, or to compensate for the failure of the Contractor to comply with the milestone dates in the Baseline Contract Schedule, including approved revisions thereto, or otherwise maintain sufficient progress in the Work, as determined by JWA.

7. EMPLOYEE ELIGIBILITY VERIFICATION
The Contractor warrants that it fully complies with all Federal and State statutes and regulations regarding the employment of aliens and others, and that all of its employees performing Work under this Contract meet the citizenship or alien status requirements set forth in Federal statutes and regulations. The Contractor shall obtain from all employees performing Work hereunder all verification and other documentation of employment eligibility status required by Federal or State statutes and regulations including, but not limited to, the Immigration Reform and Control Act of 1986, 8 United States Code (U.S.C.) §1324 et seq. as amended. The Contractor shall retain all such documentation for all covered employees for the period prescribed by the law. The Contractor shall indemnify, defend with counsel approved in writing by County, and hold harmless the County, its agents, officers, and employees from employer sanctions and any other liability that may be assessed against the Contractor or County or both in connection with any alleged violation of any Federal or State statutes or regulations pertaining to the eligibility for employment of any persons performing Work under this Contract.

8. WAGE RATES
Contractor shall post a copy of the prevailing wage rates at the jobsite and shall pay the adopted prevailing wage rates as a minimum. Pursuant to the provisions of
California Labor Code Section 1773, the Board of Supervisors of the County has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime Work in this locality for each craft, classification, or type of workman needed to execute this Contract from the Director of the Department of Industrial Relations. These rates are on file with the Clerk of Board of Supervisors. Copies may be obtained at cost from JWA Administration. The Contractor shall comply with the provisions of Part 7, Chapter 1 of the California Labor Code.

9. **WITHHOLDING OF WAGE DIFFERENTIALS**
   
   In addition to retention proceeds, County may withhold from the Contractor as much of any accrued payments as may be necessary to pay laborers, craft workmen, and mechanics employed on the Project, any difference between the rate of wages required to be paid pursuant to California law and the rate of wages actually paid to such laborers, craft workmen, and mechanics.

10. **TRADE LABOR TIME RECORDS**
    
    The Contractor shall keep full, true, and accurate records of the names and actual hours worked by the respective workers and laborers employed under this Contract in accordance with California Labor Code Section 1776 and shall allow access to the same at any reasonable hour to County, its agents or representatives, and any person having the authority to inspect the same as contemplated under the provisions of said Labor Code, or when requested by County.

11. **SAFETY**
    
    The failure by the Contractor to submit an acceptable Project-Specific Safety Plan as provided in Section 4B(1)(a) above or to meet the health and safety requirements of its Safety Plan, JWA’s safety plan, the requirements set forth in this Agreement or any ordinances, regulations, laws, or customary industry or trade practices relating to health and safety, shall be grounds for JWA to reject, in its entirety, any request for payment by the Contractor, withhold payments due to the Contractor, and order that all Work be stopped. Should JWA stop Work, Contractor may only resume Work upon Contractor’s submission and JWA’s approval of a revised Job Order-Specific Safety Plan. Contractor is not entitled to damages as a result of such stoppage of Work. Failure of the Contractor to maintain a healthy and safe environment in accordance with the requirements of this Agreement shall constitute a material breach of this Agreement. Delays to the Schedule that may be incurred by the Contractor resulting from an unapproved safety plan, revised safety plan, or work stoppage for reasons related to safety are inexcusable and non-compensable.

12. **OPERATIONAL REQUIREMENTS**
    
    The Contractor shall not interrupt any operation of JWA in the performance of the Work without prior written approval by JWA. County may stop Work if Contractor interrupts the operation of any County or Federal facility, equipment, or system.
13. **QUALITY**

Contractor shall submit a Quality Control plan within the time stated in Section 4B(1) above. JWA shall have up to 14 calendar days to approve or disapprove such plan. The failure by the Contractor to submit an acceptable Quality Control Plan or meet the Quality Control requirements of this Agreement shall be grounds for JWA to reject, in its entirety, any request for payment by the Contractor, withhold payments due to the Contractor, and order that all Work be stopped. Should JWA stop work, such Work may only resume upon Contractor submission, and upon JWA approval, of a revised Quality Control Plan. Contractor is not entitled to damages as a result of such stoppage of Work. Failure of the Contractor to meet the quality requirements of this Agreement may constitute a material breach of this Agreement. Delays to the Schedule that may be incurred by the Contractor resulting from an unacceptable Quality Control plan, revised Quality Control plan, or work stoppage for reasons related to its Quality Control Plan(s) are inexcusable and non-compensable.

14. **CONSTRUCTION EXECUTION PLAN**

Contractor shall submit a Job Order-specific Construction Execution Plan (“CEP”), for the Work within the time stated in Section 4B(1) above. JWA shall have up to 14 calendar days to approve or disapprove such plan. The failure by the Contractor to submit an acceptable CEP as provided hereinabove, or meet the CEP requirements of this Agreement, shall be grounds for JWA to reject, in its entirety, any request for payment by the Contractor, withhold payments due to the Contractor, and order that all Work be stopped. Should JWA stop work, such Work may only resume upon Contractor submission, and JWA’s approval, of a revised CEP. Contractor is not entitled to damages as a result of such stoppage of Work. Delays to the Schedule that may be incurred by the Contractor resulting from an unacceptable CEP, revised CEP, or work stoppage for reasons related to its CEP are inexcusable and non-compensable.

15. **PRESENTATION OF CLAIMS FOR MONEY AND/OR DELAY**

“Claim” means a separate demand by the Contractor for (A) a delay and/or extension of time, (B) payment of money or damages arising from work done by, or on behalf of the Contractor related to the Scope of Work, payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to, or (C) any amount the payment of which is disputed by the County. If the County rejects any request for a Change Order, which includes any of the above-mentioned demands, the Contractor shall then be required to submit a separate “Claim” within...
20 calendar days following that rejection, in accordance with the requisites of this clause.

Contractor shall not be entitled to payment for any Claim unless it shall have first given written notice to the County, within 20 calendar days following the commencement of each such condition or cause generating the Claim, which describes the reason for the Claim, the work impacted, and the duration of any delay. The Claim shall include all documentation supporting any amount claimed and/or the basis for any claimed delay and/or extension of time. No Claim shall be allowed which does not comply with these requirements. These time limits and requirements shall not be extended or superseded by the provisions of the Public Contract Code Section 20104.2(a) set forth in Section 17- Resolution of Claims of $375,000 or Less of the General Conditions.

16. WAIVER OF CLAIMS
The acceptance by Contractor of the final payment shall constitute a waiver of all claims against County under or arising out of this Agreement except those previously made in writing and identified by Contractor as unsettled at the time of its final request for payment.

17. WARRANTY WORK
Commencing with the date that the Job Order is completed, the Contractor shall warrant all Work for a period of 365 calendar days or such longer periods of time as may be set forth with respect to specific warranties required by the Contract Documents. Failure by the Contractor to take corrective action within 24 hours after personal or telephonic notice by JWA will result in County taking whatever corrective action it deems necessary. All costs resulting from such action by County will be claimed or offset against Contractor or, if necessary, the Contractor's Performance Bond. For any Work which is replaced or repaired under this provision, a new 365 calendar-day warranty period shall commence on the date of JWA’s written acceptance of the repaired or replaced Work.

18. EFFECT OF CONTRACTOR'S EXECUTION
Execution of this Agreement and all other Contract Documents by the Contractor is a representation that the Contractor has visited the Project site, has become familiar with the local conditions under which the Work is to be performed, and has correlated all relevant observations with the requirements of the Contract Documents.

19. AUDIT
Pursuant to and in accordance with Section 8546.7 of the California Government Code, if this Contract involves expenditures of public funds aggregating in excess of $10,000, then the parties shall be subject to examination and audit by the
California State Auditor for a period of 3 years after final payment under this Agreement.

Contractor’s records shall upon reasonable notice be open to inspection and subject to audit and/or reproduction during normal business working hours. County’s representatives or agents shall have reasonable access to Contractor’s facilities, shall be allowed to interview all current or former employees to discuss matters pertinent to the performance of this Agreement, and shall be provided adequate and appropriate workspace, including use of a copier, to conduct audits in compliance with this section. The County or its designee may conduct such audits or inspections throughout the term of this Agreement and for a period of 3 years after final payment or longer if required by law. County representatives or agents may (without limitation) conduct verifications such as verifying information and amounts through interviews and written confirmations with Contractor employees, field and agency labor, subcontractors, and vendors.

Contractor’s records shall include any and all information, materials, data of every kind and character, including without limitation, records, books, papers, documents, notes, receipts, vouchers, drawings, and any and all other agreements, sources of information and matters that may in County’s judgment have any bearing on or pertain to any matters, rights, duties, or obligations under or covered by any Contract Document.

Such records shall include hard copy, as well as computer readable data, written policies and procedures, accounting records of time and expenditures, time sheets, payroll registers, payroll records, cancelled payroll checks, subcontract files, change order files, back charge logs, invoices, and any other Contractor records that may have a bearing on matters of interest to the County in connection with the Contractor’s dealings with the County to the extent necessary to adequately permit an evaluation and verification of any or all of the following: (1) compliance with Agreement requirements; (2) compliance with County business ethics/conflict of interest expectations; (3) compliance with Agreement provisions regarding the pricing of Change Orders; (4) accuracy of Contractor representations regarding pricing of invoices; and (5) accuracy of Contractor representations related to claims submitted by Contractor or any Contractor payees.

Contractor represents and agrees that failure by Contractor to maintain such records in compliance with this section precludes Contractor from maintaining any request or claim for compensation from or against County for any time periods for which such records were not kept, and constitutes a waiver by Contractor of any such claim(s) against County for such time period(s).

If an audit or examination in accordance with this section discloses overpricing or overcharges (of any nature) by the Contractor to County in excess of 1% of the total Contract billings, in addition to making adjustments for the overcharges, then the Contractor shall reimburse the reasonable actual cost of the County’s audit to
the County. Any adjustments and/or payments that must be made as a result of such audit or examination shall be made within a reasonable amount of time (not to exceed 90 days) from presentation of County’s findings to the Contractor. Notwithstanding this requirement, County may exercise its right to offset.

20. **SUBCONTRACTOR AUDIT**

Contractor shall also include a clause in its contracts with Subcontractors, and shall require Subcontractors to include a clause in its contracts with sub-subcontractors, which reserves the right for a County representative to audit any cost, payment, or settlement resulting from any items set forth in this Contract during the performance of this Contract and for a period of not less than 3 years after final payment is made or until all disputes, appeals, litigation, or claims arising from this Contract have been resolved, whichever is later. This clause shall also require Subcontractors to retain all necessary records for a period of not less than 3 years after final payment is made or until all disputes, appeals, litigation, or claims arising from this Contract have been resolved, whichever is later.

21. **BUSINESS ETHICS**

Contractor employees, agents, subcontractors, vendors (or their representatives) shall not make or cause to be made any cash payments, commissions, employment, gifts, entertainment, free travel, loans, free work, substantially discounted work, or any other considerations to (1) County representatives, employees or their relatives, or (2) representatives of subcontractors, or material suppliers or any other individuals, organizations, or businesses receiving funds in connection with this Contract.

Contractor employees (or their relatives), agents, or subcontractors shall not receive any cash payments, commissions, employment, gifts, entertainment, free travel, loans, free work, or substantially discounted work or any other considerations from representatives of subcontractors, or material suppliers or any other individuals, organizations, or businesses receiving funds in connection with this Contract.

Contractor agrees to notify a designated County representative within 48 hours of any instance where the Contractor becomes aware of a failure to comply with the provisions of this section.

Contractor shall ensure that the foregoing provisions shall be included in any subcontract agreement entered into by and between Contractor and any subcontractor in connection with the Project.
22. GOVERNING LAW AND VENUE

This Contract is executed in the State of California and shall be governed by and construed under the laws of the State of California. In the event of any legal action to enforce or interpret this Contract, the sole and exclusive venue shall be in State court of competent jurisdiction located in Orange County, California, and the parties hereto agree to submit to the jurisdiction of such court, notwithstanding any provisions to the contrary under California Code of Civil Procedure Section 394.

The parties specifically agree that by soliciting and entering into and performing Work under this Contract, the Contractor shall be deemed to constitute doing business within Orange County from the time of solicitation of Work, through the period when all Work under this Contract has been completed, and continuing until the expiration of any limitations period. Furthermore, the parties have specifically agreed, as part of the consideration given and received for entering into this Contract, to waive any and all rights to request that an action be transferred for trial to another County under California Code of Civil Procedure Section 394.

23. INDEMNITY

To the maximum extent allowable by law, the Contractor agrees to indemnify, defend with counsel approved in writing by the County, and hold the County, its elected and appointed officials, officers, employees, agents and those special districts and agencies for which the County’s Board of Supervisors acts as the governing Board (“County Indemnitees”) harmless from any loss, injury, liability claims, demands, costs and expenses whether incurred by or made against the County or County Indemnitees of any kind or nature, including but not limited to personal injury or property damage, arising from or related to the services, products or other performance provided by the Contractor pursuant to this Contract. This indemnity applies even in the event of County Indemnitees’ concurrent fault, except that nothing in this indemnification provision shall be construed to require the Contractor to indemnify County Indemnitees for losses caused by County Indemnitees’ active negligence, sole negligence, willful misconduct, or defects in design furnished by them.

The Contractor’s indemnity obligation set forth above shall include but not be limited to all claims, suits, or actions of every name, kind, and description, brought for, or on account of: (1) failure of the Contractor to comply with its obligations under the Contract Documents, (2) injury or death of any person or damage to property resulting from the construction of the work or by or in consequence of any negligence in protecting the work; (3) use of materials or other things used or employed in the construction that are not in conformance with the Contract Documents; and (4) any negligent or intentional act or omission by the Contractor and any of its respective officers, employees, agents, subcontractors, suppliers, and representatives during the progress of the work or at any time before its completion and final acceptance.
If judgment is entered against the Contractor and County by a court of competent jurisdiction because of the concurrent active negligence of the County or County Indemnitees, the Contractor and County agree that liability will be apportioned as determined by the court. Neither party shall request a jury apportionment.

24. COUNTY OF ORANGE CHILD SUPPORT ENFORCEMENT FORMS

In order to enhance the child support collection efforts of the County of Orange Family Support Enforcement, the Contractor is required to provide the following information as listed in the following County of Orange Child Support Enforcement Certification Requirements: If the Contractor is an individual contractor: Name, date of birth, social security number, and residence address. If Contractor is doing business in a form other than as an individual: Name, date of birth, social security number, and residence address of each individual who owns an interest of 10 percent or more in the contracting entity.

In addition, the Contractor must provide the following fully-executed Child Support Enforcement Certificate.

Information provided shall be transmitted to the Child Support Office, which has been charged with the establishment and enforcement of child support orders. Copies shall not be retained by JWA.

Failure of the Contractor to submit the data and/or certifications required above, or to comply with all federal and state reporting requirements for child support enforcement, or to comply with all lawfully served Wage and Earnings Orders and Notices of Assignment shall constitute a material breach of the Contract. Failure to cure such breach within 30 calendar days of notice from the County shall constitute grounds for termination of the Contract.
COUNTY OF ORANGE CHILD SUPPORT ENFORCEMENT
CERTIFICATION REQUIREMENTS

1. In the case of an individual Contractor, his/her name, date of birth, Social Security number, and residence address:

   Name: ____________________________________________________________
   DOB:  ____________________________________________________________
   Social Security No.: __________________________________________ _______
   Residence Address: _________________________________________________

2. In the case of a Contractor doing business in a form other than as an individual, the name, date of birth, Social Security number, and residence address of each individual who owns an interest of 10 percent or more in the contracting entity:

   Name: ____________________________________________________________
   DOB:  ____________________________________________________________
   Social Security No.: __________________________________________ _______
   Residence Address: _________________________________________________

   Name: ____________________________________________________________
   DOB:  ____________________________________________________________
   Social Security No.: __________________________________________ _______
   Residence Address: _________________________________________________

   Name: ____________________________________________________________
   DOB:  ____________________________________________________________
   Social Security No.: __________________________________________ _______
   Residence Address: _________________________________________________

   (Additional sheets may be used if necessary.)
CHILD SUPPORT ENFORCEMENT CERTIFICATE

"I certify that _______________________________________ is in full compliance with all applicable federal and state reporting requirements regarding its employees and with all lawfully served Wage and Earnings Assignment Orders and Notices of Assignments and will continue to be in compliance throughout the term of Contract ______________ with the County of Orange. I understand that failure to comply shall constitute a material breach of the contract and that failure to cure such breach within 30 calendar days of notice from the County shall constitute grounds for termination of the contract.

______________________________________________________________
Signature *

Please Print Name

______________________________________________________________
Title

Date

______________________________________________________________
Signature

Please Print Name

______________________________________________________________
Title

Date

______________________________________________________________
Company Name

______________________________________________________________
Project Number
25. COUNTY’S INFORMATION TECHNOLOGY NETWORK

A. The County shall provide to the Contractor a connection to JWA’s Project Document Management System, Primavera Unifier. Before any access is allowed, the Contractor shall submit to the County User Access Request Forms, in the form herein provided. The User Access Request Form is required for each employee to access Project documentation including, but not limited to, correspondence, monthly reports, schedules, requests for information (RFIs), daily reports, payment applications, deliverables/submittals, change documentation, plans and drawings, and all other communications.

B. For each user, the County will create the user ID with approved access rights and provide an initial password to the user in a secure manner. As remote users, the Contractor’s employees shall acknowledge and comply with the County's Portal Usage Policy dated February 7, 2007 as herein provided.

C. Such Internet connection will allow the Contractor secured access to the Primavera Unifier Project Documentation Management System.

D. The Contractor shall use the Primavera Unifier Project Document Management System. Primavera shall be the Contractor’s exclusive means of written communication with the County and its representatives for all Project documentation.

E. The County will provide Primavera Unifier System training upon receipt of the User Access Request Form(s).
## User Access Request Form:

### Contractors and Non-County Employees

<table>
<thead>
<tr>
<th>CONTRACTOR USER INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Name (First):</td>
</tr>
<tr>
<td>Title:</td>
</tr>
<tr>
<td>Company Name:</td>
</tr>
<tr>
<td>e-mail:</td>
</tr>
<tr>
<td>Supervisor’s Name:</td>
</tr>
<tr>
<td>Project(s):</td>
</tr>
<tr>
<td>Start Date:</td>
</tr>
</tbody>
</table>

### 2. HARDWARE REQUESTED

- Desktop Computer ($1600)*
- Portable Computer ($2300)*
- Telephone ($50/month)
- Other:


### 3. ACCESS REQUESTED

- JWAIR User ID E-mail
- Document Locator Webtools only ($650)
- Skire/Unifier ($2,000)
- Off-site remote access (JWA laptop only)
- Other:

### 4. ADDITIONAL REQUIREMENTS, NOTES


### 5. User SIGNATURE

Note for all initial User Access Requests: A signed IT Usage Policy Acknowledgement form must be submitted with this request. See your Project Manager for details.

<table>
<thead>
<tr>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

### 6. APPROVAL

<table>
<thead>
<tr>
<th>Company Manager</th>
<th>JWA Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Name</td>
<td>Print Name</td>
</tr>
<tr>
<td>Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>

### 7. Please Return Completed form and signed Policy to:

Tim Harris  
Chief Technology Officer  
John Wayne Airport  
3160 Airway Ave, Costa Mesa

**Please note:** Depending on items requested, completion of Access Requests may take between 24 - 72 hours, with equipment/software purchases taking longer. If you have questions regarding the status of your request, please contact the Service Desk, 949-852-4004.
I. PURPOSE
To provide guidelines regarding usage of the John Wayne Airport Portal and affiliated programs: general, scope, approvals, audit, licensing, computer network security, internet access, electronic mail, monitoring, and hardware/software acquisition.

To provide assurance that the security of the Airport's computing network and systems will be protected.

To provide assurance that the Airport's computing network and standalone systems will be used in accordance with the Manufacturer's License Agreement terms and conditions.

To comply with the Information Technology Policy set forth by CEO/IT, County of Orange (Attachment A).

II. POLICY
A. For purposes of this policy, 'Users' are defined as:
   1. Employees, individuals or staff members hired by the County of Orange or John Wayne Airport.
   2. Consultants hired by the County of Orange or John Wayne Airport.
   3. Agents or Vendors conducting business connecting to the JWA computer network.
   4. Temporary staff hired by JWA.

B. Other terms defined throughout this document include:
   1. Hardware - all computers, peripheral equipment (printers, laptops, modems PDAs, etc).
   2. Software - all executable programs, scripts, operating systems, etc.
   3. CEO/IT - County Executive Officer/Information Technology.
   5. Systems - any single networked computer, standalone system of computers or Local Area Network (LAN) used for the purpose of processing information.
   6. Working Hours - User's assigned working hours/schedule.
   7. Business Hours - Monday – Friday, 7:30 a.m. to 5:30 p.m.

III. PROCEDURE
A. General Usage Policy
   This policy applies to all Airport employees, contractors, third parties, and other agents acting on behalf of the Airport or any of its divisions or departments.

   Generally, JWA will provide the individual user with a personal ID and password for accessing the JWA portal and associated systems.
The user to whom an ID is assigned is responsible for all use of that ID and is responsible for any inappropriate activities traced to that ID.

The individual user is responsible for protecting the ID and password from disclosure.

The user is required to not share a user ID/password with any other user.

The user is required to immediately notify JWA in the case of disclosure or compromise of a use ID or password.

B. User ID Acquisition Procedure

The user will complete a JWA access request form and submit the access request form with authorized signatures to JWA Information Systems.

Information Systems will create the user ID with approved access rights.

Information Systems will provide the ID and password to the user in a secure manner.

C. Network Security Policy

Virus protection of Airport Systems hardware and software is a collective responsibility. However, when a computer system is not owned by the Airport, it is the responsibility of each individual user and the company owning the computer to ensure the security, control, and integrity of that computer system.

Frequent, routine virus scans will be performed on all computers used in support of Airport business. This is accomplished with current virus scan software installed on each machine. Users shall not disable this software.

D. E-mail Policy

E-mail services are given to designated users and are to be used for the electronic communication of business, maintaining of business calendars, scheduling of meetings, etc. This may also include the use of e-mail for the announcement of JWA and County sponsored events.

E-mail messages should be objective, concise and free from discriminatory, sexually explicit or harassing content. Specific matters which should not be located on E-mail include private fund raising, political campaigning and business matters using names or discussing issues which could disclose inappropriate personnel or business information that would create embarrassment if sent in error or read inadvertently.

Caution should be used when forwarding an electronic mail message, taking into consideration whether or not the original sender intended for the message to be shared with the new recipient.
E. Monitoring Policy

The Airport reserves the right to monitor, at any time and without announcement, any communications to, from, or within JWA networks or systems.

It is understood that such unannounced monitoring of computer systems and computer services by the Airport Director, Airport Management, Facilities/Information Systems or designated staff may occur at any time. This monitoring may include, but not be limited to, review and/or running disk files whether they be programs or data, review of log files, capturing of network traffic, review of e-mail or review of any other files or data that may be present on computers or computer storage media covered by JWA and CEO/IT policies or procedures.

F. Compliance Policy

Failure to comply with these Airport policies and procedures may result in loss of computer privileges or other disciplinary actions as deemed appropriate by JWA Executive Management subject to applicable contractual limitations and requirements.

G. Acknowledgement Policy

All remote users of JWA computer hardware or software or users who access any JWA network or County of Orange network must acknowledge and comply with these policies.

A signed copy of acknowledgement of and compliance with these remote access policies for each user will be on file with JWA Human Resources.
I acknowledge that I have received, read, understood, and will comply with the John Wayne Airport Portal Usage Policy number E-04.

Signature
Date

Printed Name

Company Name

Project Name
26. **WRITTEN NOTICE**

The Contractor and County shall use the following addresses if any written notice is required to be given as part of the Contract:

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement Maintenance and Repair</td>
<td>Sean Lally, Project Manager</td>
</tr>
<tr>
<td>John Wayne Airport</td>
<td></td>
</tr>
<tr>
<td>3160 Airway Avenue</td>
<td></td>
</tr>
<tr>
<td>Costa Mesa, CA 92626</td>
<td></td>
</tr>
</tbody>
</table>
IN WITNESS WHEREOF, the parties hereto have caused this Contract to be executed on the date first above written.

Dated: ___________________________ COUNTY OF ORANGE

By: ________________________________
Chair, Board of Supervisors

SIGNED AND CERTIFIED THAT A COPY OF THIS AGREEMENT HAS BEEN DELIVERED TO THE CHAIR OF THE BOARD PER G.C. Sec 25103, Reso 79-1535
Attest:

______________________________
Robin Stieler
Clerk of the Board of Supervisors
County of Orange, California

______________________________
“CONTRACTOR”

By: ________________________________
Signature and Title

By: ________________________________
Signature and Title

Contractor’s License No.: ______________

Classification(s): ____________________

APPROVED AS TO FORM:

COUNTY COUNSEL

By: ________________________________
Deputy Counsel

Dated: ______________________________

END OF AGREEMENT

AGREEMENT 4-22
5. FAITHFUL PERFORMANCE BOND
JOHN WAYNE AIRPORT
PAVEMENT MAINTENANCE AND REPAIR
PROJECT NO. 280-280-1400-P305

BOND NO. ________________

FAITHFUL PERFORMANCE BOND

(The premium charged on this bond is $______________________, being at the rate of $______________________ per thousand of the Contract price.)

THAT, WHEREAS, the County of Orange, State of California, entered into a contract dated ________________, 20________, hereinafter called "Contract," with

________________________________________________________________________

(Name and Address of Contractor)

hereinafter called "Principal," for the work described as follows:

Project: Pavement Maintenance and Repair

Project No: 280-280-1400-P305

and

WHEREAS, the said Principal is required under the terms of said Contract to furnish a bond for the faithful performance of said Contract.

NOW, THEREFORE, WE, the Principal, and ___________________________________

________________________________________________________________________

(Name and Address of Surety)

duly authorized to transact business under the laws of the State of California, as Surety, hereinafter called "Surety," are held and firmly bound unto County of Orange in the penal sum _____________________ Dollars ($__________________), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors or assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that, if the Principal, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the said Contract and in any alteration thereof made as therein provided, on his or its part to be kept and performed, at the time and in the manner therein specified, in all respects according to their true intent and meaning, and shall indemnify and save harmless the County of Orange, its officers and agents, as therein stipulated, then this obligation shall become null and void; otherwise, it shall be and remain in full force and virtue. And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or
addition to the terms of the Contract, or to the work to be performed thereunder, or to the specifications accompanying the same, shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the contract, or the work, or to the specifications.

IN WITNESS WHEREOF, PARTIES hereto have executed this CONTRACT on the dates shown below their respective signatures below.

************************************************************************

CONTRACTOR:

Signature  Name  Title
Date

Signature  Name  Title
Date

*if CONTRACTOR is a corporation, signatures of two specific corporate officers are required as further set forth:

- The first signature must be one of the following: a) the Chairman of the Board; b) President; or c) any Vice President.
- The second signature must be one of the following: a) Secretary; b) the Chief Financial Officer; c) any Assistant Secretary; or d) any Assistant Treasurer.
- In the alternative, a single corporate signature is acceptable when accompanied by a corporate resolution demonstrating the legal authority of the signature to bind the company.

APPROVED AS TO INSURER AND LIMITS:

By ______________________________
Risk Manager

APPROVED AS TO FORM:
COUNTY COUNSEL

By ______________________________
Deputy

Date ______________________________

END OF FAITHFUL PERFORMANCE BOND
6. LABOR AND MATERIALS
BOND
LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

THAT, WHEREAS COUNTY OF ORANGE has awarded to ______________________

________________________________________________________________________

(Contractor's Name and Address)

hereinafter called "Contractor," a contract for the work described as follows: __________

________________________________________________________________________

________________________________________________________________________

hereinafter called "Contract"; and

WHEREAS, said Contractor is required by the provisions of Sections 3247-3252 of the
Civil Code to furnish a bond in connection with said Contract, as hereinafter set forth.

NOW, THEREFORE, WE, the undersigned Contractor, as Principal, and

________________________________________________________________________

(Name and Address of Surety)

duly authorized to transact business under the laws of the State of California, as Surety, as
hereinafter called "Surety," are held and firmly bound unto County of Orange in the penal
sum of ________________________ dollars ($____________________), lawful
money of the United States, said sum being not less than the estimated amount payable by
the said County of Orange under the terms of the contract, for the payment of which sum,
well and truly to be made, we bind ourselves, our heirs, executors, administrators,
successors and assigns, jointly and severally, firmly by these present.

THE CONDITION OF THIS OBLIGATION is such that, if said Contractor, his or its heirs,
executors, administrators, successors, and assigns, or subcontractors, shall fail to pay for
any materials, provisions, provender or other supplies, or teams, implements or machinery,
used in, upon, for or about the performance of the work under the Contract to be done, or
for any work or labor thereon of any kind, or for amounts due under the Unemployment
Insurance Code with respect to such work or labor, as required by the provisions of Chapter
7 of Title 15 of Part 4 of Division 3 of the Civil Code, and provided that the claimant shall
have complied with the provisions of said Civil Code, the Surety shall pay for the same in
an amount not exceeding the sum specified in this bond, otherwise the above obligation
shall be void. In case suit is brought upon this bond, the said Surety will pay a reasonable
attorney's fee to be fixed by the court. This bond shall insure to the benefit of any and all
persons, companies and corporations entitled to file claims under Section 3181 of the Civil
Code, so as to give a right of action to them or their assigns in any suit brought upon this
bond, and shall also cover payment for any amounts required to be deducted, withheld, and
paid over to the Employment Development Department from the wages of employees of the Contractor or his or its subcontractors pursuant to Section 13020 of the Unemployment Insurance Code. And the said Surety, for the value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract, or to the work to be performed thereunder, or to the specifications accompanying the same, shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the work, or to the specifications.

IN WITNESS WHEREOF, PARTIES hereto have executed this CONTRACT on the dates shown below their respective signatures below.

************************************************************************

CONTRACTOR:

Signature
Name
Title
Date

Signature
Name
Title
Date

*if CONTRACTOR is a corporation, signatures of two specific corporate officers are required as further set forth:

- The first signature must be one of the following: a) the Chairman of the Board; b) President; or c) any Vice President.
- The second signature must be one of the following: a) Secretary; b) the Chief Financial Officer; c) any Assistant Secretary; or d) any Assistant Treasurer.
- In the alternative, a single corporate signature is acceptable when accompanied by a corporate resolution demonstrating the legal authority of the signature to bind the company.

APPROVED AS TO INSURER AND LIMITS:

By _________________________________
Risk Manager

APPROVED AS TO FORM:
COUNTY COUNSEL

By _________________________________
Deputy

Date _________________________________

END OF LABOR AND MATERIAL PAYMENT BOND

LABOR AND MATERIALS BOND 6-2
7. ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION
ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between

_________________________________________ , whose address is
_________________________________________ , hereinafter called “Owner”; and
_________________________________________ , whose address is
_________________________________________ , hereinafter called “Contractor”; and
_________________________________________ , whose address is
_________________________________________ , hereinafter called “Escrow Agent.”

For the consideration hereinafter set forth, the Owner, Contractor, and Escrow Agent agree as follows:

(1) Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by Owner pursuant to the Construction Contract entered into between the Owner and Contractor for the Pavement Maintenance and Repair in the amount of __________________________, dated ______________ (hereinafter referred to as the "Contract"). Alternatively, on written request of the Contractor, the Owner shall make payments of the retention earnings directly to the escrow agent. When the Contractor deposits the securities as a substitute for Contract earnings, the Escrow Agent shall notify the Owner within 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the Owner and Contractor. Securities shall be held in the name of __________________________, and shall designate the Contractor as the beneficial owner.

(2) The Owner shall make progress payments to the Contractor for those funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.

(3) When the Owner makes payment or retention earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of the Contractor until the time that the escrow created under this contract is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the Owner pays the Escrow Agent directly.
(4) Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the Owner. These expenses and payment terms shall be determined by the Owner, Contractor, and Escrow Agent.

(5) The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.

(6) Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from the Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.

(7) The Owner shall have a right to draw upon the securities in the event of default by the Contractor. Upon 7 days' written notice to the Escrow Agent from the owner of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by the Owner.

(8) Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payments of fees and charges.

(9) Escrow Agent shall rely on the written notifications from the Owner and the Contractor pursuant to Sections 6 to 8, inclusive, of this agreement and the Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

(10) The names of the persons who are authorized to give written notice or to receive written notice on behalf of the Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:
JOHN WAYNE AIRPORT  
PAVEMENT MAINTENANCE AND REPAIR  
PROJECT NO. 280-280-1400-P305  

On behalf of Owner:  
Airport Director, John Wayne Airport  
Mr. Barry A. Rondinella, A.A.E./C.A.E.  
Signature  
3160 Airway Ave, Costa Mesa, CA 92626  

On behalf of Contractor:  
Title  
Name  
Signature  

On behalf of Escrow Agent:  
Title  
Name  
Signature  
Address  

At the time the Escrow Account is opened, the Owner and Contractor shall deliver to the Escrow Agent a fully executed counterpart of this Agreement.  

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.  

Owner:  
Airport Director, John Wayne Airport  
Mr. Barry A. Rondinella, A.A.E./C.A.E.  
Signature  

Contractor:  
Title  
Name  
Signature  

END OF ESCROW AGREEMENT
8. GENERAL CONDITIONS
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GENERAL CONDITIONS

1. DEFINITIONS

As used herein, the following terms have the meanings indicated:

A. **A-E:** The Architect-Engineer or its authorized representative retained by County to design the Project.

B. **Allowance:** The allocation of funds for items in the bid schedule for the purpose of identification and budgeting of work where actual quantities and/or cost are unknown at bid time. If the actual cost is either greater or less than the allowance in the bid price, then the Contract Sum will be increased or decreased accordingly, depending upon documentary proof by the Contractor of the actual amount of the item expended or incorporated into the Project. Allowance prices shall include all of the costs of materials, fixtures, or equipment and all costs of delivery, handling, and installations.

C. **Additive or Deductive Bid Item:** A bid item that may be added to, or deducted from, the scope of work prior to contract award. Determination of the lowest bidder shall be as indicated in the Bid Form.

D. **Board of Supervisors:** The governing body of the County of Orange.

E. **Commissioning Agent:** Entity or individual retained by the County to perform, and/or assist JWA in performing commissioning of project infrastructures, buildings, and/or systems. In the absence of a contracted entity or individual for this purpose, then JWA staff will perform this function.

F. **Construction Manager:** Entity or individual retained by the County to perform, and/or assist JWA in performing construction management and field activity oversight upon Contractors. In the absence of a contracted entity or individual for this purpose, then JWA staff will perform this function.

G. **Contract Sum:** The amount stated in the Agreement.

H. **County:** The County of Orange, a political subdivision of the State of California, or other designated County representative for the Project.

I. **JWA:** The Airport Director, or other designated John Wayne Airport representative for the Project.

J. **Project Manager:** The individual designated by, and representing, JWA for managing the Project.
K. **Major Bid Item:** A single contract item constituting 5 percent or more of the original Contract Sum.

L. **Project:** The Project identified in the Notice Inviting Bids.

M. **Program Manager:** Entity or individual retained by the County to perform, and/or assist JWA in performing, overall JWA Capital Improvement Program project management. In the absence of a contracted entity or individual for this purpose, then JWA staff will perform this function.

N. **Project Controls Manager:** Entity or individual retained by the County to perform, and/or assist JWA in performing, Project Controls Management, such as project budget and cost analysis, forecasting and control, and project scope change analysis, forecasting and control. In the absence of a contracted entity or individual for this purpose, then JWA staff will perform this function.

O. **Unifier:** JWA's electronic Project Management System, Oracle Primavera Unifier (Unifier). The CONTRACTOR shall use Unifier as the predominant means of communication with JWA and its representatives for all Project documentation.

P. **Work:** The construction and other services required by the Contract Documents to complete the Project, whether completed or partially completed, and includes all labor, materials, and equipment incorporated or to be incorporated into the Project by the Contractor, and/or all other related services provided or to be provided by Contractor to fulfill the Contractor's obligations as set forth in the Contract Documents. Work shall further include all alterations, amendments, change orders, or time extensions to the Contract Documents resulting from modifications.

Q. **Project:** Project No. 280-280-1400-P305 is for Pavement Maintenance and Repair at John Wayne Airport.

2. **COUNTY'S REPRESENTATIVES**

A. The Work will be under the general direction of the Board of Supervisors. JWA is the authorized representative of the Board of Supervisors and, under the Board of Supervisors, has complete charge of the Work and shall exercise full control of the Work, as far as it affects the interests of the County.

B. The provisions in this Section 2 or elsewhere in the Contract regarding approval or direction by the County, Board of Supervisors, or JWA, or action taken pursuant thereto, are not intended to and shall not relieve the Contractor of responsibility for the accomplishment of the Work, either as regards sufficiency or the time of performance, except as expressly otherwise provided herein.
3. ARCHITECT-ENGINEER STATUS

Unless otherwise expressly stated in the Agreement between the Contractor and the County, the A-E is responsible to the County for the preparation of adequate drawings, specifications, cost estimates, and reports within the scope of its contract. A-E services normally include review of shop drawings and material lists; recommendations to the County regarding proposed substitutions; and furnishing consultation and advice to the County to clarify the intent of the drawings and specifications and on questions that may arise during construction. The A-E shall have access to observe the Work at all times. The A-E does not have the authority to act for the County or to stop the Work. Should the A-E observe Work that, in its judgment, should be stopped to prevent damage, injury, loss, or error, the A-E should notify the Contractor and JWA immediately.

4. CONTRACTOR REQUIREMENTS

A. Contractor is required to have experience with a minimum of three (3) airfield paving projects.

B. Joint Entities: If the Contractor is comprised of more than one legal entity, then each such entity shall be jointly and severally liable hereunder.

C. Review Documents Review: The Contractor shall carefully study and compare all plans, drawings, details, specifications, and other instructions and shall at once report to JWA any error, inconsistency, or omission that the Contractor or its Subcontractors may discover. While it is believed that much of the information pertaining to conditions that may affect the cost of the Work will be shown on the plans, drawings, details, or indicated in the specifications, the County does not warrant the completeness or accuracy of such information. The Contractor shall ascertain the existence of any conditions affecting the cost of the Work that would have been disclosed by reasonable examination of the site.

D. Site Clearance: Existing improvements visible at the jobsite for which no specific disposition is made on the plans but which could reasonably be assumed to interfere with the satisfactory completion of the improvements contemplated by the plans shall be removed and disposed of by the Contractor unless Contractor is instructed otherwise by the County. The Contractor shall be liable to the County for any damage resulting from any errors or deficiencies in the Contract Documents or other instructions furnished by the County, if said errors or deficiencies were or could have been discoverable by reasonable inspection prior to the commencement of construction.

E. Superintendence: During construction, the Contractor shall maintain on the site a competent superintendent and any necessary assistants, all satisfactory to JWA with the following qualifications.
Personnel | Required Qualification
--- | ---
1. Superintendent | As a Superintendent, experience with a minimum of three (3) airfield projects.
2. Foreman (as applicable) | As a Foreman, experience with a minimum of three (3) airfield projects.
3. Paving Crew
   a. Foreman
   b. Paving Machine Operators
   c. Screed Operators
   d. Rake Men | As an Operators, experience with a minimum of three (3) airfield projects.

The superintendent shall not be changed except with the consent of JWA, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in its employ, in which case such superintendent shall be replaced within 24 hours by a superintendent acceptable to JWA.

F. Licenses and Certificates: Contractor shall, at all times during the term of the Contract, maintain in full force and effect such licenses as may be required by the State of California or any other governmental entity for the Contractor to perform the duties specified herein and provide the services required pursuant to the Contract. Contractor shall strictly adhere to, and obey, all governmental rules and regulations, including applicable environmental and CAL/OSHA requirements now in effect or as subsequently enacted or modified, as promulgated by any local, state, or federal governmental entities.

G. Assignment: Neither the Contract nor any portion thereof may be assigned by the Contractor. Claims for monies due or to become due the Contractor from the County under the Contract may be assigned, with the written consent of the Board of Supervisors, to a bank, trust company, or other financing institution and may thereafter be further assigned or reassigned to any assignees. The Contractor shall submit a written request to the Board of Supervisors enclosing a letter from the proposed assignee indicating that it will accept such assignment. Any attempted assignment contrary to the provisions of this paragraph shall be void. If the Contractor is not a corporation the stock of which is publicly traded, then the transfer of more than 10 percent of the stock held by shareholders of the corporation or a change in the composition of the Board of Directors of the corporation shall be deemed an assignment for purposes of this paragraph.

H. Responsibility: The Contractor is fully responsible for the acts and omissions of the Contractor and of persons directly or indirectly employed by the Contractor.

5. SUBCONTRACTS
A. **Licensed Subcontractors:** Each Subcontractor selected for the Work shall be licensed in the State of California for the portion of the Work that will be accomplished by such Subcontractor.

B. **Instructions:** Instructions to Subcontractors shall be made through the Contractor except when in emergency situations the Contractor is not readily available, in which case detailed instructions will be transmitted to Subcontractors directly by JWA.

C. **Responsibility:** The Contractor shall be fully responsible to the County for the acts and omissions of the Subcontractors and all persons directly or indirectly employed by them. The Contractor shall pay each Subcontractor the amount allowed the Contractor based on the Subcontractor's Work to the extent of such Subcontractor's interest therein, in accordance with the terms of the applicable Subcontract Agreement. The Contractor shall comply with the prompt payment provisions of California Public Contract Code 10262.5.

D. **Contractual Relations:** Nothing contained in the Contract shall create any contractual relations between County and a Subcontractor. Except as otherwise specifically provided hereinafter under warranties, the Contractor shall not be an agent for the County. Nothing contained in the Contract shall create any contractual relations between County and a Subcontractor.

6. **DRAWINGS AND SPECIFICATIONS**

A. **Examination of Plans:** The Contractor shall check all plans, drawings, details, and specifications furnished to the Contractor immediately upon their receipt and shall immediately notify JWA of any discrepancies. Figures marked on drawings shall in general be followed in preference to scale measurements. Large-scale drawings shall in general govern small-scale drawings. Schedules, such as door and finish hardware, shall govern over drawings. The Contractor shall compare all drawings and verify the figures before laying out the Work and will be responsible for any errors that might have been avoided thereby. When measurements are affected by conditions already established, the Contractor shall take measurements notwithstanding the giving of scale or figure dimensions in the drawings. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both.

B. **Omissions, Misdescriptions and Ambiguities:**

1) Upon issuance of Job Order, Contractor shall notify JWA immediately of all omissions from the plans, drawings, details, or specifications or the misdescription of details of Work, which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed. JWA shall notify the Contractor of the correction or addition to be made. In the event the omission or misdescription is substantial and the custom of the trade or industry does not require the Contractor to perform the Work without additional charge, then JWA shall issue
an additive or deductive Change Order and the Contractor shall be compensated in the manner herein provided for Change Orders. Any adjustment by the Contractor without written determination shall be at its own risk and expense.

2) If the Work required by the Contract Documents cannot be performed in a good and workmanlike manner or should discrepancies appear among Contract Documents, then the Contractor shall request an interpretation before proceeding with the Work. If the Contractor fails to make such a request, then no excuse will thereafter be entertained for failure to carry out the Work in a good and workmanlike manner. Should conflict occur in or between drawings and specifications, the Contractor is deemed to have estimated the more expensive way of doing the Work unless the Contractor asked for and obtained a written decision before submission of its bid as to which methods or materials will be required.

3) The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect or JWA. If the Contractor proceeds with such Work without obtaining further drawings, specifications, or instructions, then the Contractor shall correct Work incorrectly done at the Contractor's own expense.

C. Drawings and Specifications at the Site: The Contractor shall keep available at the site for ready reference a complete set of all Contract drawings, details, supplementary drawings, and approved shop drawings; and a complete copy of the specifications with all addenda, bulletins, amendments, and copies of Project correspondence.

D. As-Built: The Contractor shall maintain on the site a complete "as-built" record set of prints. In addition, the Contractor shall keep on the site, as required, a copy of each original equipment manufacturer’s current printed manual and recommendations. The Contractor shall also submit a copy of such materials to JWA upon receipt from manufacturer.

E. Shop Drawings:

1) When shop drawings or other drawings are required by the plans or specifications, or requested by the County, they shall be prepared in accordance with current modern engineering practice at the Contractor's expense. Drawings shall be of a size and scale to clearly show all necessary details and shall be transmitted by via Unifier to the County for approval or correction at least 30 days before approved drawings will be required for commencing the Work. Materials shall not be furnished or fabricated, nor any Work done for which drawings are required, before approval of the drawings.

2) When first submitted by the Contractor, each drawing shall be a good quality transparency accompanied by two prints. If approved without change or correction, then 3 approved copies on paper will be furnished to the Contractor. If extensive additions or corrections are required, then the County will return 1 marked-up copy to
the Contractor, together with the transparency, for correction and resubmission. Approved transparencies will be retained by the County.

3) Approval of drawings by the County shall not relieve the Contractor from the responsibility for errors or omissions in the drawings or from deviations from the Contract Documents unless such deviations were specifically called to the attention of JWA in a letter of transmittal submitted with the drawings. The Contractor shall be responsible for the correctness of the drawings, for shop fits and field connections, and for the results obtained by use of such drawings.

F. Deviations: Deviations from the drawings and the dimensions therein given, whether or not error is believed to exist, shall be made only after written authority is obtained from JWA.

7. DIVISIONS OF THE SPECIFICATIONS

A. For convenience, specifications are arranged in several divisions and sections, but such separations shall not be considered as the limits of the Work required for any subcontract or trade; the terms and conditions of such limitations are wholly between the Contractor and its Subcontractors, and the County will not be responsible for any division of Work by Subcontractors. The Contractor will be solely responsible for all subcontract arrangements of Work regardless of the location of provisions in the specifications.

B. Schedules of Work set forth or described in sections, where listed, are given for convenience only, and they shall not be considered as a comprehensive list of items or Work necessary to complete the Work of any section.

C. Where devices, items, or parts thereof are referred to in the singular, it is intended that such reference shall apply to as many such devices, items, or parts as are required to properly complete the Work.

D. Each section of the specifications is covered by applicable requirements of the Contract Documents and other related sections as if therein written.

8. SITE CONDITIONS

A. Existing Conditions: Information respecting the site of the Work given in drawings or specifications has been obtained by County's representatives and is believed to be reasonably correct, but the County does not warrant either the completeness or accuracy of such information, and it is the responsibility of the Contractor to verify all such information.

B. Changed Conditions: The Contractor shall immediately, and before any site conditions are disturbed, but in no event more than 3 days after the condition is first observed, notify JWA in writing of:
1) Subsurface or latent physical conditions at the site differing materially from those indicated in the Contract, or

2) Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in this Contract.

JWA shall immediately investigate the conditions and if, as a result, finds that such conditions do so materially differ and cause an increase or decrease in the Contractor's cost of, or the time required for performance of the Contract, then an equitable adjustment in accordance with General Conditions Section 16 - CHANGES herein below shall be made and the Contract modified in writing accordingly. Any claim of the Contractor for adjustment hereunder shall not be allowed unless it has given notice as above required.

C. Cooperation With Other Contractors: The Contractor shall cooperate with other contractors of the County and shall not commit or permit any act that will interfere with the performance of Work by any other contractor or employees of the County whether at the site or not.

9. CONDITIONS AFFECTING THE WORK

A. Nature and Location: The Contractor shall be responsible for having taken steps reasonably necessary to ascertain the nature and location of the Work, and the general and local conditions that can affect the Work or the cost thereof. Any failure by the Contractor to do so will not relieve it from responsibility for successfully performing the Work without additional expense to the County. The County assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of the Contract, unless such understanding or representations by the County are expressly stated in the Contract.

B. Rights-of-Way: Rights-of-way, easements, or rights of entry for the Work will be provided by the County. Unless otherwise provided, the Contractor shall make arrangements, pay for, and assume all responsibility for acquiring, using, and disposing of additional Work areas and facilities temporarily required. The Contractor shall indemnify and hold harmless the County, and its hired agents and representatives, if any, but not limited to, the Program Manager, Construction Manager, Project Controls Manager and Commissioning Agent from all claims for damages caused by such actions.

10. PROTECTION

A. The Contractor shall take proper safety and health precautions to protect the Work, all contractors and JWA employees, the public, and the property of others at the Project site. The Contractor shall comply with the provisions of the Contract Documents.
B. The Contractor shall continuously maintain adequate protection of all of its Work from damage and shall protect the County's property from injury or loss arising in connection with this Contract. The Contractor shall make good any such damage, injury, or loss, except such as may be directly due to errors in the Contract Documents or caused by agents or representatives of the County. The Contractor shall adequately protect adjacent property as provided by law and the Contract Documents, and shall maintain reasonable security of the site at all times. It shall limit visitors to the site to those necessary for construction and inspections.

C. In an emergency affecting the safety of life, the Work, or adjoining property, the Contractor, without special instruction or authorization from the A-E or County, is hereby permitted to act at its discretion to prevent such threatened loss or injury. The Contractor shall so act if directed or instructed by JWA. Any dispute as to compensation claimed by the Contractor because of emergency Work shall be determined by agreement as hereinafter set forth.

D. JWA may notify the Contractor of any noncompliance with the foregoing provisions and the action to be taken. The Contractor, after receipt of such notice, shall correct such conditions immediately. Such notices, when delivered to the Contractor or its representative at the site of the Work, shall be deemed sufficient for said purpose. Failure of receipt of such notice from JWA shall not relieve the Contractor of responsibility.

E. If Contractor fails or refuses to comply promptly with such notice or notices by JWA, then the County may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. None of any time lost due to any such stop order shall be made the subject of any claim for extension of time or for any additional cost or damage compensable to Contractor. The Contractor will be responsible for ensuring that its subcontractors comply with the provisions of this sub-paragraph.

11. OTHER CONTRACTS AND CONTRACTORS

A. Cooperation: The County may undertake or award other contracts for additional work, and the Contractor shall fully cooperate with such other contractors and County employees and carefully coordinate its Work with such additional work as may be directed by JWA. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by County employees. In case of any conflicts in the Work between the Contractor on the one hand, and JWA forces and/or other contractors on the other, that cannot be resolved satisfactorily, the matter shall be referred to JWA for its final determination.

B. Claims, Actions, Attorneys’ Fees and Costs: Should the Contractor cause damage to or delay the work or property of any separate contractor, the Contractor shall, upon due notice, make all reasonable and timely attempts to settle with such other contractor by agreement between them. If such separate contractor brings any action or proceeding against the County on account of any damage alleged to have been sustained as a result
of any act or omission by Contractor, then the County will notify the Contractor who shall defend such proceedings with the cooperation of County, and if any judgment against the County arises from such action or proceeding, then the Contractor shall pay or satisfy same to the extent caused by the fault of the Contractor and shall reimburse the County for all reasonable attorneys’ fees and court costs that the County has incurred.

12. BONDS

A. The Contractor shall furnish, for COUNTY’S approval, a surety bond that will protect the laborers and material suppliers in the amount of 100 percent of the Contract, amount in accordance with California Civil Code Section 3248, and a surety bond in the amount of 100 percent of the Contract amount, guaranteeing the faithful performance of the Contract. The bonds shall be submitted for COUNTY's approval, each in duplicate, within seven (7) calendar days of the Contract Award Date. Should the CONTRACTOR submit the documents on time, COUNTY will review each document for acceptance by COUNTY within fourteen (14) calendar days of receipt. Construction shall not commence until such bonds are approved by the COUNTY. Such bonds shall be in substantially the form provided in the Contract Documents. Failure of the Contractor to file acceptable bonds as provided herein shall be just cause for the forfeiture of the bidder’s bond or other bid guaranty for the project, and may constitute a material breach of this Contract. The time required for submission and review of the bonds is included within the Time of Completion. The CONTRACTOR shall not be entitled to any compensation or time extension for its failure to furnish acceptable bonds within the time prescribed above. The bonds must be approved by the Office of the County Counsel and the Office of the County Risk Manager.

Refer to other sections of the Contract Documents for additional bond requirements.

B. If any surety upon any bond furnished in connection with the Contract becomes unacceptable to the County, or if any such surety fails to furnish reports as to its financial condition from time to time as requested by the COUNTY or JWA, then the Contractor shall furnish such additional security as may be required by JWA or the Board of Supervisors from time to time to protect the interests of the County and of persons supplying labor or materials in the prosecution of the Work contemplated by the Contract.

13. INSURANCE

The CONTRACTOR shall furnish, for COUNTY's approval, acceptable Insurance Certificates within seven (7) calendar days of the Contract Award Date. Should the CONTRACTOR submit the documents on time, COUNTY will review each document for acceptance by COUNTY within fourteen (14) calendar days of receipt. Construction shall not commence until such insurance is approved by the COUNTY. Failure of the Contractor to file acceptable insurance shall be just cause for the forfeiture of the bidder’s bond or other bid guaranty for the Project and may constitute a material breach of this
Contract. The time required for submission and review of the insurance certificates is included within the Time of Completion. The CONTRACTOR shall not be entitled to any compensation or time extension for its failure to furnish acceptable insurance within the time prescribed above.

INSURANCE PROVISIONS

Prior to the provision of services under this contract, the Contractor agrees to purchase all required insurance at Contractor’s expense and to deposit with the COUNTY Certificates of Insurance, including all endorsements required herein, necessary to satisfy the COUNTY that the insurance provisions of this contract have been complied with and to keep such insurance coverage and the certificates therefore on deposit with the COUNTY during the entire term of this contract. The COUNTY reserves the right to request the declarations page showing all endorsements and a certified copy of the policy. In addition, all sub-contractors performing work on behalf of Contract pursuant to this contract shall obtain insurance subject to the same terms and conditions as set forth herein for Contractor.

Contractor shall ensure that all sub-contractors performing work on its behalf, pursuant to this agreement, shall be covered under Contractor's insurance as an Additional Insured or maintain insurance subject to the same terms and conditions as set forth herein for Contractor. Contractor shall not allow sub-contractors to work if sub-contractors have less than the level of coverage required by COUNTY from Contractor under this agreement. It is the obligation of Contractor to provide notice of the insurance requirements to every sub-contractor and to receive proof of insurance prior to allowing any sub-contractors to begin work. Such proof of insurance must be maintained by Contractor through the entirety of this agreement for inspection by COUNTY representative(s) at any reasonable time.

All self-insured retentions (SIRs) shall be clearly stated on the Certificate of Insurance. Any self-insured retention (SIR) in an amount in excess of Fifty Thousand Dollars ($50,000) shall specifically be approved by the County’s Risk Manager, or designee, upon review of Contractor’s current audited financial report. If Contractor’s SIR is approved, Contractor, in addition to, and without limitation of, any other indemnity provision(s) in this Agreement, agrees to all of the following:

1) In addition to the duty to indemnify and hold the COUNTY harmless against any and all liability, claim, demand or suit resulting from Contractor’s, its agents, employee’s or sub-contractor’s performance of this Agreement, Contractor shall defend the COUNTY at its sole cost and expense with counsel approved by Board of Supervisors against same; and

2) Contractor’s duty to defend, as stated above, shall be absolute and irrespective of any duty to indemnify or hold harmless; and

3) The provisions of California Civil Code Section 2860 shall apply to any and all actions to which the duty to defend stated above applies, and the Contractor’s SIR
provision shall be interpreted as though the Contractor was an insurer and the COUNTY was the insured.

If the Contractor fails to maintain insurance acceptable to the COUNTY for the full term of this contract, the COUNTY may terminate this contract.

**Qualified Insurer**

The policy or policies of insurance must be issued by an insurer with a minimum rating of A- (Secure A.M. Best's Rating) and VIII (Financial Size Category as determined by the most current edition of the *Best's Key Rating Guide/Property-Casualty/United States* or ambest.com). It is preferred, but not mandatory, that the insurer be licensed to do business in the state of California (California Admitted Carrier).

If the insurance carrier does not have an A.M. Best Rating of A-/VIII, the CEO/Office of Risk Management retains the right to approve or reject a carrier after a review of the company's performance and financial ratings.

The policy or policies of insurance maintained by the Contractor shall provide the minimum limits and coverage as set forth below:

<table>
<thead>
<tr>
<th>Coverage</th>
<th>Minimum Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial General Liability</td>
<td>$1,000,000 per occurrence</td>
</tr>
<tr>
<td></td>
<td>$2,000,000 aggregate</td>
</tr>
<tr>
<td>Automobile Liability including coverage for owned, non-owned and hired vehicles</td>
<td>$10,000,000 per occurrence</td>
</tr>
<tr>
<td>Workers’ Compensation</td>
<td>Statutory</td>
</tr>
<tr>
<td>Employers’ Liability Insurance</td>
<td>$1,000,000 per occurrence</td>
</tr>
<tr>
<td>Professional Liability Insurance</td>
<td>$1,000,000 per claims made or occurrence</td>
</tr>
<tr>
<td></td>
<td>$2,000,000 aggregate</td>
</tr>
</tbody>
</table>

**Required Coverage Forms**

The Commercial General Liability coverage shall be written on Insurance Services Office (ISO) form CG 00 01, or a substitute form providing liability coverage as broad.

The Business Auto Liability coverage shall be written on ISO form CA 00 01, CA 00 05, CA 00 12, CA 00 20, or a substitute form providing liability coverage as broad.
Required Endorsements

The Commercial General Liability policy shall contain the following endorsements, which shall accompany the Certificate of Insurance:

1) An Additional Insured endorsement using ISO form CG 2010 or CG 2033 or a form at least as broad naming the County of Orange, its elected and appointed officials, officers, employees and agents as Additional Insureds, or provide blanket coverage which shall state AS REQUIRED BY WRITTEN AGREEMENT.

2) A primary non-contributing endorsement using ISO form CG 20 01 0413, or a form at least as broad evidencing that Contractor’s insurance is primary and any insurance or self-insurance maintained by the County of Orange shall be excess and non-contributing.

The Workers’ Compensation policy shall contain a waiver of subrogation endorsement waiving all rights of subrogation against the County of Orange, its elected and appointed officials, officers, employees and agents, or provide blanket coverage which shall state AS REQUIRED BY WRITTEN AGREEMENT.

All insurance policies required by this Agreement shall waive all rights of subrogation against the County of Orange, its elected and appointed officials, officers, employees and agents when acting within the scope of their appointment or employment.

Contractor shall notify COUNTY in writing within thirty (30) days of any policy cancellation and ten (10) days for non-payment of premium and provide a copy of the cancellation notice to COUNTY. Failure to provide written notice of cancellation may constitute a material breach of the contract, upon which the COUNTY may suspend or terminate this Contract.

If Contractor’s Professional Liability policy is a "claims made" policy, Contractor shall agree to maintain Professional Liability coverage for Two (2) years following completion of contract.

The Commercial General Liability policy shall contain a severability of interests clause (standard in the ISO CG 001 policy).

Insurance certificates should be forwarded to the agency/department address listed on the solicitation. If the Contractor fails to provide the insurance certificates and endorsements within seven (7) days of notification by Project Manager or the agency/department Facilities Division, award may be made to the next qualified vendor.

COUNTY expressly retains the right to require Contractor to increase or decrease insurance of any of the above insurance types throughout the term of this Contract. Any increase or decrease in insurance will be as deemed by County of Orange Risk Manager as appropriate to adequately protect COUNTY.
COUNTY shall notify Contractor in writing of changes in the insurance requirements. If Contractor does not deposit copies of acceptable certificates of insurance and endorsements with COUNTY incorporating such changes within thirty (30) days of receipt of such notice, this Contract may be in breach without further notice to Contractor, and COUNTY shall be entitled to all legal remedies.

The procuring of such required policy or policies of insurance shall not be construed to limit Contractor’s liability hereunder or to fulfill the indemnification provisions and requirements of this Contract, nor act in any way to reduce the policy coverage and limits available from the insurer.

14. CHANGES

A. Change Orders

County may, at any time, by written order, and without notice to the sureties, make changes to the Contract Documents if within the general scope of the Work. If County desires a change in the Contract Documents, County will request a potential change order pricing. The request for a quote shall set forth in reasonable detail the nature of the change, whether additions, deletions, or other revisions to the Contract Documents. If such change causes an increase or decrease in the Contractor's cost or the time required for performance of the Agreement, an equitable adjustment shall be made and the Contract Sum and/or Time of Completion shall be modified in writing accordingly by a Change Order. Contractor shall expeditiously proceed to implement the changed Work described in the Change Order.

The execution of any Change Order by the Contractor shall resolve, satisfy, dispose of all claims against the County which are incidental to or as a consequence of the change unless expressly exempted. The Contractor agrees to execute the Change Order and Release, which shall be in a form substantially the same as the form attached hereto as Attachment A.

When the County requests a quote for a change, the County will have the right to select the basis of compensation in accordance with the pricing provisions found in this Section. The options will be: (1) lump sum change; (2) unit price change; or (3) time and materials change, all as defined in the following provisions.

B. Lump Sum Change Orders

Within seven (7) calendar days of receiving County's request for a quote for a lump sum change, Contractor shall present to County a detailed lump sum proposal for change in the Contract Sum and/or Time of Completion in a format satisfactory to the County. Contractor's proposal shall be itemized and supported with sufficient substantiating data including, but not limited to, detailed estimates, price quotes, and rate sheets to permit
evaluation with respect to the following costs for the all-inclusive Work associated with the change: services; labor; materials, supplies, equipment, and tools; machinery and equipment rental; all transportation, freight, shipping, and delivery; premiums for all bonds; sales, use or similar taxes related to the Work; and overhead and profit associated with the change, not to exceed the percentage mark-ups specified below relating to Time and Materials Change Orders.

Contractor's lump sum proposal shall not include a separate line item for "contingency", regardless of whether the contingency line item is stated as a percentage or a lump sum. Contractor's labor hours estimate shall cover all labor hours required to perform the changed Work, regardless of Contractor's uncertainty at the time it prepares its proposal about the actual number of hours that will be required. Contractor's estimate of materials cost shall include all materials costs, regardless of Contractor's uncertainty at the time it prepares its proposal about the materials costs involved in the changed Work. Contractor's proposal shall include itemized substantiating data from subcontractors of any tier that will be involved in performing the changed Work. Contractor shall submit its proposal with the supporting documentation into Unifier. County may approve, reject, or negotiate the Contractor's lump sum proposal and incorporate it into a Lump Sum Change Order.

Payments for lump sum change orders shall be based on the reported and County-approved percentage of completed work.

C. Unit Price Change Orders

Within seven (7) calendar days of receiving County's request for a quote for a unit price change, Contractor shall present to County a detailed unit price proposal for change in the Contract Sum and/or Time of Completion in a format satisfactory to the County. Unit Prices shall cover all direct and indirect costs of completing the changed Work and no mark-up for overhead and profit shall be applied on top of the Unit Prices. Contractor shall itemize and support with sufficient substantiating data to permit JWA to evaluate the following costs included within the Unit Prices for the all-inclusive Work associated with the change: services; labor; materials, supplies, equipment, and tools; machinery and equipment rental; all transportation, freight, shipping, and delivery; premiums for all bonds; and sales, use, or similar taxes related to the changed Work.

Contractor shall submit itemized substantiating data for the costs from subcontractors of any tier that will be involved in performing the changed Work. Contractor shall submit its proposal with the supporting documentation into the Unifier. County may approve, reject, or negotiate the Contractor’s unit price proposal.

Required Advance Notification, and Submission of Daily Statements for Unit Price Changes. The Contractor shall notify JWA and the County in writing before performing any unit price changes to the Work. COUNTY may issue a Work Authorization to Contractor indicating permission to commence performing the unit price changes.
COUNTY and Contractor will coordinate the monitoring and acceptance of unit price changes in the Work in the manner described in this Section, leading to COUNTY’S issuance of a Unit Price Change Order. The Contractor shall submit daily statements to the County, for acceptance by the County, showing all quantities provided, by line item, for the changed Work. The County shall review the daily statements to ensure that the Contractor has properly represented the quantities provided for the changed Work item(s). The daily statements shall be signed by the Contractor and by the County at the end of each work shift. However, the County's signature shall not preclude the County from thereafter conducting an audit with respect to the quantities provided, and making any appropriate adjustment based on such audit.

Accounting of Quantities Provided. Contractor shall keep and present, in such form as County may prescribe and into Unifier, an itemized accounting of the quantities provided attributable to the changed Work once completed, together with appropriate supporting data, including the signed daily statements. County will then issue a Unit Price Change Order adjusting the Contract Sum according to the unit prices incurred as determined permissible by the County and, if appropriate, adjusting the Time of Completion.

D. Time and Materials Change Orders

If County and Contractor do not reach an agreement on a lump sum or unit price amount for accomplishing any changed Work, or if the County so chooses, the County may direct the Contractor in writing to accomplish the changed Work on a time and materials basis. The Contractor shall proceed with the changed Work upon receiving County's written direction to perform the changed Work on a time and materials basis, regardless of whether the Contractor has submitted a proposal for the change or whether the County has issued the Change Order. The County shall determine the adjustment to the Contract Sum for time and materials changes on the basis of the actual costs described below:

1) **Cost of labor** (show actual total hourly rate multiplied by actual hours spent on changed Work, broken down by discipline). The costs of labor shall be not less than the wages prevailing for each craft or type of workers performing the changed Work at the time the changed Work is done. The costs of labor shall be based on the actual, fully burdened hourly rate paid by the Contractor and/or subcontractors for those workers who directly perform the changed Work, including employer’s payroll taxes, usual and customary fringe benefits, Worker’s Compensation insurance, and other costs resulting from Federal, State, and/or local laws. The costs of labor shall not include any amount for bonuses of any kind. The use of a labor classification that would increase the cost of changed Work will not be permitted unless Contractor establishes the necessity for such classification in performing the changed Work and its associated additional costs. Contractor shall report labor costs for equipment operators and helpers only when such costs are not included in the invoice for equipment rental. Contractor shall apportion the labor cost for foremen to all of their assigned Work and County will only pay the labor cost for foremen proportional to the changed Work. County will not pay any time charges for overtime hours worked
if the individual who worked the hours is not paid for the overtime worked. County will not pay any overtime or shift differential expense for hourly workers of Contractor or its subcontractors of any tier unless County approves the cost of the premium or differential before the cost is incurred. Indirect labor costs including supervision above the level of working foreman (such as general foreman, nonworking foreman, superintendent, project manager, etc.) shall be considered part of the mark-up for overhead and profit below.

2) **Cost of materials and supplies** (show actual unit cost multiplied by actual quantity). The cost of materials shall be at the lesser of either invoice price or the lowest current price at which such materials are locally available and delivered to the job site in the quantities involved, plus sales taxes, freight and delivery. Material costs shall reflect cost reductions available to the Contractor due to trade discounts, free material credits, and/or volume rebates. County reserves the right to approve materials and sources of supply or to supply materials to Contractor if necessary for the progress of the Work. No mark-up for overhead and profit shall be applied to any material provided by County or on any government imposed taxes or fees, including sales taxes and excise taxes.

3) **Tool and equipment rental.** County will not pay for the use of tools or equipment that have a replacement value of seven hundred and fifty dollars ($750) or less. Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental agencies or distributors at the time the changed Work is performed. The rental rates paid shall include the cost of fuel, oil lubrication, supplies, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. Necessary loading and transportation costs for equipment used on the changed Work shall be included. If equipment is used intermittently and, when not in use, could be returned to its rental source at less expense to County than holding it at the Work site, then Contractor shall return the equipment, unless Contractor elects to keep it at the Work site at no expense to County. All equipment shall be acceptable to County, in good working condition, and suitable for the purpose for which it is to be used. Manufacturers’ ratings and approved modifications shall be used to classify equipment and it shall be powered by a unit of at least the minimum rating recommended by the manufacturer. The reported rental time for equipment already at the Work site shall be the duration of its use on the changed Work, commencing at the time it is first put into actual operation on the changed Work. Contractor shall submit invoices for tool and equipment rental costs.

4) **Other Items.** County may authorize other items that may be required for the changed Work. Such items include labor, services, material, and equipment that are different in their nature from those required for the Work and that are of a type not ordinarily available from Contractor or any of its subcontractors. Contractor shall inform COUNTY of these items in advance of deploying them for the changed Work,
to allow COUNTY the time to consider such items. Contractor shall submit detailed invoices covering all such items.

5) **Overhead and profit.** If Contractor uses its own employees to perform the changed Work or any part thereof, then Contractor shall receive a maximum mark-up of 15% for overhead and profit on those Items 1 through 4 above.

If Contractor’s subcontractor performs the changed Work or any part thereof, then that subcontractor shall be entitled to a maximum mark-up of 15% on those Items 1 through 4 above that the Subcontractor performs, and the Contractor shall only be entitled to a maximum mark-up of 5% for its overhead and profit on the subcontractor's compensation. (as opposed to the direct cost of Items 1 thru 4 exclusive of Subcontractor’s overhead and profit).

6) **Bond.** 1% of items 1 through 5 above.

**Required Advance Notification, and Submission of Daily Statements for Time and Materials Changes.** The Contractor shall notify JWA and the County in writing prior to starting the performance of any time and materials changes to the Work. COUNTY may issue a Work Authorization to Contractor, indicating permission to commence performing the time and material changes. COUNTY and Contractor will coordinate the monitoring and acceptance of time and material changes in the Work in the manner described in this Section, leading to COUNTY’S issuance of a Time and Material Change Order. The Contractor shall submit daily statements to the County, for acceptance by the County, showing all labor (in the form of daily time sheets with names of all Contractor's and/or subcontractors employees performing the changed Work), materials, and equipment utilized for the changed Work. Daily time sheets will break down the paid hours worked by the Contractor's or subcontractors' employees showing time spent on both unchanged Work as well as changed Work performed by each employee. The County shall review the daily statements to ensure that the Contractor has properly represented: the number of labor and equipment hours and materials used for the changed Work; premiums for all bonds and insurance for the changed Work; sales, use, or similar taxes related to the changed Work; and overhead and profit associated with the changed Work calculated as set forth above. The daily statements shall be signed by the Contractor and by the County at the end of each work shift. However, the County’s signature shall not preclude the County from thereafter conducting an audit with respect to the labor, materials and equipment utilized, and making any appropriate adjustment based on such audit.

**Accounting of Costs or Savings.** Contractor shall keep and present, in such form as County may prescribe and into the Unifier, an itemized accounting of the costs or savings incurred attributable to the changed Work once completed, together with appropriate supporting data, including the signed daily statements. County will then issue a Time and Materials Change Order adjusting the Contract Sum according to
the actual costs incurred as determined permissible by the County and, if appropriate, adjusting the Time of Completion.

E. Credits

Regardless of whether the amount associated with changed Work is recorded through a Lump Sum Change Order, or Unit Price Change Order: (1) if the net value of a change to the Work results in a credit from the Contractor or its subcontractors, the credit given shall include costs as well as overhead and profit as described in Section above relating to Time and Materials Change Orders; and (2) if the net value of a change to the Work results in additional costs, overhead and profit will only be applied to the amount by which the added costs of the change exceed the credited amount.

F. Overhead and Profit

Regardless of whether the equitable adjustment associated with changed Work is recorded through a Lump Sum Change Order or a Time and Materials Change Order, the amount County pays for overhead and profit shall be Contractor's only compensation for profit and all indirect costs associated with the changed Work. Items intended to be covered by the overhead and profit mark-up include, but are not limited to: project management, all costs of supervision, superintendence, general foremen, nonworking foremen, and scheduling; wages of timekeepers, watchmen, and clerks; small tools (tools and equipment, power or non-power, with an individual purchase cost of less than seven hundred and fifty dollars ($750); incidentals; field and home office expenses and overhead of any kind; costs of estimating, and preparing change orders; administrative costs of coordinating, expediting, purchasing, and detailing of the changed Work; legal, accounting, data processing or other administrative expenses; shop drawings; permits; auto insurance and umbrella insurance; pick-up truck costs; warranty expense costs; all impact costs including but not limited to lost productivity associated with "learning curves", "productivity factors", and "ripple effects"; and all other expenses not included in itemized costs.

G. Request for Change Order

If the Contractor believes that a change order is needed, it shall submit a Request for a Change Order within 10 calendar days of the occurrence of the event giving rise to the change. The Contractor shall submit a Request for Change Order, in writing, which shall include a description of the proposed change in the Contract Documents, documentation of the event or circumstance giving rise to the need for the change, and any proposed change in the Contract Sum and/or Time of Completion. If Contractor determines it will be unable to submit a Request for Change Order within 10 calendar days of the occurrence of the event giving rise to the change, Contractor may request, in writing, from the County an extension of time to submit a Request for Change Order. Contractor must submit any request for extension within 5 calendar days of the occurrence of the
event or circumstance giving rise to the change. County, in its sole discretion, may grant or deny this request for extension of time to submit a Request for Change Order.

County will only grant Contractor's request for an extension of the Time of Completion if the Contractor submits a Time Impact Analysis clearly demonstrating: (1) the need for such change results from a delay for which the County is contractually responsible; and (2) the estimated impact of the delay on the Time of Completion of the Work. The Time Impact Analysis shall be based upon the Contract Baseline Schedule or (if applicable) most recent Contract Revised Baseline Schedule, and shall show that the delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of Work or other means. Upon the issuance of a Change Order changing the Time of Completion, the Contractor shall incorporate such change into a Contract Revised Baseline Schedule, in accordance with this Section on SCHEDULE of the General Requirements.

If County agrees that a change to the Contract Sum and/or Time of Completion is appropriate, then County may use the same options described in the "Lump Sum Change Orders," "Unit Price Change Orders," or "Time and Materials Change Orders" provisions set forth above.

If the County and the Contractor cannot agree that the change is appropriate, or cannot agree on the amount of the change, then the Contractor must submit a claim in accordance with the requirements set forth in this Section on PRESENTATION OF CLAIMS FOR MONEY AND/OR DELAY and/or the Section on RESOLUTION OF CLAIMS FOR $375,000 OR LESS below. The Contractor shall not be entitled to any damages, compensation, or other payment unless a claim is submitted.

In the event of a Claim or litigation arising from any disagreement involving Contractor's Request for a Change Order, Contractor's compensation shall be limited to an amount calculated in accordance with D. Time and Materials Change Orders, and F. Overhead and Profit provisions above.

H. Minor Changes in the Work

County shall have authority to order minor changes in the Work that are consistent with the intent of the Contract Documents and that do not involve an adjustment in the Contract Sum or an extension of the Time of Completion. Such changes shall be effected by written order and shall be binding on Contractor. Contractor shall carry out such written orders.

I. Accurate Change Order Pricing Information

Contractor is responsible for submitting accurate cost and pricing data on behalf of itself and its subcontractors of any tier to support its Lump Sum Change, Unit Price Change, and/or Time and Materials Change Order Proposals or other contract price adjustments.
under the Contract. Contractor further agrees to submit change order proposals with cost and pricing data which are accurate, complete, current, and in accordance with the terms of the Contract with respect to pricing of change orders.

J. **Right to Verify Change Order Pricing Information**

Any designated County representative will have the right to examine, copy, and/or scan the records of the Contractor and its subcontractors of any tier (during the Contract period and up to three years after final payment is made on the Contract) to verify the accuracy and appropriateness of the pricing data used to price all change order proposals and/or claims. If the County determines the cost and pricing data submitted by Contractor or its subcontractors of any tier (whether approved or not) was inaccurate, incomplete, outdated, or not in compliance with the terms of the Contract regarding pricing of change orders, County will make an appropriate adjustment to the Contract Sum. The County shall have the right to adjust the Contract Sum as a result of such cost and pricing data regardless of whether the changed Work was performed by Contractor or by its subcontractors of any tier, and regardless of the type of Change Order involved, whether lump sum, unit price, or time and materials.

15. **RESOLUTION OF CLAIMS OF $375,000 OR LESS**

A. **Claim Procedures**

California Public Contract Code Sections 20104, et seq., apply to all "public works claims" of $375,000 or less. The terms "public work" and "claim" are defined in California Public Contract Code Sections 20104(2)(b)(1) and (2), respectively. For public works claims of $375,000 or less, Contractor and County shall follow the steps set forth in the statute, which states:

"20104.2(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of final payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims."

"20104.2(b)(1) For claims of less than fifty thousand dollars ($50,000), the local agency shall respond in writing to any written claim within forty-five (45) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant."

"20104.2(b)(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant."

"20104.2(b)(3) The local agency’s written response to the claim, as further documented, shall be submitted to the claimant within fifteen (15) days after receipt of the further
documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater."

"20104.2(c)(1) For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the local agency shall respond in writing to all written claims within sixty (60) days of receipt of the claim, or may request, in writing, within 30 days of receipt of the claim any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant."

"20104.2(c)(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant."

"20104.2(c)(3) The local agency’s written response to the claim, as further documented shall be submitted to the claimant within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater."

"20104.2(d) If the claimant disputes the local agency’s written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within fifteen (15) days of receipt of the local agency’s response or within fifteen (15) days of the local agency’s failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute."

"20104.2(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process."

"20104.2(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code."

B. Civil Action Procedures
Contractor and County shall follow the procedures set forth in California Public Contract Code Section 20104.4 in connection with any civil action to resolve a public works claim of $375,000 or less. Section 20104.4 states:
"20104.4(a) Within sixty (60) days, but no earlier than thirty (30) days, following the filing or responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select mediation within the 15-day period, any party may petition the court to appoint the mediator."

"20104.4(b)(1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act (Title 4 (commencing with Section 2016.010) of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration."

"20104.4(b)(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds."

"20104.4(b)(3) In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedures, any party who after receiving an arbitration award, requests a trial de novo, but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney’s fees of the other party arising out of the trial de novo."

"20104.4(c) The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process."

16. PRESENTATION OF CLAIMS FOR MONEY AND/OR DELAY

“Claim” means a separate demand by the Contractor for (A) a delay and/or extension of time, (B) payment of money or damages arising from work done by, or on behalf of the Contractor related to the Scope of Work, payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to, or (C) any amount the payment of which is disputed by the County. If the County rejects any request for a Change Order, which includes any of the above-mentioned demands, the Contractor shall then be required to submit a separate “Claim” within 20 calendar days following that rejection, in accordance with the requisites of this clause.
Contractor shall not be entitled to payment for any Claim unless it shall have first given written notice to the County, within 20 calendar days following the commencement of each such condition or cause generating the Claim, which describes the reason for the Claim, the work impacted, and the duration of any delay. The Claim shall include all documentation supporting any amount claimed and/or the basis for any claimed delay and/or extension of time. Contractor shall submit a final Claim for the record no later than 30 calendar days after the County responds in writing rejecting, or rejecting in part, the Claim. Contractor may not thereafter increase the amount of its final Claim and/or request any additional extension of time beyond that stated in its final Claim. No Claim shall be allowed which does not comply with these requirements. These time limits and requirements shall not be extended or superseded by the provisions of the Public Contract Code Section 20104.2(a) set forth in Clause 16 – “Resolution of Claims of $375,000 or Less.”

17. WAIVER OF CLAIMS

The acceptance by Contractor of the final payment shall constitute a waiver of all claims against County under or arising out of this Agreement except those previously made in writing and identified by Contractor as unsettled at the time of its final request for payment.

18. ORAL MODIFICATION

No oral statement of any person shall in any manner or degree, modify or otherwise affect the terms of the Contract.

19. MATERIAL, WORKMANSHIP, AND ACCEPTANCE

A. General. All materials, parts, and equipment furnished by the Contractor in the Work shall be new, and free from defects. Contractor shall perform all Work shall be in good and workmanlike fashion. Materials and Work quality shall be subject to JWA’s approval.

Material and Work quality not conforming to the requirements of the specifications shall be considered defective and will be subject to rejection. Defective Work or material, whether in place or not, shall be removed immediately from the site by the Contractor, at its expense, when so directed by JWA.

If the Contractor fails to replace any defective or damaged Work or material after reasonable notice, then JWA may cause such Work or materials to be replaced. The replacement expense shall be deducted from the amount to be paid to the Contractor.

Used or secondhand materials, parts, and equipment may be used only if permitted by the specifications.
B. Standard Specifications. Where materials are specified by reference to standard specifications of the American Society for Testing Materials (ASTM), Federal Specifications, or others, all applicable provisions of the designated specifications shall be considered as forming a part of the Contract Documents to the same force and effect as if repeated therein.

C. Skill. All Work under the Contract shall be performed in a skillful and workmanlike manner. JWA may require, in writing, the Contractor to remove from the Work any employee of the Contractor that JWA deems incompetent, careless, or otherwise objectionable.

D. Replacement of Materials. The Contractor shall, without charge, replace any material or correct any workmanship found by JWA not to conform to the Contract requirements, unless in the public interest JWA consents to accept such material or workmanship with an appropriate adjustment in Contract Sum. The Contractor shall immediately segregate and remove rejected material from the premises.

If the Contractor does not immediately replace rejected material or correct rejected workmanship, then the County (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor, or (2) may terminate the Contractor's right to proceed in accordance with the Termination for Default & Damages for Delay.

E. Acceptance by County. Unless otherwise provided in the Contract, acceptance by the County shall be accomplished by recordation of Notice of Completion, which shall be made as soon as practicable after completion and inspection of all Work required by the Contract including delivery of complete and properly prepared “as-built” and received plans and specifications Operations and Maintenance (O & M) Manuals, and all warranties and guarantees by the Contractor as well as individual Subcontractors. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the County's rights under any warranty or guarantee. Informal procedures, such as "punch lists," are not to be deemed final or conditional acceptance.

20. PROSECUTION, PROGRESS, AND ACCEPTANCE OF THE WORK

A. The Contractor's Representative

Before starting the Work, the Contractor shall designate, in writing, a representative who shall have complete authority to act for it at the jobsite. An alternate representative may be designated. The representative or alternate shall be present at the Work site whenever Work is in progress or whenever actions of the elements necessitate its presence to take measures necessary to carry out the intentions of the primary representative if necessary.
B. Delays and Extensions of Time

1) General. If delays are caused by unforeseen events beyond the control of the Contractor, then such delays will entitle the Contractor to an extension of time as provided herein, but the Contractor will not be entitled to damages or additional payment due to such delays, unless expressly provided in these General Conditions Clause 16 - CHANGES. Such unforeseen events may include war; government regulations; labor disputes; strikes; fires; floods; extraordinarily adverse weather necessitating cessation of Work; other similar action of the elements; inability to obtain materials, equipment, or labor as a result of the above unforeseen events or other extenuating circumstances beyond the control of the Contractor; or other specific events as may be further described in the specifications. No extension of time will be granted for a delay caused by the Contractor's inability to obtain materials unless the Contractor furnishes to JWA documentary proof of the inability to obtain such materials in a timely manner in accordance with the sequence of the Contractor's operations and the approved construction schedule. If delays beyond the Contractor's control are caused by events other than those mentioned above, but substantially equal in gravity to those enumerated, and an extension of time is deemed by JWA to be in the best interests of the County, then an extension of time may be granted, but the Contractor will not be entitled to damages or additional payment due to such delays.

2) Extensions of Time. Extensions of time, when granted, will be based upon the effect of delays to the Work and will not be granted for non-controlling delays to minor portions of the Work unless it can be shown that such delays did or will delay the progress of the Work.

C. Right to Stop Work

If Contractor fails to correct Work which is not in conformance with the requirements of the Contract Documents, or carry out Work in accordance with the Contract Documents, or for any cause whatsoever, JWA may, in its sole discretion, order the Contractor to stop Work, or any portion of the Work, until such failure on the part of the Contractor has been corrected to the satisfaction of JWA or until the Contractor has fully complied with the requirements of any written notice or directive by JWA. A stoppage of work by JWA under this clause shall not inure to the benefit of the Contractor. No compensation or time extension shall be granted by JWA arising from the stoppage of Work under this paragraph. If the Contractor fails to properly provide for public safety, traffic, and protection of the Work during any stoppage of work, then the County may elect to do so and deduct the cost thereof from monies due the Contractor. Such actions will not relieve the Contractor from liability.

D. Right to Carry Out Work
If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents in any manner, JWA may, at its sole discretion, order the Contractor to correct such default or neglect. If the Contractor fails to commence and continue, diligently and promptly, the correction of such deficiencies within the time specified in any notice issued by JWA, JWA may correct such deficiencies by any means acceptable to it, without prejudice to other remedies available to JWA. JWA may issue a change order, in accordance with Section 16 - CHANGES above for the costs incurred by JWA in correcting the Work, either by its own forces, if applicable, or by others. JWA may immediately withhold and deduct such amounts necessary to perform the correction work from amounts due and owing the Contractor. If amounts due and owing the Contractor by JWA are insufficient to cover the amount incurred by JWA for the correction Work, the Contractor and/or its surety shall immediately pay such amounts to JWA.

E. Right to Accept Non-Conforming Work

JWA may, in its sole discretion, determine that the correction of any defective, deficient, or non-conforming Work is undesirable or impracticable to the County. Upon such a determination and direction by JWA, the Contract Sum shall be reduced by an amount reasonably representing the value of County’s acceptance of such defective, deficient, or non-conforming Work.

F. Completion and Acceptance

The Work will be inspected by JWA for acceptance upon receipt of the Contractor's written assertion that the Work has been completed. If in JWA's judgment, the Work has been completed and is ready for acceptance in accordance with the conditions of Section 20 – MATERIAL, WORKMANSHIP, AND ACCEPTANCE above, then JWA will record a Notice of Completion.

21. TERMINATION FOR DEFAULT & DAMAGES FOR DELAY

A. If the Contractor refuses or fails to prosecute the Work with such diligence as will ensure its completion within the time specified in the Contract or any extension thereof; fails to complete said Work within such time; files a petition in bankruptcy; makes a general assignment for the benefit of its creditors; a receiver is appointed on account of Contractor’s insolvency; persistently or repeatedly refuses or fails to provide enough properly skilled workers or proper materials to timely complete the Work; is persistently or repeatedly absent, without excuse, from the site; fails to make prompt payment to subcontractors for materials or labor; has committed a material breach of any provision of the Contract Documents; or is not complying with the Contract Documents, then the Board of Supervisors may, by written notice to the Contractor, terminate Contractor's right to proceed with the Work or such part of the Work as to which there has been delay. In such event, the County may take over the Work and prosecute the same to completion, by contract or by use of its own forces, and may take possession of and utilize in completing the Work such materials, appliances, and Project facilities as may be on the
site of the Work and necessary. Whether or not the Contractor's right to proceed with the Work is terminated, the Contractor and its sureties shall be liable for any damage to the County resulting from its refusal or failure to complete the Work within the specified time.

B. If the County terminates the Contractor, then the resulting damage will consist of such liquidated damages through final completion of the Work by the County, any increased costs incurred by the County in completing the Work, and all other allowable damages.

C. The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

1) The delay in the completion of the Work arises from causes beyond the control and without the fault or negligence of the Contractor or the Contractor's agents, employees, Subcontractors, and suppliers including, but not restricted to: acts of God; acts of the public enemy; fires; floods; epidemics; quarantine restrictions; freight embargoes; other than normal weather; and

2) The Contractor shall immediately notify JWA in writing of the causes of delays to the Contract. JWA shall ascertain the facts and the extent of the delay and extend the time for completing the Work when, in its judgment, the delay is justified.

D. The rights and remedies of the County provided throughout this Section are in addition to any other rights and remedies provided by law or under the Contract.

22. TERMINATION FOR CONVENIENCE OF THE COUNTY

A. The Contractor's performance of Work under the Contract may be terminated from time to time or in part by the County as provided herein below whenever the Board of Supervisors determines that such termination is in the best interest of the County. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of Work under the Contract is terminated, and the date upon which such termination becomes effective.

B. After receipt of a Notice of Termination, and except as otherwise directed by the Board of Supervisors, the Contractor shall:

1) Stop Work under the Contract on the date and to the extent specified in the Notice of Termination.

2) Place no orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the Work under the Contract as is not terminated.
3) Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination.

4) Assign to the County, all of the right, title, and interests of the Contractor under the orders and subcontracts so terminated, in which case the County shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts.

5) Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, subject to the approval of the Board of Supervisors.

6) Complete performance of such part of the Work as shall not have been terminated by the Notice of Termination.

7) Take such action as may be necessary, or as JWA may direct, for the protection and preservation of the property related to the Contract that is in the possession of the Contractor and in which the County has, or may acquire, interest.

8) Submit to JWA a verified termination claim. Such claim shall be submitted not later than 60 days from the effective date of termination, unless one or more extensions in writing are granted by the Board of Supervisors upon request of the Contractor made in writing within such 1-year period or authorized extension thereof.

C. The Contractor and JWA shall attempt to agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of Work pursuant to this Section, which amount or amounts may include a reasonable allowance for profit on Work done; provided, that such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total Contract Sum as reduced by the amount of payments otherwise made and as further reduced by the Contract Sum of Work not terminated. The Contract shall be amended accordingly, and the Contractor shall be paid the agreed amount.

23. SUSPENSION OF WORK

A. County's Options

County may, without cause, at any time by written notice to Contractor suspend further performance of all or any portion of the Work by Contractor for such period of time as the County may determine in its sole discretion. The notice of suspension shall specify the date of suspension and the estimated duration of the suspension. Upon receiving any such notice of suspension, Contractor shall promptly suspend further performance of the Work to the extent specified, and during the period of such suspension shall properly care for and protect all work in progress and information, materials, supplies, and equipment that Contractor has on hand for performance of the Work.
Upon the request of County, Contractor shall promptly deliver to County copies of outstanding purchase orders, agreements, and subcontracts of Contractor for materials, equipment, and services for the Work, and shall take such action relative to such purchase orders, agreements, and subcontracts as may be directed by County. The Contractor shall insert in each subcontract a provision that the Subcontractor shall comply immediately with a written notice issued by the County to the Contractor to suspend the Work, and that they shall further insert the same provision in each subcontract of any tier.

The County may at any time withdraw the suspension of performance of the Work as to all or part of the suspended work by written, verbal, or facsimile, or email notice to Contractor specifying the effective date and scope of withdrawal, and Contractor shall resume diligent performance of the work for which the suspension is withdrawn on the specified effective date of withdrawal.

B. Compensation Related to Suspension Without Cause

If the County orders a suspension without cause under this Section and that causes the Contractor to incur increased cost for the performance of the Work, an adjustment to the Contract Sum shall be made for costs that are directly attributable to such suspension. If such suspension causes a delay to the critical path of the Work an adjustment shall be made to the Time of Completion in accordance with Section 2 - SCHEDULE of the General Requirements.

The Contractor shall maintain complete and accurate daily written records of all costs attributable to such suspension, delay or interruption, clearly distinguishing them from the costs of other portions of the Work, and shall submit a detailed written report of such costs to the County within 30 days of incurring the delay. Failure to comply shall result in waiver by the Contractor to any claims for an adjustment in the Contract Sum and/or Time of Completion.

No suspension or withdrawal of suspension shall entitle Contractor to any prospective profits or other consequential losses or damages of any kind resulting from such suspension or withdrawal of suspension.

No adjustment shall be made under this Section for any suspension to the extent that the Contractor’s performance would have been so suspended, delayed or interrupted by any other cause for which the Contractor would not be entitled to an increase in the Contract Sum or in the Contract Time, including the fault or negligence of, or breach of contract by, the Contractor.

24. COUNTY OCCUPANCY

A. The County may, at any time, and from time to time, during the performance of the Work, enter onto, occupy, or use the Work area, or any portion thereof, for the purpose of performing facilities maintenance, installing any necessary work by JWA labor or other
contracts, performing operational readiness testing, training, commissioning and start-up work, and for any other work in connection with airport operations, and for any other purpose in connection with the Work. In doing so, the County shall endeavor not to interfere with the Contractor, and the Contractor shall not interfere with other work being done by or on behalf of the County. Such temporary occupancy shall not be considered, and is distinguished from, a beneficial occupancy as set forth below.

B. If, prior to completion and final acceptance of all the Work, the County takes possession of the Project site (whether completed or otherwise) comprising a portion of the Work with the intent of retaining possession thereof (as distinguished from temporary possession contemplated the return to the Contractor), then, while the County is in possession of the same, the Contractor, notwithstanding its normal responsibilities, shall be relieved of liability for loss or damage to Project site other than that resulting from the Contractor's fault or negligence. Such taking of possession by the County shall not relieve the Contractor from any provisions of this Contract respecting such Project site, other than to the extent specified in the preceding sentence, nor constitute a final acceptance by the County of the Work.

25. PATENT INFRINGEMENT

A. The Contractor shall report to JWA, and in reasonable detail, each notice or claim of patent infringement based on the performance of the Contract of which the Contractor has knowledge.

B. In the event of any suit against the County, or any claim against the County made before suit has been instituted, on account of any alleged patent infringement arising out of the performance of the Contract, or out of the use of any supplies furnished or Work or services performed hereunder, the Contractor shall, at its own expense, furnish to the County, upon request, all evidence and information in possession of the Contractor pertaining to such suit or claim. The Contractor further agrees to indemnify and hold harmless the County, including its agents, and representatives, against any and all claims or lawsuits based upon such patent infringement, to defend such suits, and to pay any judgment rendered against County, its employees, or the Board of Supervisors.

26. NO WAIVER BY COUNTY

The failure of the County in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred, shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion.

27. PAYROLL RECORDS

Pursuant to the provisions of California Labor Code Section 1776:
A. The Contractor and each Subcontractor performing any portion of the Work under the Contract shall keep an accurate record, showing the name, address, social security number, work classification, straight time and overtime hours for each day and work week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by it in connection with the Work.

B. Said payroll records of Contractor and each Subcontractor shall be certified and shall be available for inspection at the principal office of the Contractor on the basis set forth in California Labor Code Section 1776.

C. The Contractor shall file a certified copy of said payroll records with the County within 10 days after receipt of a written request from JWA or otherwise from the County.

D. The Contractor shall inform the County of the location of said payroll records, including the street address, City, and County, and, within 5 working days, shall provide a notice of change of location and address of said payroll records.

E. It shall be the responsibility of the Contractor to ensure compliance by itself and its Subcontractors with the provisions of this Section and the provisions of California Labor Code Section 1776.

F. In the event of noncompliance with the requirements of this Section or the requirements of California Labor Code Section 1776, the Contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respect it must comply. Should noncompliance exist after said 10-day period, the Contractor shall, as a penalty to the County, forfeit $50 for each calendar day, or portion thereof, for each worker to whom the noncompliance pertains, until strict compliance is effectuated. The Contractor acknowledges that, without limitation as to other remedies of enforcement available to the County, upon the request of the Division of Apprenticeship Standards of the Division of Labor Standards Enforcement of the California Department of Industrial Relations, such penalties shall be withheld from progress payments then due the Contractor.

28. WAGE RATE PENALTY
Pursuant to the provisions of California Labor Code Section 1775, the Contractor shall forfeit to the County, as a penalty, the sum of $50.00 for each calendar day, or portion thereof, for each laborer, worker, or mechanic employed, paid less than the stipulated prevailing rates for Work done under the Contract, by Contractor or by Subcontractors, in violation of the provisions of the Contract.

29. WORK HOUR PENALTY
Eight hours of labor constitute a legal day's work, and 40 hours shall constitute a legal week's work. Pursuant to California Labor Code Section 1813, the Contractor shall forfeit to the County $25.00 for each worker employed in the execution of the Contract by the
Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to Work more than the legal day's or week's work, except that Work performed by employees of said Contractor and Subcontractors in excess of the legal limit shall be permitted without the foregoing penalty upon the payment of compensation to the workers for all hours worked in excess of 8 hours per day of not less than 1.5 times the basic rate of pay.

30. APPRENTICES

A. The Contractor acknowledges and agrees that, if the Contract involves a dollar amount greater than or a number of working days greater than that specified in California Labor Code Section 1777.5, then the Contract is governed by the provisions of California Labor Code Section 1777.5. It shall be the responsibility of the Contractor to ensure compliance with this subparagraph and with California Labor Code Section 1777.5 for all apprenticable occupations.

B. Pursuant to California Labor Code Section 1777.5, if that Section applies to the Contract as indicated above, then the Contractor and any Subcontractors under it employing workers in any apprenticable craft or trade in performing any Work under the Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

C. Pursuant to California Labor Code Section 1777.5, if that Section applies to the Contract as indicated above, then the Contractor and Subcontractor under it may be required to contribute to the apprenticeship program.

D. The Contractor and all Subcontractors shall comply with California Labor Code Section 1777.6 which forbids certain discriminatory practices in employment of apprentices.

31. NONDISCRIMINATION

In performing the Contract and all applicable terms thereof, the Contractor agrees that it will not engage in nor permit such Subcontractors as it may employ to engage in discrimination against any employee or application for employment on the basis of race, sex, color, religion, ancestry, national origin, marital status, age, or as an otherwise qualified handicapped individual. In the event facilities are constructed, maintained, or otherwise operated for a purpose for which a United States Department of Transportation program or activity is extended, Contractor shall comply with all requirements imposed pursuant to 49 CODE OF FEDERAL REGULATIONS, Part 21, Subtitle A, Nondiscrimination in Federally Assisted Programs of the Department of Transportation-Effectuation of Title VI of the CIVIL RIGHTS ACT OF 1964, and as said Regulations may be Amended. This prohibition shall pertain to employment, upgrading, demotion, or transfer; recruitment advertising; layoff or termination; rates of pay and other forms of
compensation; selection for training, including apprenticeship; and any other action or inaction pertaining to employment matters.

32. ASSIGNMENT OF UNFAIR BUSINESS PRACTICES CLAIMS

In accordance with California Public Contract Code Section 7103.5, by entering into the Contract or into a subcontract to supply goods, services, or materials pursuant to the Contract, the Contractor or Subcontractor offers and agrees to assign to the County all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 United States Code [U.S.C.] Sec.15) or under the Cartwright Act (Chapter 2 [commencing with Section 16700] of Part 2 of Division 7 of the California Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the Contract or the subcontract. This assignment shall be made and become effective at the time the County tenders final payment to the Contractor without further acknowledgment by the parties. The Contractor shall cause to be inserted in any such subcontract stipulations to effect the provisions of this paragraph and the provisions of California Public Contract Code 7103.5.

33. SUBSTITUTED SECURITY

In accordance with California Public Contract Code Section 22300, the County will, at the request and expense of the Contractor, accept securities equivalent to any amount withheld by the County to ensure performance under the Contract. Such substituted security must meet the requirements of said Section 22300 and shall be deposited with a California or federally chartered bank as escrow agent. The security shall be held by the escrow agent subject to a written escrow agreement between County, Contractor, and escrow agent, which said agreement shall be in a form substantially similar to that contained in California Public Contract Code Section 22300.

34. PUBLIC SAFETY

The Contractor shall have at the Work site, copies or suitable extracts of Construction Safety Orders and General Industry Safety Orders issued by the State Division of Industrial Safety. The Contractor shall comply with provisions of these and all other applicable laws, ordinances, and regulations.

Payment for performing all Work necessary to provide safety measures shall be included in the prices bid for other items of Work, except where separate bid items for excavation safety are provided.

35. PUBLIC RELATIONS
All inquiries of any kind pertaining to the Project, presented to the Contractor in any form including, but not limited to, written or oral requests, and originating from any media source, such as the press and other print publications, television or radio networks, the World Wide Web, or instruments thereof, community or public interest groups, or any other limited or mass media systems, shall be immediately referred by the Contractor to JWA. The Contractor and its Subcontractors shall not disseminate information on behalf of the County or JWA pertaining to the nature, scope, or details of the Project without the prior specific written consent of JWA.

The Contractor shall not release information in any manner or form on behalf of the County or JWA pertaining to the nature, scope, or details of the Project in any organized public or private event, setting, or ceremony without the prior specific written consent of JWA.

The Contractor and any of its Subcontractors at any tier shall not publish, or allow to be published, any press releases without prior written authorization from County.

36. JWA INFORMATION TECHNOLOGY REQUIREMENTS

A. The COUNTY shall provide connection to its Information Technology network in support of Contractor’s required access to JWA's Electronic Project Management System, Oracle Primavera Unifier (Unifier).

B. The Contractor shall submit to the COUNTY a JWA User Access Request Form within seven (7) days following Contract Award. The JWA User Access Request Form is required for each employee requiring access to Project documentation, including, but not limited to correspondence, monthly reports, schedules, RFIs, daily reports, payment requests, deliverables/submittals, change documentation, plans and drawings, and all other communication.

C. For each user, JWA will create a user ID with approved access rights and provide an initial password to the user in a secure manner. As remote users, the CONTRACTOR's employees shall acknowledge and comply with JWA's Portal Usage Policy as herein provided.

D. Such internet connection will allow the CONTRACTOR secured access to JWA’s Electronic Project Document Management System.

E. The CONTRACTOR shall utilize Unifier as the predominant means of communication with JWA and its representatives for all Project documentation.

F. JWA Process for Gaining Access and Using Unifier and Other Allowable Information Technology Domains.

Contractor shall complete and submit the following forms to obtain equipment, software, and/or access to JWA systems:

- IT Usage Policy Acknowledgement
- User Access Request Form – Non-COUNTY Employees

User shall fill out the User Information section, Sections 2, 3, 4 if applicable and then sign within Section 5. The User Access Request Form will not be processed without user’s company manager’s signature in Section 6. User then submits the form to the JWA Project Manager. The JWA Project Manager will then obtain the JWA Manager’s signature in Section 6 to begin processing the request through JWA IT Section.

For Unifier access, new companies may take as long as a week to process; existing companies with new access requests should only require one to three business days to process. Once processed, the requestor will receive two separate e-mails from the JWA IT Section. The first will have the user’s user name and the other will have the password, respectively. The first time the user logs on the web-based application user will be required to reset the password and configure settings.

2) Help Desk.

If user experience any errors or have difficulties with any of the equipment/software, a request must be submitted to the Help Desk at (949) 852-4004. User will need to provide name, e-mail, phone number, location, and a brief description of the problem. Once the information is entered into the system, a call ticket will be created and sent to a JWA IT representative, who will contact user within one to three business days.

G. JWA will provide Unifier training upon receipt of the JWA User Access Request Form(s).

1) Unifier Training.

For Unifier training, Contractor shall coordinate with the Project Manager to schedule a time and date.

User’s account will be deactivated if user does not log on within a 30 day period. To reactive the account, user shall submit a help desk request for Unifier reactivation. Also, after 4 failed attempts to log on user will be locked out of Unifier. To unlock the account and re-set password the user must call in a help desk request.

2) Access to Unifier Document Manager.

If access is needed to a folder in Unifier Document Manager, Contractor shall contact the Project Manager.
37. WRITTEN NOTICE

Written notices required to be given in part of the Contract documents shall be performed by depositing the same in the U.S. Mail, postage prepaid, to the address of the CONTRACTOR as set forth in the contract documents, and to the County addressed as follows:

Airport Director
John Wayne Airport
3160 Airway Avenue
Costa Mesa, CA 92626

END OF GENERAL CONDITIONS
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GENERAL REQUIREMENTS

1. GENERAL

1.1. DEFINITIONS

As used herein in the Contract Documents, the following terms shall have the meaning set forth below:

A. AS DIRECTED

Where the terms “as directed,” “as required,” “as permitted,” “approval,” “acceptance,” or similar words are used, it shall be understood that direction, requirement, permission, approval, or acceptance of the John Wayne Airport (JWA) Director and/or its designated representative is intended unless stated otherwise.

B. AS SHOWN

Where the terms “as shown,” “as detailed,” or similar words are used, it shall be understood that reference is made to the drawings, if any, accompanying this instrument unless stated otherwise.

C. ENVIRONMENTAL LAW(S) shall mean any federal, state, or local law, statute, ordinance, code, judgment, or orders pertaining to the environment, hazardous materials or substances, pollutants, or occupational safety and health, and includes, without limitation, the following:

1) Clean Air Act, 42 USCA 7401, et seq.
2) Clean Water Act, 33 USCA 1251, et seq.
6) Oil Pollution Act of 1990, 33 USCA 2701 et seq.
8) Federal Water Pollution Control Act, 33 U.S.C. 1317, et seq.
9) California Health and Safety Code Sections 25100 et seq., 25395.7 et seq., 25915, et seq.
10) California Water Code Section 1300 et seq.
12) Storm Water Discharge Rules, 40 CFR, 122.26, 122.30-37.
13) All other state laws, rules, orders, directives, codes, regulations, judgments, and amendments thereto relating to (i) emissions, discharges, releases, or threatened releases of hazardous substances into the environment including, but not limited to, ambient air, surface water, groundwater, land surface or subsurface strata; and (ii) the manufacture, processing, distribution, use, generation, treatment, storage, disposal, transport or handling of hazardous substances.

D. FACILITY shall mean any establishment, structure, or assembly of units or equipment designated for a specific function.

E. GENERAL SERVICES shall mean any various incidental requirements of a non-maintenance, non-construction nature.

F. HAZARDOUS MATERIAL(S) shall mean any hazardous or toxic substance, pollutant, contaminant, particulate, radiation, chemical or waste that is considered under California or Federal law, regulations, or guidance to be hazardous to human health or safety or the environment including, without limitation, all of those substances that are listed or defined as “pollutants,” “contaminants,” “hazardous materials,” “hazardous wastes,” “hazardous substances,” “toxic substances,” “radioactive materials,” “solid wastes,” or other similar designations pursuant to Environmental Laws referred to above including, without limitation, petroleum, including crude oil or any fraction thereof; any petroleum product; asbestos and asbestos-containing materials (ACMs); polychlorinated biphenyls (PCBs); mold or mold spores and gases from mold or mold spores; flammable or explosive substances; or substances designated by any governmental entity to cause cancer and/or reproductive toxicity.

G. MAINTENANCE shall mean recurring day-to-day, periodic, or scheduled Work required to preserve or restore real property, or structures thereon, or equipment to such a condition that it may be effectively utilized for its designated purpose. The term includes Work undertaken to prevent damage that otherwise would be more costly to restore, but specifically excludes alterations, improvements, and upgrading that would modify or change the nature of such real property, structures, and/or equipment.

H. NIGHT WORK HOURS shall mean the curfew hours for airline traffic at JWA from 11:00 PM to 6:00 AM during which time all Work within the runway and/or taxiway safety areas or Work involving power or auxiliary systems outages must be performed.
I. NON-STORM WATER DISCHARGE means any discharge to storm water drainage systems that is not entirely composed of storm water.

J. NPDES PERMIT (National Pollutant Discharge Elimination System) shall mean the currently applicable discharge permit(s) issued by the Regional Water Quality Control Board (RWQCB), Santa Ana Region, which establishes waste discharge requirements applicable to storm runoff within the County and JWA.

K. OPERATION shall mean actions required by a qualified mechanic or technician to start up, observe, control, adjust, optimize, and shut down equipment or utility systems under normal or emergency conditions as required herein and includes all minor incidental maintenance and completion of all required logs and reports.

L. POLLUTANT shall mean any liquid, solid, or semi-solid substances, or combination thereof including, but not limited to:

1) Artificial materials (e.g., floatable plastics, wood products, or metal shavings);

2) Household waste (e.g., trash, paper, and plastics; cleaning chemicals, yard wastes, animal fecal materials, used oil and fluids from vehicles, lawn mowers, and other common household equipment);

3) Metals and nonmetals, including compounds of metals and nonmetals (e.g., cadmium, lead, zinc, copper, silver, nickel, chromium, cyanide, phosphorus, and arsenic) with characteristics that cause an adverse effect on living organisms;

4) Petroleum and related hydrocarbons (e.g., fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease);

5) Unusual coloration, turbidity, or odor;

6) Materials causing an increase in biochemical oxygen demand, chemical oxygen demand, or total organic carbon;

7) Materials that contain base/neutral or acid extractable organic compounds;

8) Those pollutants defined in Section 1362(6) of the Federal Clean Water Act; and

9) Any other constituent or material including, but not limited to, pesticides, herbicides, fertilizers, fecal coliform, fecal streptococcus or enterococcus, or eroded soils, sediment, and particulate materials, in quantities that will interfere with or adversely affect the beneficial uses of the receiving waters, flora, or fauna of the State.
M. PROHIBITED DISCHARGE shall mean any discharge that contains any pollutant, from public or private property to (i) the storm water drainage system; (ii) any upstream flow, which is tributary to the storm water drainage system; (iii) any groundwater, river, stream, creek, wash or dry weather arroyo, wetlands area, marsh, coastal slough; or (iv) any coastal harbor, bay, or the Pacific Ocean.

N. JWA PROJECT MANAGER shall mean an individual designated by, and representing, JWA for managing the Project.

O. QUALITY ASSURANCE (QA) shall mean a systematic, comprehensive, and rigorous method used by JWA to measure and confirm the Contractor's adherence to the Contract requirements.

P. QUALITY CONTROL (QC) shall mean methods used by the Contractor to internally control the quality of Work performed and ensure conformance to the Contract requirements.

Q. REPAIR shall mean correction of deficiencies in a malfunctioning, broken down, or deteriorated system by adjustment, overhaul, or replacement of component parts or materials, as required to restore the system to such condition that it may be effectively used for its designated purpose.

R. STORM WATER DRAINAGE SYSTEM shall mean street gutter, channel, storm drain, constructed drain, lined diversion structure, wash area, inlet, outlet, or other facility that is a part of a tributary to the countywide storm water runoff system and owned, operated, maintained, or controlled by the County, the Orange County Flood Control District (OCFCD), or any co-permittee city, and used for the purpose of collecting, storing, transporting, or disposing of storm water. The JWA storm drain system shall mean any gutter, channel, storm drain, constructed drain, wash area, inlet or outlet, or other facility that flows into, onto, through, or out of the airport property.

S. STORM WATER means storm water runoff, snowmelt runoff, and storm water surface runoff and drainage.

T. WORK HOURS shall mean regular working hours, which are from 7:00 AM to 4:00 PM, Monday through Friday, except Federal Holidays and other days specifically designated by JWA.

1.2. SUMMARY OF WORK

A. CONTRACTOR’S USE OF PREMISES

The Contractor shall:
1) Repair any and all damage resulting from Contractor-caused accident(s), Contractor negligence, or misuse of equipment. Repair shall be performed at the Contractor’s expense immediately and as directed by JWA.

2) Unless authorized in writing by JWA, Contractor shall avoid any and all cannibalization, relocation, or tampering of any JWA facilities or equipment of any type to effect repairs to other facilities or equipment or for any other reasons.

3) Confine operations at site to areas permitted by:
   
a) Law;
b) Ordinances;
c) Permits; and
d) Contract Documents

4) Not unreasonably encumber site with materials or equipment.

5) Not overload any structures that will in any way endanger their structural integrity.

6) Assume full responsibility for protection and safekeeping of products stored on premises and Work performed until completion and acceptance of the entire construction.

7) Not store any products in locations that interfere with operations of County or other contractors.

8) Obtain and pay for use of additional storage or Work areas needed for operations.
   
a) Onsite Facilities. JWA will provide a location and site for Contractor’s office trailers, storage, lay-down, sanitary facilities, and construction operations. Within 7 days after the Contract Award Date, Contractor shall submit for JWA’s approval a written plan or drawing showing the proposed locations of the office trailers, storage, lay-out, and construction operations and the type, size, and manufacturer of the proposed office trailers, sanitary facilities, and any storage containers proposed to be placed thereon. Such office trailers, sanitary facilities, and storage containers shall be properly licensed and permitted by the appropriate governmental agencies, and copies of such licenses and permits submitted to JWA for approval. The Contractor’s plan for onsite facilities shall comply with the requirements in the Specifications.

9) Temporary Utilities. JWA shall not provide any temporary water, gas, electrical, or sanitary sewer utilities for the Project. The Contractor shall be solely and completely responsible for obtaining, procuring, and maintaining all said temporary utilities. The Contractor shall comply with the provisions for Temporary Utilities in the Specifications.
10) As part of the staging area set-up activities, the Contractor shall investigate the availability of an adequate supply of all temporary utilities, make all necessary arrangements, including permits, for the purchase thereof, and provide necessary facilities to furnish such temporary utilities during construction, at the Contractor’s expense. Any and all utilities required for the Contractor’s operations shall be arranged for and paid for by the Contractor and paid directly to the appropriate utility. Utility arrangements shall be subject to the approval of the Project Manager.

B. PROJECT MANAGEMENT

1) Key Personnel. At all times throughout the term of this Agreement, the Contractor shall designate the following Key Personnel to perform the services required under the Contract Documents:

   a) Contractor’s Project Manager
   b) Safety Manager
   c) Superintendent
   d) Quality Control Manager

In addition to the Key Personnel identified above, Contractor shall furnish such additional personnel, qualified to perform the assigned duties, to complete the Work in accordance with its Contract Baseline Schedule. Contractor shall commit its full resources as needed to perform the Work and as requested by JWA.

2) Reassigning Key Personnel

Contractor agrees that it will not reassign or remove any of the Key Personnel without the prior written consent of JWA.

3) Construction Management

During construction, the Contractor shall maintain on the site a competent Contractor’s Project Manager, Safety Manager, superintendents, and any necessary assistants, all satisfactory to JWA. In the event that the Contractor reassigns or removes the Contractor’s Project Manager, after obtaining JWA’s consent thereto, the Contractor’s Project Manager shall be replaced within 7 days by a Contractor’s Project Manager acceptable to JWA.

Contractor shall not be entitled to an extension to the time of completion as a result of Contractor’s Project Management replacement.

The Contractor’s Project Manager shall represent the Contractor, and all directions given by the Contractor’s Project Manager shall be binding as if given by the Contractor.

4) Superintendence
During construction, the Contractor shall maintain on the site a competent superintendent and any necessary assistants, all satisfactory to JWA. In the event that the Contractor reassigns or removes the superintendent, after obtaining JWA’s consent thereto, such superintendent shall be replaced within 24 hours by a superintendent acceptable to JWA.

Contractor shall not be entitled to an extension to the time of completion as a result of Contractor’s Project Management replacement.

The superintendent shall represent the Contractor, and all directions given by the superintendent shall be binding as if given by the Contractor.

5) **Removal of Personnel at JWA’s Discretion**

JWA may require, at its sole discretion, Contractor to remove any of its personnel assigned to the Project promptly after JWA’s request. Contractor will replace any person so removed within 7 days with a person of like qualifications acceptable to JWA.

Contractor shall not be entitled to an extension to the time of completion as a result of Contractor’s Project Management replacement.

6) **Turnover**

Contractor and JWA both recognize and agree that performance of the Project will be jeopardized or suffer in the event of excessive turnover in the personnel assigned by Contractor to the Project. In identifying turnover, JWA shall not include any person who may cease working on the Project by reason of death, disability, resignation from Contractor or its affiliated companies, any person who retires upon 30 days’ notice, or persons removed from the Project at the request of JWA.

7) **Personnel Organization and Assignments**

Within 7 days following the Contract Award Date, as defined in this Agreement, Contractor shall prepare and submit to JWA an organizational chart for the Project detailing Contractor activities by employee name, job title, and organizational unit, and showing lines of command and authority. Contractor shall update the organizational chart as needed to show any proposed changes, and shall submit (1) the updated chart to JWA, or (2) a report of no changes made, on a monthly basis within the monthly report.
8) **Work Locations**

JWA anticipates Contractor shall perform construction services onsite at offices provided by Contractor and offsite at Contractor’s offices.

9) **Compliance With Employment Laws**

Contractor shall be solely responsible for complying with all laws pertaining to the employment of all of Contractor's personnel including, but not limited to, compliance with all applicable laws and regulations concerning workers' compensation, social security, unemployment insurance, hours of labor, services, working conditions, equality in employment, and like subjects affecting employers engaged in public projects.

10) **Working Hours of Key Personnel**

The Project Manager, Safety Manager, Superintendent and Quality Control Manager shall work on-site and in sufficient hours so as to ensure proper execution of all Project-related tasks during the performance of the Work. The Safety Manager and Superintendent or their JWA-approved designees shall be present on-site at all times during the performance of any construction activities by the Contractor or its subcontractors.

C. **PARTNERING**

(NOT USED)

D. **LAYOUTS**

(NOT USED)

E. **LOCATION OF FACILITIES**

1) Existing improvements visible at the jobsite, for which no specific disposition is made in the Contract Documents, but which could reasonably be assumed to interfere with the satisfactory completion of the improvements contemplated by the Contract Documents, shall be removed and disposed of, relocated, or abandoned by the Contractor. The disposition of such existing improvements shall be by the direction of JWA. The Contractor shall be liable to JWA for any damage resulting from any errors or deficiencies in the Contract Documents or other instructions furnished by JWA, if said errors or deficiencies were or could have been discoverable by reasonable inspection prior to the commencement of construction.

2) Whenever any pole, structure, culvert, conduit, cable, or other obstruction either above or below ground surface within the area of the Work affected by the Contractor’s construction is, or may be affected by the Contractor’s operations, the Contractor shall
preserve the same or make arrangements with the owners of such items for their protection, support, alteration, removal, or relocation as may be necessary.

3) It shall be the responsibility of the Contractor to identify and verify the existence and location of existing utilities prior to construction. Contractor shall provide advance notice to the owners of any poles, structure, culvert, pipe, conduits, cables, or any other improvements that may be affected by the Work required herein and shall cooperate with such owners to safeguard those items on property that may be so affected.

4) Where water mains or services are altered or removed and reinstalled either to avoid interference with the Work required under the Contract Documents, such alteration, removal, and reinstallation shall be performed in accordance with the rules and regulations of the owners of those utilities.

5) Contractor shall, at its sole expense, identify and verify the existence and the exact location of existing underground utilities prior to any excavation, regardless of the depth. Contractor shall hand-dig to determine depths and exact location of utilities prior to excavation in the area of the Work. The Contractor shall uncover any sewer laterals, telephone and electric conduits, water mains and gas mains, or any other major utilities or other underground facilities in advance of trenching operations at least 7 calendar days sufficient to permit grade changes. Such grade changes shall be included in the Contractor’s scope of work, and Contractor shall not be entitled to additional compensation.

6) Unless otherwise provided in the Contract Documents, all costs of protecting, potholing, supporting, altering, removing, salvaging, reconstructing, and reinstalling any pipes, poles, structures, trees, landscaping, irrigation, culvert, conduit, conduit, cable, or other obstruction shall be borne by the Contractor, including the facilities which are altered or removed and reinstalled for the Contractor’s convenience, except:

   a) Unless otherwise provided, where a subsurface, unknown, or latent condition is encountered, which is of an unusual nature materially different from those ordinarily encountered and such conditions are not shown on, or reasonably inferable from, the Contract Documents.

   b) Where it is necessary to remove or alter obstructions which are maintained under a JWA franchise, ordinance, contract permit, or other agreement by the terms of which the obstruction is required to be moved or adjusted.
c) JWA shall not be required to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the work site can be inferred from the presence of other visible facilities, such as buildings, pull boxes, meter, and junction boxes, on or adjacent to the site of the construction.

7) Where existing piping, utilities, and underground obstructions are indicated in locations to be traversed by new piping, ducts, and other Work provided herein, and such are not indicated in the plans, obstructions shall be determined before the new Work is laid closer than the nearest manhole or other structure at which an adjustment in grade could be made.

8) Except as otherwise expressly provided herein, the Contractor shall not be entitled to any additional compensation due to the presence of, or interference, delays, or expense caused by obstructions, or the removal and/or replacement of obstructions where such obstructions could have been reasonably anticipated and such removal and/or replacement is required for proper Completion of the Work. The Contractor shall not be assessed Liquidated Damages, as set forth in Section 5 - Liquidated Damages, in the Agreement, for delays in the Completion of the Work, when such delay was caused by the failure of JWA or the owner of the utility facilities as provided by California Government Code Section 4215.

1.3. PROJECT REFERENCE DOCUMENTS

When deemed necessary, and at the discretion of the County, the County will provide the following Reference Documents to the Contractor in DVD format, for informational purposes:

A. AS-BUILT DRAWINGS

1.4. ACCESS AND SECURITY REQUIREMENTS

A. AIRPORT SECURITY

Contractor shall comply with all security requirements of the Transportation Security Administration (TSA), Federal Aviation Administration (FAA), United States Customs and Border Protection (USCBP), JWA security regulations, and all applicable federal, state, and local regulations regarding airport security. Contractor is responsible for fines imposed by any regulatory agency as a result of Contractor’s failure to comply with applicable rules and regulations regarding airport security. If Contractor’s employees, or its subcontractors’ employees, are discovered in a secure area without a badge, then a fine of up to $10,000 may be awarded. Contractor may be required to obtain airport security clearance to perform Work under this Contract. The Contractor, Contractor’s employees, and Contractor’s
Subcontractors must complete a background clearance Security Identification Display Area (SIDA) class to obtain an ID badge and a driving permit for access to secure areas and to drive on the airfield.

At no time shall construction vehicles or equipment be driven or used without badged personnel in the immediate vicinity (i.e., within 100 feet). Personnel who drive vehicles on the airfield will be issued an Airport driving permit. All Contractor vehicles must be marked with a company logo. The Airport security department will inspect the vehicles, and vehicle hangtags will be issued.

B. BADGE ACQUISITION

Prior to issuance of a security badge(s), designated Contractor personnel who will be working onsite at the Project site and engaged in the performance of Work must pass JWA’s screening requirements, which include a Federal Bureau of Investigation (FBI) Criminal History Records Check ($29.00 fee per person) and a Security Threat Assessment (no charge). Upon successful completion of the background checks, Contractor’s designated personnel will be required to attend a 3-hour SIDA class and pass a written test. Those personnel who may be permitted by JWA to drive on the Airport Operations Area (AOA) perimeter road must also complete a Driver’s Training class and written test. JWA identification badges are not issued until designated Contractor personnel have: (1) completed appropriate application forms and submitted proof of identity and employment eligibility, (2) passed both background checks, (3) completed and passed appropriate classroom training, and (4) paid an identification badge fee of $10.00 per person. Contractor should anticipate a minimum of 5 business days to complete the security badge process if all requirements listed above are fulfilled by individual badge applicants in a timely manner. Contractor shall be responsible for all costs associated with the background checks and abide by all of the security requirements set forth by FAA, TSA, and JWA. Contractor’s designated personnel must successfully complete the badge acquisition process unless other arrangements have been coordinated by the JWA Project Manager.

C. BADGE HOLDER REQUIREMENTS AND RESPONSIBILITIES

The Federally approved security program for JWA requires that each person issued a JWA security badge is made aware of his/her responsibilities regarding the privilege of access to restricted areas of JWA. All persons within the restricted AOAs of JWA are required to display, on their person, a JWA security badge, unless they are specifically exempted for safety reasons or they are under escort by a properly badged individual. When working in a secure area, each badged person is responsible for challenging any individual who is not properly displaying a JWA-issued or approved and valid ID badge. Any person who is not properly displaying or who cannot produce a valid JWA security badge must immediately be referred
to the Sheriff's Department - Airport Police Services Office for proper handling. The JWA security badge is the property of the County of Orange and must be returned upon the termination of employment of any employee of the Contractor and/or the termination or expiration of the Contractor’s contract at JWA. The loss of a badge shall be reported within 24 hours to the Sheriff's Department - Airport Police Services by calling (949) 252-5000. Individuals who lose their badge shall be required to pay a fee before receiving a replacement badge. The charge for lost badge replacement will be at the current posted rate located in the JWA Administration Office. A report shall be made before a replacement badge will be issued. The JWA security badge is nontransferable.

In the event that a Contractor’s badge is not returned to JWA within 24 hours of termination of Contractor personnel employment and/or termination or expiration of Contract, a fine of $250 per badge will be charged to the Contractor and Contractor may be subject to civil penalties of up to $10,000. Contractor’s final payment may be held by JWA, or a deduction from the Contractor’s payment(s) may be made to ensure that funding is available to cover the fine in the event that badges are not returned.

2. SCHEDULE

2.1. CONTRACTOR’S SCHEDULER

(NOT USED)

2.2. SUMMARY OF REQUIRED SCHEDULES

The Contractor shall be required to prepare and submit the following types of schedules, as more particularly described below:

A. A baseline schedule which, upon its acceptance by the County, establishes a baseline for the performance and measurement of Work activities, and which shall not be changed without the County's prior written approval; and

B. Progress schedules, which shall be based on and contain the same logic and durations as the baseline schedule, but which shall be updated periodically to reflect actual progress of the Work activities.

The initial baseline schedule, upon its acceptance by the County, shall be known as the Baseline Contract Schedule, as set forth in Section 2.5 below. The Contractor shall not be permitted to make any change to the Baseline Contract Schedule unless it has requested and obtained prior written approval from the County in accordance with the procedures set forth in Section 2.6 below. In the event the County approves a change, the Contractor shall incorporate the change into a revised baseline schedule which shall be known as the Revised Baseline Contract Schedule.
The periodically updated progress schedules shall be known as Current Contract Schedules, as set forth in Sub-Clause G below.

The Baseline Contract Schedule, Revised Baseline Contract Schedule (if any), and Current Contract Schedules shall be the only record schedules. The Contractor's performance will be measured against these schedules.

2.3. PRE-COMMENCEMENT SCHEDULING CONFERENCE

Within 5 calendar days after Contract Award Date, the County shall schedule and conduct a Pre-Commencement Scheduling Conference to commence development of the Proposed Baseline Contract Schedule. At this meeting, the Contract scheduling requirements shall be reviewed with the Contractor. The Contractor shall be prepared to review and discuss methodology for the schedule and sequence of activities plus cost and manpower loading methodology for the construction and commissioning phases of the Work.

2.4. PROPOSED BASELINE CONTRACT SCHEDULE

A. Contractor shall, within 7 calendar days after the Contract Award Date, submit to the County a Proposed Baseline Contract Schedule, which shall set forth the sequence and interdependence of activities required for complete performance of all of the Work. Contractor's Proposed Baseline Contract Schedule shall begin with the Contract Award Date and conclude within the Time of Completion. The Proposed Baseline Contract Schedule shall be separated by the construction and commissioning phases and show all milestones.

B. The Proposed Baseline Contract Schedule will provide the basis of payment.

C. Contractor shall use Primavera "Project Management" Software Version 6.0, or equivalent scheduling software approved by JWA, for the development and maintenance of all critical path method (CPM) schedules. Contractor shall use an 11-inch by 17-inch schedule layout and shall include a copy of the electronic file with all schedule submittals.

D. Contractor shall submit all schedules electronically to the County Project Document Management System (Oracle Primavera Unifier) as a .pdf file format.

E. The Proposed Baseline Contract Schedule shall include cost-loaded Work Breakdown Structure Summary ("WBS Summary") activities. The status of the WBS Summary activities shall be determined by the status of their component activities or tasks. All activities that have tangible value must be linked to the WBS Summary activity that includes the cost for that activity. The Proposed Baseline Contract Schedule shall use the activity codes dictated by the County. At a minimum, the Contractor's coding of activities shall include reference to the phase of the Work (construction or commissioning), the trade/subcontractor, and the WBS Summary. The cash flow shall be shown in tabular format and in graphic format.
F. The activities included in the Proposed Baseline Contract Schedule shall be analyzed in sufficient detail to show activity durations in working days. During construction, durations shall be based on the labor, equipment, and materials required to perform each activity on the basis of an 8-hour shift for each working day. No activity shall have a duration exceeding 15 working days, except for activities not involving onsite construction such as submittals, submittal reviews, and procurement and delivery of materials. The manpower to be assigned and equipment to be utilized shall be shown for each construction activity in the schedule and shall be considered the detail of the Proposed Baseline Contract Schedule.

G. The Contractor shall submit a separate document listing all deliverables and other submittals required under the Contract and showing when each deliverable and other submittal will be provided (the "Master Deliverables and Submittals List"). The Contractor shall submit the Master Deliverables and Submittals List into Oracle Primavera Unifier for the County's review prior to the acceptance of the Proposed Baseline Contract Schedule. The Master Deliverables and Submittals List shall be incorporated into the Proposed Baseline Contract Schedule such that each and every deliverable or other submittal will be represented by a schedule activity logically and accurately tied to Work activities. The Contractor shall incorporate activities for any revised or additional submittals, and applicable review periods, into the periodically updated progress schedules described below, including any submittals which were rejected in the previous period.

H. The Proposed Baseline Contract Schedule shall also include the following items:

1) A written narrative description explaining the Contractor’s approach for completing the Work in accordance with all milestones and within the Time of Completion, including a clear description of the critical path activities, crew sizes for major components of the Work, production rates, and any anticipated problems;

2) All milestone dates as defined in the clause entitled Time of Performance;

3) The following activities:
   a) Approval of bonds and insurance;
   b) Approvals and permits required to be obtained from regulatory agencies or other third parties;
   c) Mobilization activities;

4) All items included in the Master Deliverables and Submittals List;
   a) Fabrication and delivery activities;
   b) Interface activities with the County's Central Plant Project, Parking Structure C Project, and all other Airport Improvement Program (AIP) projects; and
c) Contractor's commissioning activities.

2.5. COUNTY'S ACCEPTANCE OF PROPOSED BASELINE CONTRACT SCHEDULE

The County shall review Contractor's Proposed Baseline Contract Schedule and may require revisions or refinements of the schedule. Comments made by the County regarding the Contractor's Proposed Baseline Contract Schedule during such review shall not relieve the Contractor from compliance with the requirements of the Contract Documents. The Contractor shall make revisions to the Proposed Baseline Contract Schedule as may be required by the County, and shall submit its revised, proposed schedule to the County for approval within 7 calendar days.

Following the County's acceptance of the Proposed Baseline Contract Schedule, it shall become known as the Baseline Contract Schedule and shall be so titled by the Contractor. All schedules submitted after the Baseline Contract Schedule shall be based on the same electronic file, be in the same detail, and use the same structure and coding as the Baseline Contract Schedule, unless instructed otherwise by the County in writing.

The Contractor shall not be entitled to any payment under the Contract whatsoever until after the County has accepted the Contractor's submission of the Baseline Contract Schedule.

2.6. CHANGES TO BASELINE CONTRACT SCHEDULE

Contractor shall not make any change to the Baseline Contract Schedule without prior approval from the County. If Contractor desires to make a change to the Baseline Contract Schedule, then it shall request permission in writing stating the reasons for the change, as well as the specific proposed revisions to activities, logic, and durations.

If Contractor notifies the County that a proposed change is of a major nature, as defined below, then the County may require Contractor to revise and submit a written analysis of the time impact of the change upon the entire schedule or any part of it ("Time Impact Analysis"). The proposed change and the Time Impact Analysis shall be submitted to the County within 7 calendar days after the Contractor notifies the County that the change is of a major nature. A proposed change shall be considered to be of a major nature if it meets any of the following criteria:

A. It changes the duration or start date of any critical path activity including, but not limited to, any change to the Time of Completion or any milestone;

B. It causes an additional activity or additional activities to become “critical,” defined to mean that such activity has less than 5 calendar days of total float;

C. It impacts another entity such as the County, a separate contractor, an airport tenant, or the general public; or
D. It comprises an accumulation of minor changes, and such changes cause multiple activities to approach becoming critical as defined above.

If the County approves a change to the Baseline Contract Schedule, the approved change shall be reflected in the next schedule submitted by Contractor, which shall be known as the Revised Baseline Contract Schedule and shall be so titled by the Contractor.

2.7. CURRENT CONTRACT SCHEDULES

Contractor shall submit monthly updates of the Baseline Contract Schedule, or (if applicable) most recent Revised Baseline Contract Schedule showing progress achieved through a certain day of the month which shall be determined by the County and shall be referred to as the Monthly Status Data Date. Each such monthly update shall be referred to as the Current Contract Schedule, and shall be so titled by the Contractor. The Current Contract Schedule shall be based on and contain the same logic and durations as the Baseline Contract Schedule or most recent revised Baseline Contract Schedule, but it shall be updated to reflect actual progress of the Work. The Current Contract Schedule shall include an accurate showing of the status of all submittal activities, including the addition of re-submittal activities with full review durations as allowed per the Contract.

The Contractor shall be required to provide a written narrative to identify every change in the sequencing of construction activities, and confirm that these changes do not extend the performance period of any activity shown in the Baseline Contract Schedule. The Contractor shall provide a written description of why activities were performed out of sequence if and when the change has extended the performance period of any activity.

With each monthly Current Contract Schedule, the Contractor shall include a schedule of cost loading and corresponding cash flow. The WBS Summary activity costs shall be identical to those activity costs shown on the Baseline Contract Schedule or most recent Revised Baseline Contract Schedule. The summation of cost-loaded scheduled activities shall equal the current Contract Sum. The cash flow shall be shown in tabular format and in graphic format, and it shall be submitted into Oracle Primavera Unifier.

Failure to submit an acceptable cost loading and cash flow summary shall be considered cause for withholding progress payments that otherwise would or may become due under this Contract.

The submittal of the Current Contract Schedule which satisfies the requirements of this Contract, accurately reflects the status of the Work, and incorporates all changes into the schedule, shall be a condition precedent to the County's obligation to process each monthly application for payment. Upon approval of a Change Order or issuance of a notice to proceed with a change, the approved change shall be reflected in the next Current Contract Schedule submitted by the Contractor.

2.8. PERFORMANCE IN ACCORDANCE WITH SCHEDULE
Contractor shall perform the Work so that its progress and the sequence and timing of Work activities conform to the Baseline Contract Schedule or most recent Revised Baseline Contract Schedule. Contractor shall obtain from subcontractors information and data about the progress of the Work in a timely manner. Contractor shall coordinate and integrate such information and data into the monthly Current Contract Schedules and shall monitor the progress of the Work.

2.9. PROGRESS MEETINGS AND REPORTS

The Contractor shall participate in Monthly Status Review Meetings (defined below) throughout the duration of the construction, and shall participate in Weekly Progress Meetings throughout the duration of construction and commissioning, as follows:

A. Monthly Status Review Meetings

On the Monthly Status Data Date defined above, the Contractor, having obtained from subcontractors and staff all necessary information, shall issue to the County a proposed, updated Current Contract Schedule. The County shall field-verify the status of individual activities. The County and the Contractor shall resolve any discrepancies, and Contractor shall then re-issue the proposed, updated schedule prior to a monthly status review meeting with the County (the "Monthly Status Review Meeting"), to be held within the succeeding 7 days after the Monthly Status Data Date.

The Contractor’s Project Manager, Construction Scheduler, Superintendent and involved subcontractors shall attend the Monthly Status Review Meeting for review and approval of the proposed, updated, Current Contract Schedule.

Once the County accepts the proposed, updated Current Contract Schedule, it shall become the new Current Contract Schedule. Contractor shall prepare its monthly application for payment to reflect the value of Work shown on the latest accepted Current Contract Schedule.

B. Weekly Progress Reports

At each Weekly Progress Meeting, Contractor shall submit a Three Week Look-Ahead report from the Current Contract Schedule, with the activities completed and in progress for the previous week and the activities scheduled, including the Contractor’s anticipated working hours, for the succeeding 3 weeks (the “Weekly Progress Report”). This will require weekly updates of the Current Contract Schedule in the manner described in Paragraph G. In addition, during construction, the Weekly Progress Report shall include manpower, anticipated work hours, major construction equipment, bulk material quantity, and pre-purchased items tracking (aggregated from the daily site report). The Weekly Progress Report shall contain a short narrative describing major equipment installations, testing, and any issues. Each Weekly Progress Report must identify special requirements of the County, such as road closures, work hour restrictions, night work, large deliveries, and special inspection and testing. The
Contractor shall submit an electronic copy of the Weekly Progress Report in .pdf format into Oracle Primavera Unifier.

C. Monthly Progress Reports

Contractor shall provide together with its application for payment a Monthly Progress Report to the County that shall include, but shall not be limited to, the following information:

1) The latest accepted Current Contract Schedule, as set forth above.
2) Cost loading and cash flow reports described above.
3) Updated summary of the status of all submittal activities, including the addition of re-submittal activities, with full review durations.
4) Written narrative describing progress to date, critical path, out of sequence logic corrections, changes in logic, issues of concern that may affect the schedule, and recommended mitigation actions for the issues of concern.
5) Any delays experienced by Contractor during the period covered by the Report.
6) Any change of manpower among key Project employees.
7) Itemization of pending, potential Change Orders.
8) List of any Claims which the Contractor has submitted.
9) Updated histogram as defined in Sub-Clause D.6 above, showing actual manpower expended to date and planned for all required manpower for all Work, including Change Order Work, necessary to complete all remaining activities in accordance with the Current Contract Schedule.

2.10. RECOVERY PLAN

Immediately upon learning of any event that may lead to a delay to the Time of Completion or any milestone, Contractor shall prepare a proposed plan for recovery to the Baseline Contract Schedule or (if applicable) most recent Revised Baseline Contract Schedule, including any associated costs, impacts or related effects thereof ("Recovery Plan"). Upon receipt of such Recovery Plan, County may direct Contractor to execute the Plan described, or a modification thereof.

The Recovery Plan shall include some or all of the following actions:

A. Increase of construction forces in such quantities and crafts as shall overcome the delay;
B. Increase of the number of working hours per shift, shifts per working day, working days per week, and the amount of construction equipment, or any combination of the foregoing to overcome the delay;
C. Rescheduling of Work activities so they are performed concurrently; and/or
D. Such other schedule-recovery actions as the Contractor may propose.

Under no circumstances will the Contractor's increasing equipment or construction forces, increasing the working hours, or taking any other action in order to recover to the Baseline Contract Schedule or (if applicable) most recent Revised Baseline Contract Schedule, be considered justification for a Change Order adjusting the Contract Sum, unless the need for such recovery to the schedule results from a delay for which the County is contractually responsible.

Any failure of the County to discover errors or omissions in schedules that it has reviewed, or to inform Contractor that Contractor, its subcontractors, or others are behind schedule, or to direct or enforce procedures for complying with the Baseline Contract Schedule, Revised Baseline Contract Schedule (if applicable), and Current Contract Schedule(s) shall not relieve Contractor from its sole responsibility to perform and complete the Work within the Time of Completion and shall not be a cause for an adjustment of the Time of Completion or the Contract Sum.

2.11. FLOAT

All Float contained in the Baseline Contract Schedule shall belong to the party that needs it first. Under no circumstance shall Contractor be entitled to maintain a claim against the County for Contractor's failure to achieve completion on a date earlier than that set forth on the Baseline Contract Schedule or most recent Revised Baseline Contract Schedule.

2.12. WEATHER

Contractor is to be experienced in scheduling construction Work in Orange County and therefore shall provide sufficient time in the schedule as may reasonably be expected to be consumed by weather impacts during the course of the Work.

2.13. DISTRIBUTION OF SCHEDULES

Contractor shall disseminate all schedules to its staff, all subcontractors, suppliers, and other concerned entities, regardless of access rights to Oracle Primavera Unifier, and shall instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

3. QUALITY CONTROL REQUIREMENTS

3.1. GENERAL

A. The Contractor is responsible and shall provide Quality Control (QC) for all aspects of the Work.

B. The Contractor shall provide a licensed and independent testing and inspection agency to verify compliance with the requirements specified or indicated in the Contract Documents. These services do not relieve the Contractor of its responsibility for compliance with the Contract Documents.

3.2. DEFINITIONS
As used throughout this instrument, the following terms shall have the meanings as indicated:

A. **Quality Assurance (QA).** Tests, inspections, procedures, and related actions performed by JWA to verify accuracy, as well as consistency, in Contractor’s QC Program.

B. **Quality Control Services.** Tests, inspections, procedures, and related actions prior to, during, and after execution of the Work to evaluate that completed construction complies with requirements. Contractor is fully responsible for all specified QC tests and inspections in a manner depicted in the QC Plan. No separate payment shall be made by JWA for any testing, inspection, or other QC activities required by its QC Plan.

C. **Testing and Inspection Agency.** An independent contractor/agency working under the direction of the Quality Control Manager and hired by the Contractor that is engaged to perform inspections, as well as perform specific tests, inspections, or both. The Contractor shall be responsible for ensuring cooperation between trades, as well as ensuring that adequate time is allotted for the testing to be performed and the results to be received and reviewed whenever necessary.

D. **Fabricator.** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. **Installer.** A firm or individual experienced in installing, erecting, or assembling Work similar in material, design, and extent to that indicated for this Project, whose Work has resulted in construction with a record of successful in-service performance.

F. **Manufacturer.** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in service performance.

G. **Professional Engineer.** A professional engineer who is legally qualified to practice in California and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for the Project in material, design, and extent.

H. **Specialist.** Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated. Requirements for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local train-union jurisdictional settlements and similar conventions.
I. **Preconstruction Testing.** Testing that is conducted at the source by a Certified Testing agency employed by the manufacturer that performs preconstruction testing for compliance with contract specifications.

J. **Quality Control (QC) Manager.** A person employed by the Contractor to manage and ensure that procedures submitted in their Quality Control Program are adhered to. The Quality Control Manager shall be employed by the Contractor and will be an independent, dedicated entity within the organization with no other responsibilities but quality.

3.3. **CONTRACTOR RESPONSIBILITIES**

A. Contractor shall commit its full resources as needed, to provide on-site Quality Control (QC) management so as to meet the demands of the Work and as requested by JWA.

B. The Contractor shall submit for approval a QC Plan listing requirements for all construction activities as specified in the Specifications.

C. The Contractor shall provide specified tests, inspections, and related procedures as stipulated in the Contract Documents and QC submittal; however, these do not limit the Contractor’s responsibility to take further actions deemed necessary, including any additional testing, or that facilitates compliance with the Contract Documents.

D. The Contractor shall provide an outstanding issues report at the weekly progress meetings and shall be prepared to discuss all outstanding quality issues and Contractor’s proposed corrective actions.

E. The Contractor shall provide products and systems complying with specific performance and design criteria required by the Contract Documents.

F. The Contractor shall submit a written request for additional information to the Construction Manager if provisions stipulated in the Contract Documents are not sufficient to perform services or provide certifications required.

G. The Contractor shall be responsible for Costs for re-testing and re-inspecting Work deemed noncompliant.

H. The Contractor shall submit a certified written daily report into Oracle Primavera Unifier of all QC testing performed and documentation of results, as well as corrective actions to be performed, as described in Section 3.5A below.

I. The Contractor shall be responsible for testing and inspection requested by the Contractor that is not required by the Contract Documents.

J. The Contractor shall provide additional QC services required due to changes in the Work. The cost for additional testing will be included in the Contractor’s overhead costs provided in the allowable change order mark-ups.
K. The Contractor shall be responsible for overtime expenses and schedule delays incurred by JWA as a result of executing QC services.

L. The Contractor shall coordinate the sequence of activities to accommodate required QC services with no delay and avoid costs associated with removing and replacing construction to accommodate testing and inspection.

M. Contractor shall submit a Quality Control Plan, in accordance with Section 3.4B below. The plan will be updated and be submitted with any Construction Schedule updates.

N. Contractor will coordinate and conduct Pre-Activity Meetings prior to the start of any new activities of construction. These will include a review of the pertinent specification section, safety procedures to be employed, schedule and materials to be used, and their approval status. The Quality Control Manager shall notify JWA and its Construction Manager (CM) of scheduled Pre-Activity meetings at least 3 days in advance.

O. Contractor shall schedule and chair weekly Quality Control Meetings. Contractor shall submit an agenda for approval prior to the first Quality Control Meeting taking place. Quality Control meetings will include, at a minimum, safety requirements; a review of the two-week look-ahead and its interaction with testing or inspection duties required; and a review of the QC deficiency list and proposed corrections.

P. The Contractor shall notify JWA at least 3 days in advance of any testing or inspection required by the Contract Documents.

Q. The Contractor shall verify dimensions as an integral part of any operation as necessary.

R. The Contractor shall comply with the Specification requirements for Division 01 Section - Cutting and Patching upon completion of testing, inspecting, sample taking, and similar services; repair damaged construction; and restore substrates and finishes as required.

S. The Contractor shall repair and protect construction exposed by or for QC service activities.

T. Contractor is to supply mockups or test panels prior to beginning work on elements of construction required by the Contract.

3.4. SUBMITTALS

A. Qualification Data. The Contractor shall assure that the testing agency (the “Testing Agency”) specified in Section 3.6 B(1) below demonstrate its capabilities, experience, and proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority as documented by ASTM E548, and that specializes in types of tests and inspections to be performed.
B. **Quality Control Plan.** The Contractor’s QC Plan shall include, at a minimum:

1) An organizational chart complete with names of individuals, including the dedicated Quality Control Manager, responsible for implementation of the Contractor’s QC Plan.

2) A Project-specific inspection and testing plan that lists and describes the inspections that the Contractor will conduct, all tests that will be performed, their frequencies, and acceptance criteria. The list shall identify items that are to be inspected and/or tested by the Contractor, Supplier, fabricator, and Testing Agency (or Agencies).

3) Identification and resume of the individual within the Contractor’s organization who will be responsible for Quality, including his/her role and responsibility (the “Quality Control Manager”). Such individual must have at least 5 years of experience as a Quality Control Manager in airport construction.

4) Upon completion of Construction Manager’s review of the Contractor’s QC Plan, there may be a meeting to resolve any outstanding issues among the parties and to coordinate inspection efforts by all JWA representatives and Consultants.

C. **Schedule of Tests and Inspections.** The Contractor shall include the following items:

1) Specifications Section number and title
2) Description of test and inspection
3) Identification of applicable standards
4) Identification of test and inspection methods
5) Frequency of tests and inspections required
6) Time schedule or time span for tests and inspections
7) Entity responsible for performing tests and inspections
8) Requirements for obtaining samples
9) Document, register, or otherwise log approvals of testing and inspections

3.5. **DOCUMENTATION**

The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection; proposed remedial action; and corrective actions taken.

These records shall be maintained by the Quality Control Manager.
These records must cover both conforming and defective or deficient features, and they must include a statement that all supplies and materials incorporated in the Work are in full compliance with the terms of the Contract. Legible copies of these records shall be furnished to JWA, and its designated representative, daily. The records shall cover all Work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor’s Project Manager. Failure of the Contractor to maintain, verify, and provide JWA with the records described herein shall be grounds for the County to reject, in its entirety, any request for payment by the Contractor, withhold any payment due to the Contractor, and order that all Work be stopped.

Specific Contractor QC records required for the Contract shall include, but are not necessarily limited to, the following records:

A. **Daily Inspection Reports.** Contractor QC personnel shall maintain a daily log of all inspections performed for both Contractor and Subcontractor operations on a form acceptable to the Engineer. These will include all testing and certifications performed at the source by the manufacturer. These daily reports shall provide factual evidence and certify that continuous QC inspections have been performed and shall, at a minimum, include the following:

1) Date of Issue
2) Project Title and Number
3) Name, address, and telephone number of testing agency
4) Dates and locations of samples and tests or inspections
5) Names of individual making tests and inspections
6) Description of the Work and any test and inspection method
7) Identification of Product and Technical specification item number and description
8) Complete test or inspection data
9) Test and inspection results and interpretation of test results
10) Ambient conditions at the time of sample taking, and comments or professional opinion on whether statement certifying testing and inspection tested or inspected Work complies with the Contract Document requirements
11) Name and signature of laboratory inspector
12) Recommendations on retesting and re-inspecting
13) Compliance with approved submittals materials and equipment received
14) Safety inspection
The Contractor shall assure that the daily inspection reports shall identify inspections conducted, results of inspections, noncompliant Work location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The Contractor shall cause the daily inspection reports to be signed by the responsible QC technician and the Contractor’s Project Manager, or other principal designee. The Contractor shall submit to JWA, and its designated representative, through Oracle Primavera Unifier at least 1 copy of each daily inspection report on the second workday following the day of record.

B. **Daily Test Reports.** The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

1) Technical specification item number and description;
2) Test designation;
3) Location;
4) Date of test;
5) Control requirements;
6) Test results;
7) Causes for rejection;
8) Suggested remedial actions; and
9) Retests

Test results from each day’s work period shall be submitted to the JWA Project Manager prior to the start of the next day’s work period.

C. The Contractor shall be responsible to assure that the Testing Agency complies with the following:

1) Submit a certified written report of each test, inspection, and similar QC service to the JWA Project Manager, with a copy to the Contractor.
2) Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract documents.
3) Submit resume of all testing personnel performing testing and inspections for approval prior to performing any tests or inspections.

D. **Permits, Licenses, and Certificates.** The Contractor shall submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts, for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work for the County’s records.
3.6. CONSTRUCTION TESTING

A. County Responsibilities

1) The County may engage a qualified testing agency to perform testing services for QA services. JWA retains the right to require the use of a different testing agency for retesting and re-inspecting.

B. Contractor Responsibilities

1) The Contractor shall engage an independent qualified Testing Agency to perform testing services for QC services.

2) The Contractor shall not employ the same entity engaged by the County, unless agreed to in writing by the County.

3) The Contractor shall be responsible for costs incurred during retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract documents.

4) The Contractor shall be responsible for overtime expenses and schedule delays accruing as a result of executing QC services and shall not be charged to the County.

5) The Contractor shall coordinate sequence of activities to accommodate required QC services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

6) The Contractor shall assure that the Testing Agency will provide the following:

   a) Cooperation with JWA, its Project Manager, Program Manager, Construction Manager, Commissioning Agent, and Contractor in performance of duties.

   b) Provide qualified personnel to perform required tests and inspections.

   c) Notify JWA, its Project Manager, Program Manager, Construction Manager, Commissioning Agent, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

   d) Provide tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.

   e) Submit a written report of each test, inspection, and similar QC services through the Contractor.

   f) Not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
g) Not perform any duties of Contractor.

h) Attend Project progress meetings as requested by JWA.

i) Cooperate with other agencies performing required tests, inspections, and similar QC services, and provide reasonable auxiliary services as requested.

j) Notify other agencies sufficiently in advance of operations to permit assignment of personnel as required, and provide the following:
   i) Access to the Work.
   ii) Incidental labor and facilities necessary to facilitate tests and inspections.
   iii) Adequate quantities of representative samples of materials that require testing and inspecting.
   iv) Assist such other agencies in obtaining samples.
   v) Facilities for storage and field curing of test samples.
   vi) Delivery of samples to testing agencies or arranging for pickup of test samples after normal business hours.
   vii) Preliminary design mix proposed for use for materials mixes that require control by testing agency.
   viii) Security and protection for samples and for testing and inspecting equipment at Project site.

3.7. CORRECTIVE ACTION REQUIREMENTS

A. The Contractor shall establish detailed requirements in its QC Program that assures the County that actions will be taken whenever a process is determined to be out of control or out of tolerance. The requirements for corrective action shall include both general requirements and individual items of Work contained in the technical specifications.

B. The Contractor shall provide the detail of its QC Program detailing how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

C. The Contractor shall establish and utilize statistical QC charts for individual QC tests when applicable or required by the technical specifications or Contract Documents. The requirements for corrective action shall be linked to the control charts.

3.8. NONCOMPLIANCE
A. The County shall notify the Contractor of any noncompliance with any of the foregoing requirements.

B. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or his/her authorized representative to the Contractor or his/her authorized representative at the site of the Work, shall be considered sufficient notice.

C. In cases where QC activities do not comply with either the Contractor’s QC Program or the Contract Documents, or where the Contractor fails to properly operate and maintain an effective QC Program, as determined by JWA, its Program Manager, Construction Manager, or Commissioning Agent, JWA or its Construction Manager may:

1) Order the Contractor to replace ineffective or unqualified QC personnel or Subcontractor; or

2) Order the Contractor to stop operations until appropriate corrective actions are taken.
4. **HEALTH AND SAFETY PROVISIONS**

The Contractor shall at all times conduct all operations under the Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The safety provisions of applicable laws and building and construction codes shall be observed. Work, materials, and equipment used will comply with Title 8 California Code of Regulations (CCR) and the Federal Occupational Safety & Health Administration (OSHA) requirements.

4.1. **COMPLIANCE**

The Contractor shall have at the Work site copies of or suitable extracts of “Construction Safety Orders” and “General Industry Safety Orders” issued by the California State Division of Industrial Safety. The Contractor shall comply with the provisions of these and all other applicable laws, ordinances, and regulations including, but not limited to:

A. **REQUIREMENTS OF THE STATE OF CALIFORNIA INCLUDING CAL/OSHA**

Comply with applicable and pertinent recommendations contained in State of California, California Administrative Code, Title 8, Industrial Relations, Chapter 3.2 California Occupational Safety and Health Regulations (CAL/OSHA), Chapter 3.3 Occupational Safety and Health Appeals Board, Chapter 3.5 Occupational Safety and Health Standards Board, Chapter 4 Division of Industrial Safety (Industrial Safety Orders), published by Office of Administrative Hearings, Department of General Services, current edition.

B. **OSHA COMPLIANCE**

All articles and services covered by this specification shall meet or exceed the safety standards established under the Federal Occupational Safety and Health Act, 29 U.S.C. 600, et seq., together with all amendments in effect as of the date of this specification.

C. **Contractor shall fully comply with Title 8 CCR, Subchapter 7. General Industry Safety Orders Group 16. Article 109, and Section 5194, Appendices B&C, and shall be responsible for protecting employees and invitees from all hazardous chemicals known to be present in the workplace. Contractor shall provide their employees and the Airport with Manufacturers’ Material Safety Data Sheets (MSDSs) for all hazardous materials that shall be furnished to or used on this Project.**

4.2. **OPERATIONAL REQUIREMENTS**

Contractor shall comply with FAA Advisory Circular AC 150/5370-2E, or the most recent edition, “Operational Safety on Airports during Construction Activity,” all of which must be fully complied with during the term of the Contract.
The height and use of any construction equipment and cranes shall be subject to conditional approval by FAA. At least 10 days prior to beginning construction, the Contractor shall submit to JWA information regarding the height of the tallest equipment (greater than 15 feet) planned to be used at various points on the site, when the equipment will be used, and the specific location at the airport where the equipment is planned to be used. The Contractor will assist JWA with the preparation of FAA Form 7460 (Notice of Proposed Construction or Alteration) and JWA will submit the form for conditional approval by FAA. As a guideline, the Contractor is advised of the following draft conditions for the use of tall construction equipment and cranes that will be placed on the FAA conditional approval for their temporary use at JWA:

A. The use of tall construction equipment and cranes shall be coordinated with the Manager of the Airport Traffic Control Tower (ATCT) to ensure that the appropriate Notice to Airmen (NOTAM) is issued.

B. All cranes and tall equipment shall be equipped with checkered flags during the daytime and equipped with red lights on the boom at all times and for nighttime use, and lowered during periods of non-use. The flag shall be not less than 3 feet square consisting of five 1-foot squares of international orange color and four 1-foot squares of white color. Obstruction marking and lighting shall be installed in accordance with the provisions of FAA Advisory Circular 70/7460-1K, Obstruction Marking and Lighting.

C. Construction cranes shall not impair the line of sight view from the ATCT at any time or interfere with airport operations at any time. The final determination of the allowable heights and conditions of approval will be made by FAA. Contractor shall operate all construction cranes and equipment subject to this determination in compliance with the conditions and as directed by JWA. Crane booms or other equipment shall not exceed a height of 25 feet without prior permission of the Airport Operations Representative. Permission for the operation of a crane will not be granted when visibility is less than 3 miles or during thunderstorm activity.

D. COMMUNICATION WITH THE FAA CONTROL TOWER
The Contractor is advised that all communications with FAA Tower personnel will be made through the County and not by the Contractor. This is important, as the number of people having contact with the tower should be limited to prevent a misunderstanding or conflicting information. The Airport will have direct radio contact with the FAA Tower, and all communication regarding the use of construction equipment and cranes shall be made by JWA.

E. TRENCH EXCAVATION
Before excavating any trench 5 feet or more in depth, the Contractor is to submit to JWA a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for the protection from the hazards
of caving ground during the excavation of such trench. If the plan varies from the Construction Safety Orders for shoring systems, then it will be prepared and stamped by a registered Civil Engineer. No excavation will start until JWA has accepted the plan and the Contractor obtains a permit from the state's Division of Industrial Safety. A copy of the permit is to be submitted to JWA.

All excavation and trenching activities at JWA must be supervised by a competent person as defined by CAL-OSHA and conducted in accordance with Title 8 CCR, Subchapter 4. Construction Safety Orders, Article 6 Excavations (Sections 1539-1547). The Contractor is responsible for contacting the local utility locating agency. The Contractor shall have an additional second independent entity conduct utility locations to confirm the local utility locating agencies’ initial analysis. The Contractor must follow all erosion control procedures and ensure all dust mitigation measures are in place.

4.3. HEALTH, SAFETY, AND ENVIRONMENTAL REQUIREMENTS

JWA requires that all Contractors and Subcontractors impose the same priority and emphasis on Health, Safety, and Environment (HSE) protection as JWA imposes on its own employees. Contractors must comply with all applicable contractor, client, State, and Federal health, safety, and environmental and FAA regulations.

Certain specific JWA HSE requirements may exceed CAL-OSHA and Federal OSHA standards or the Contractor's normal HSE procedures. Contractor is responsible for reviewing and implementing the most stringent HSE requirements set forth in this section. Contractor is also responsible for ensuring that all lower-tier Subcontractors review and implement these HSE requirements.

4.4. DOCUMENTATION AND REPORTING REQUIREMENTS

A. The Contractor shall submit for approval, in accordance with the Agreement, a comprehensive Project-Specific Safety Plan outlining code of safe practices and procedures as listed in Appendix C: Code of Safe Practices in the Guide to Developing Your Workplace Injury and Illness Prevention Program, subchapter 4, Construction Safety Orders, Article 3, General, for all construction activities including, but not limited to, trenching and shoring, fall protection, confined space entry, hazardous materials, night work, and lockout/tagout. Such Plan shall provide a list of competent persons for activities for which competent persons are defined and are required by State law and shall also describe Airport security procedures including the ANSI A.10 standard for the Protection of the Public during Construction Activities.

The Project-Specific Safety Plan shall contain directions to the closest hospital and provide a map showing the Airport and the location of hospitals. Information regarding spill response and hazardous materials is to be included. The Plan shall identify the project-included limits, describe
operational safety during construction, type of construction activities, and aircraft movement areas.

The review and approval shall not relieve the Contractor of its responsibility for safety, nor shall such review be construed as limiting in any manner the Contractor’s obligation to undertake any action that may be necessary or required to establish and maintain safe working conditions at the airport. The Project-Specific Safety Plan shall comply with the safety and health rules governing the conduct of its employees, agents, consultants, and Subcontractors at and about the Project site. Contractor agrees that it shall ensure that its supervisory personnel, employees, agents, and Subcontractors comply strictly with such rules. JWA reserves the right to, from time to time, revise any such rules and the Contractor shall comply fully with such rules as revised in accordance with the foregoing provisions.

B. Contractor is required to submit the information in Exhibit 1, Contractor HSE Data Form, along with the Project-Specific Safety Plan.

A Project-specific HSE Action Plan or, in the case of hazardous waste operations, a Health and Safety Plan (HSP), must be generated by the Contractor mobilizing on the Project. Such Plan must include a Project-specific Emergency Response Action Plan in accordance with JWA, State, Federal, and FAA requirements.

C. If, at any time, the Project is regulated as a hazardous waste or emergency response operation, as defined in 29 CFR 1926.65 or 29 CFR 1910.120, then the Contractor has the choice of adopting the site HSP or developing a similar plan that is, at a minimum, equally protective and compliant. Contractor site personnel shall read and acknowledge by signature that they will comply with the applicable HSP.

D. Contractor shall furnish to JWA the names and qualifications of the Competent Persons and Qualified Persons who may be required for their scope of Work by Federal, State, or local regulations. Examples include Competent Persons and/or Qualified Persons for steel erection, excavation, scaffold erection, confined space entry, annual crane inspections, horizontal lifeline systems, etc.

E. Contractor shall include a First Aid Register form in the Project-Specific Safety Plan and shall be responsible for maintaining the Register for all employee injuries and illnesses reported on the Project.

F. Contractors must immediately inform JWA and Construction Managers of any CAL-OSHA, United States Environmental Protection Agency (EPA), South Coast Air Quality Management District (SCAQMD), or other HSE regulatory agencies’ inspections or other actions involving the Contractor’s Work.

G. Contractor employees must promptly report all potentially Work-related incidents, injuries, or illnesses to their Supervisor or their Site HSE Representative.
H. Contractor must promptly report all potential Work-related incidents, injuries, or illnesses to JWA and its Project Manager after the appropriate level of medical assistance has been arranged.

I. Injuries, illnesses, or any incident involving a third party or a member of the general public must be promptly reported by Contractor to JWA and its Project Manager.

J. Incidents involving potential exposures to hazardous materials and releases or spills of such materials must be promptly reported by Contractor to JWA in accordance with Section 5.4C - Spills below.

K. Accident investigation reports for all Contractor accidents, injuries, and Work-related illnesses shall be forwarded to JWA and the JWA Project Manager within 24 hours of the occurrence.

L. Contractor’s employees are required to participate in documented, daily task-specific Safe Plans of Action (Exhibit 3) and regular Safety Observation Reports (Exhibit 4).

M. Contractor will conduct weekly HSE meetings, and signed copies of the meeting reports shall be made available to JWA.

N. Contractor shall complete the Monthly Contractor’s Accident Statistics Report (Exhibit 2) for each month in which they conduct Work on the Project. These reports are due to JWA by the fifth business day of the month for the preceding month.

O. Contractor shall submit a shoring and fall protection plan to JWA and its Construction Manager’s HSE representative for approval prior to starting any concrete operations.

4.5. HSE TRAINING/COMMUNICATION REQUIREMENTS

A. Contractor employees must complete HSE training as required by applicable Contractor, JWA, State, and Federal HSE requirements. Such training may include, but is not limited to, a site-specific orientation and quiz provided by the Contractor, OSHA 10-Hour Construction Safety & Health Outreach Program, Safety Leadership Training for Supervisory Personnel, and ergonomics training. Documentation of all HSE training shall be maintained at the Project site by the Contractor and provided to JWA upon request.

B. Workers involved with hazardous waste operations, as defined by 29 CFR 1910.120 or equivalent applicable State regulations, shall have met, prior to any fieldwork activity or exposure, the training requirements of the standard. Certification of individual worker training shall be provided to JWA prior to commencing Work.

C. Contractors must certify that all operators of mobile equipment, such as forklifts, cranes, boom lifts, and buses, have been trained and/or certified on the proper operation of the equipment. Copies of this training and
certification shall be maintained on the Project site by the Contractor and forwarded to JWA prior to the employee being allowed to operate the equipment. Mobile crane operators must be qualified on each specific crane (type and rating) that they are assigned to operate through a testing and qualification procedure recognized by JWA. All crane operators shall possess an NCCCO certification or equivalent for the specific crane they are operating.

D. Contractors must establish a prompt and effective method of providing HSE communications, such as HSE alerts, advisories, bulletins, and regulatory updates, to all site employees.

4.6. BASIC HSE REQUIREMENTS

The following HSE rules list JWA’s fundamental requirements for Contractor HSE. When there are multiple rules that may apply, the most stringent (i.e., Contractor, JWA, State, or Federal) HSE regulations that govern the Work shall be followed.

A. Contractor shall, prior to commencing construction, designate a full-time onsite HSE Representative with the necessary qualifications and experience (i.e., a degree or college coursework from an accredited university or college program, and/or equivalent experience, and/or appropriate industry/professional certification) to supervise the implementation and monitoring of all safety precautions and programs related to the Work. At a minimum, the HSE Representative shall submit a Project-Specific Safety Plan for approval, shall make routine daily inspections of the site, and shall hold safety meetings with Contractor personnel, Subcontractors, and others as applicable. The HSE Representative shall liaise and coordinate activities with the TSA Safety Coordinator and JWA’s HSE representative.

B. Contractor shall also obtain the services of a certified Industrial Hygienist for regular monitoring of dust and other conditions in and around the site, especially in the TSA facility.

C. The Contractor shall conduct a preconstruction and Safety Kick-off meeting with their personnel and their Subcontractors, at which time a list of safety considerations will be discussed.

D. The Contractor shall hold safety meetings at the start of the project, every 7 days thereafter, at the beginning of each phase of the Project, at the introduction of new personnel onsite, and when new security procedures are established. The meeting shall cover the items in the Project-Specific Safety Plan and review security procedures.

E. Hard hats (ANSI Z89.1 or equivalent) shall be worn at all times regardless of the worker’s activities. This includes welders when using welding hoods.

F. Shirts with at least 4-inch sleeves shall be worn at all times. No tank tops are allowed. Loose or frayed clothing, loose or hanging long hair, ties,
rings, body jewelry, etc. shall not be worn around moving machinery or other areas where they may become tangled.

G. Hearing protection shall be worn when exposures exceed 85 dBA.

H. Hard-toe footwear (ASTM F2412 or F2413, or equivalent) shall be worn by all workers when in the construction environment or in areas where there is a danger of foot injuries due to falling, rolling, or piercing objects or when employee’s feet are exposed to electrical hazards.

I. Safety glasses with rigid side shields (ANSI Z87.1, or equivalent) shall be worn at all times when in the construction environment and in any area where eye hazards exist. This includes under welding hoods and for workers with prescription eyewear. Safety goggles may be worn over non-safety prescription eyewear.

J. Face shields must be worn in addition to safety glasses when grinding, chipping, jack hammering, and power sawing or when conducting other tasks that involve such face and/or eye hazards.

K. Gloves, appropriate for the hazard present, shall be worn when hands are exposed to absorption of harmful substances, cuts, abrasions, punctures, biological hazards, chemical burns, thermal burns, or harmful temperature extremes.

L. Contractors shall comply with the 100% Fall Protection Policy, which states “anytime employees are working from an unprotected elevation of six feet or more, fall protection must be used.” Working as stated above means while traveling, stationary, or at any time exposed to a fall from a surface not protected by approved handrails, guardrails, or some other approved fall elimination device. JWA prohibits the use of positioning devices as the sole means of fall protection when working above 6 feet. Positioning device means a body harness system rigged to allow a worker to be supported on an elevated vertical surface, such as a wall, and work with both hands free.

M. The use of “passive” systems, such as safety nets, monitoring systems, or controlled access zones, as the sole means of fall protection when working above 6 feet is prohibited. Safety nets are prohibited as an independent means of fall protection.

N. Workers in mechanical lifts, including scissor lifts, boom trucks, suspended or supported personnel baskets, articulating lifts, and other similar devices must use fall protection equipment at all times. Handrails on lifts may only be used for fall protection anchor points if approved by the manufacturer. Such devices shall not be used as elevators to transport workers to different Work locations.

O. All portable ladders must be clearly marked with the Contractor/Subcontractor’s name.
P. The common types of portable ladders are: fiberglass or reinforced plastic ladders. Metal ladders are not allowed on site. It is not the purpose of this program to specify all the details of construction for all the portable ladders. The scope is to provide information on the most common types used. See, the American National Standard Institute, ANSI A14.1-1994, ANSI A14.2-1990, et al. provided in Title 8, CCR, Subchapter 4 CSO, Article 25 Ladders, Sections 1675-1678.

Q. The safest means of worker access for overhead Work (e.g., rolling scaffolds, mechanical lifts, platform ladders) shall be considered as alternatives to the use of portable ladders. The top of all ladders shall be tied to a substantial anchor point and extend at least 3 feet above the landing before use, and a second worker must hold the ladder until the tie-off is secure.

R. Detailed requirements relating to fall protection for employees working on scaffolds are provided in Title 8 CCR, Subchapter 4 CSO, Article 21, Scaffolds – General Requirements, Sections 1635.1-1637, and Article 22, Scaffolds – Various Types, Sections 1640-1655. Anyone erecting, maintaining or using scaffolding shall also comply with the requirements set forth by this standard, as well as any applicable state or local safety or building code. Anyone who works on a scaffold must be trained to recognize hazards associated with the type of scaffold they are using and to understand the procedures to control or minimize these hazards.

S. Three-point contact is considered acceptable fall protection for fall exposures of less than 6 feet. Personal fall arrest system must be used for fall exposure above 6 feet.

T. Decking sections shall be laid tightly and immediately secured upon placement to prevent accidental movement. During initial placement, decking sections shall be placed in such a manner to ensure full support by structural members, and each piece shall be individually secured. Pre-installation or shake-out of multiple sections of decking using temporary methods of attachment, such as tack welding, is not allowed. The use of controlled decking zones is not allowed.

U. Equipment and tools shall not be altered in any way to adapt it for a job for which the manufacturer does not intend it, without written approval of the manufacturer. Only trained and authorized persons shall operate machinery or equipment.

V. All hand-held power tools must be equipped with constant pressure switches that will automatically shut off power when the pressure (worker’s hand) is removed. Hand-held power tools with on/off or lock-on switches are not allowed.

W. Ground Fault Circuit Interrupters (GFCIs) shall be used to protect all temporary electrical wiring and cord sets. The use of assured grounding (quarterly equipment inspections) in lieu of GFCIs is not an option.
X. Lock-out/tag-out procedures must be followed to minimize the potential exposure of workers to hazardous energy. Hazardous pipelines or vessels will be isolated by using a double block and bleed system or by blanking. Every effort must be made to de-energize electrical equipment to be worked on and other electrical equipment in the area that may affect the Work. If the equipment cannot be isolated or de-energized, then written approval must be obtained from JWA/Construction Manager before Work proceeds. Only “Qualified Electricians” may work on energized or potentially energized circuits. See Title 8 CCR, Subchapter 5 Electrical Safety Orders, and Groups 1 & 2 for qualified electrician requirements. JWA considers equipment rated at 480 volts and above as “high voltage.”

Y. Contractor shall comply with the provisions of NFPA 70E, “Standard for Electrical Safety in the Workplace.” Contractors shall ensure that their employees are trained in safe work practices, that they are qualified, and that they are provided equipment, tools, and personal protective equipment (PPE) that are specified in NFPA 70E.

Z. Confined space entry Work must follow a documented hazard assessment and safe work planning process, which must be submitted to JWA/Construction Manager for review prior to entry. Contractors that encounter potential confined spaces shall notify JWA Construction Manager’s HSE Representative. Each confined space will be evaluated by the Contractor’s Industrial Hygienist to determine its status as permit or non-permit required. All confined space activities at JWA must conform to the Confined Space standard 29 CFR 1910.146.

AA. High-visibility reflective safety apparel/vests (ANSI/ISEA 107, Class 2, or 3) must be worn by all personnel in the construction environment. Vests are also required for other work that places personnel, such as flaggers, riggers, and survey crews, near mobile equipment.

BB. Motor vehicles and mobile equipment shall never be left running without an operator at the controls. Proper use of seatbelts by all occupants is mandatory. Motor vehicle operators are prohibited from using a mobile phone or two-way radio. This applies to both hands-free and non-hands-free devices. If the use of such a device by the motor vehicle operator is necessary, then it is only allowed when the motor vehicle is stationary and in a safe location off the roadway.

CC. For movement of mobile equipment in congested areas, a designated flag-person shall be in full view of the operator and shall direct the movement. In some cases, multiple flag-persons may be required.

DD. Mobile lifts having any of the following characteristics or conditions are defined as “critical lifts” and require approval from JWA for their operation by Contractor:

1) over 50 tons,
2) exceeding 85 percent of the crane’s capacity,
3) involving more than one crane,
4) of a non-rigid object,
5) over active Work areas,
6) in active process facilities,
7) over pipelines,
8) near power lines or public property, or
9) in confined or tight Work areas,

EE. All outriggers on mobile cranes must be fully extended and fully deployed when the crane is used to lift or support a load. If, due to configuration or physical location, all outriggers cannot be fully deployed, then calculations must be made from the “on-rubber” section of the load chart. On-rubber lifts and pick-and-carry operations require JWA/Construction Manager written approval.

FF. Anti two-block devices that automatically disengage crane hoist/boom functions when the hook or block approaches the jib or boom tip are required on all cranes.

GG. Multiple lift rigging (Christmas tree lift) is not allowed.

HH. All skid-steer style loaders shall be fitted with a manufacturer-approved safety glass front door, front cage cover of equivalent effectiveness, or other device designed to keep the operator’s hands and arms inside the protective cage. Operators are also required to use a manufacturer-approved shoulder harness.

II. Smoking is allowed only in designated smoking areas that have been approved by JWA.

4.7. CERTIFICATION, INSPECTIONS, AND REGULATORY AGENCY PERMITS

A. Certain operations may require a JWA permit. Such activities may include, but are not limited to, hot Work, confined space/vessel entry, excavations, asbestos abatement, and lead abatement. The Contractor shall obtain a JWA permit for such operations when required.

B. Contractor is responsible for securing and complying with any permit required by state or local authority for specific activities such as excavations, heavy lifts, asbestos/lead abatement, air permits, water permits, and hazardous waste generation. Copies of all permits shall be forwarded to JWA prior to Work beginning.

C. A third-party certified inspector shall make a thorough annual inspection of all cranes and powered hoisting equipment. Cranes assembled onsite shall receive an annual inspection prior to being put into service. Documentation of all crane inspections shall be provided to JWA and must be maintained onsite by the Contractor.

D. All scaffolding must be inspected and tagged by a Competent Person prior to initial use, before each work shift, and after any event that could affect
its structural integrity. Suspended scaffolds must receive documented daily pre-use inspections. Untagged scaffolds must not be used.

E. Mobile equipment must receive daily pre-use inspections, which will be documented. Examples include forklifts, backhoes, and personnel lifts/manlifts.

4.8. HAZARDOUS CHEMICALS

A. Contractors shall include planning for environmental compliance in the preparation of their HSP or HSE Action Plan. Issues to be considered include, but are not limited to, release reporting, air permits, water permits, asbestos/lead permits or notifications, hazardous waste generation and related disposal procedures, spill mitigation, and clean-up methods.

B. If hazardous materials (e.g. asbestos, lead, PCBs) are suspected to exist in an unidentified area, or are found in any place within the construction environment the Contractor shall immediately stop work and notify JWA and the Construction Manager. Contractor will initiate the abatement of any such hazardous materials that are the result of operations as required by law, prior to construction work continuing. Abatement of pre-existing hazardous materials whether known or found during the course of the Work under this agreement will be the responsibility of the County. The County, at its option, may request the Contractor to submit a Request for Change Order for the abatement of hazardous materials under Section 16-Changes.

C. Contractor shall have a written Hazard Communication Program and comply with the requirements of that program. A copy of the program shall be forwarded to JWA and the Construction Manager prior to mobilization, and a copy shall be in the possession of the Contractor on the site.

D. Any potentially hazardous material or chemical brought onto the site shall be accompanied by an MSDS and other permits and reporting requirements described in Section 5.4 below. Copies of MSDSs and other reporting requirements shall be forwarded to JWA and the Construction Manager before the product is brought onto the site.

E. Small quantities (less than 10 gallons) of hazardous liquids, such as gasoline, diesel fuels, and solvents, brought onto the site shall be stored in a properly labeled safety container with a flame arrestor and self-closing lid.

F. JWA and its Construction Manager shall be notified before any chemical or material is used that could create foul-smelling, noxious, or toxic vapors or gases.

G. If Contractor spills, or detects a release, of a hazardous material on JWA property, it must report such condition immediately to the Orange County Sheriff at JWA at (949) 252-5000 and the Construction Manager as described in Section 5.4C - Spills below. Analytical testing may be
necessary to determine the extent of the contamination and the acceptable cleanup level. Contractor shall clean up and restore the contaminated area to levels acceptable to JWA and any applicable regulatory standards. If the Contractor performs the cleanup, proper documentation, including manifests, for the disposal of the hazardous material, contaminated soil, and any other materials contaminated during the spill or release must be provided to JWA.

H. All accidents involving exposure to potentially hazardous materials and hazardous material releases (as defined by EPA-RCRA), whether or not caused by the Contractor, must be immediately reported to the Orange County Sheriff at JWA and the Construction Manager as described in Section 5.4C - Spills below. It is important to report all releases or exposures even though the incident may be considered minor or no adverse health effects or symptoms are apparent at the time.

4.9. RESPIRATORY PROTECTION

A. If Contractor plans to use respirators as a part of its Work operations, then Contractor is required to forward to JWA Project Manager a copy of Contractor’s written Respiratory Protection Program. Refer to 8 CCR, Subchapter 7 GISO, Group 16, Article 107, Section 5144.

B. Contractor shall use wet cutting methods to eliminate the hazard of airborne silica and other particles.

4.10. HSE SURVEYS

A. JWA will conduct periodic HSE surveys of the site. Any HSE discrepancy observed shall be reported to the appropriate Contractor representative for immediate correction.

B. These HSE surveys do not relieve the Contractor, or its Subcontractors, of their responsibility to self-inspect their Work and equipment and to conduct their Work in a safe and environmentally compliant manner.

4.11. PLANNING AND OBSERVATION PROCEDURES

To achieve JWA’s goal of Zero Incidents, the following shall be implemented by the Contractor:

A. The Safe Plan of Action (SPA), the Task Awareness (TA), and the Safety Observation Report (SOR) process require each worker to receive on-the-job training from their direct Supervisor. Subcontractor employees shall also be trained and educated on their individual responsibilities contained in these tools by Contractor after mobilization.

B. SAFE PLAN OF ACTION

The SPA is developed by the crew assigned to perform the Work with guidance from their Supervisor (Exhibit 3). The Supervisor identifies the Work area and task to be performed and then leads the crew in developing an SPA.
Creating the SPA requires the Supervisor to solicit crew participation in identifying hazards and hazard control measures, such as PPE, training requirement, permits, and procedures.

Members of the team are required to sign the SPA document to indicate their understanding and agreement to follow the plan.

C. TASK AWARENESS

The Task Awareness (TA) meeting is a daily HSE briefing associated with the task(s) that are scheduled for the crew during the work shift.

These meetings generally take from 2 to 10 minutes and address the HSE measures specific to the tasks.

TA meetings shall be conducted at least daily and whenever a task presents a change of hazards from the previous tasks.

D. SAFETY OBSERVATION REPORTS

The SOR, Exhibit 4, is a proactive process designed to identify and document HSE-related acts and conditions in the Work environment. All Contractor/Subcontractor’s supervisors are required to participate in the SOR process by generating written SORs and turning them in to JWA Site/Project Management at least weekly.

The SOR allows any site worker to record observed proper or improper HSE practices and identifies the cause of any deficiencies so that corrective action can be taken.

4.12. ACCIDENT/INCIDENT INVESTIGATION

A. A formal accident investigation must be conducted when an accident occurs, including non-injury incidents, most first-aid type accidents, and environmental releases or spills.

B. In the event of a workplace accident, injury, or illness, the most important immediate actions are to provide medical assistance to those who may need it and to ensure the safety of others that may be affected or acting as emergency responders.

C. Securing the accident scene is essential to ensure an effective accident investigation. No materials or equipment shall be moved until a review of the accident is completed, except when securing equipment or materials that could result in further injury.

D. Obtain witnesses’ names, permanent addresses, and signed statements of their complete factual observations (Exhibit 6).

E. All accident investigations must be documented using the Accident Investigation Report (Exhibit 5). All required reports shall be completed and copies provided within 24 hours to the JWA/Construction Manager.

4.13. DRUGS, ALCOHOL, AND CONTRABAND

GENERAL REQUIREMENTS 9-41
A. Contractor shall implement a Drug, Alcohol, and Contraband Policy, including post-incident testing, which meets the requirements of JWA. JWA, except where prohibited by law, shall have access to Pre-access/Pre-assignment testing.

B. Post-incident testing is required of any worker involved in a Project-related workplace incident that results, or could have resulted, in injury to any person requiring medical treatment beyond first aid, any type of medical attention given by a third-party medical services provider (e.g., hospital, clinic, doctor), a motor vehicle incident, or property damage.

C. Post-incident testing must be conducted as soon as possible after the incident occurs.

D. Reasonable suspicion testing: Upon reasonable suspicion by Contractor or Subcontractor management that a worker is under the influence of a drug, alcohol, or other prohibited substance, the worker(s) shall be immediately removed from the Project and surrender their Project credentials. Personnel so removed may only be allowed to return with a negative test result and written permission of JWA.

E. Periodic random or unannounced testing: For workers randomly selected or chosen by job classification or worksite, the percentage of the workforce or the number of workers selected for testing shall be specified on a Project-specific basis and stated in the Project’s HSP.

F. Possession or use of alcohol in any company-provided vehicle or on the Project site is prohibited.

G. Any worker whose drug or alcohol test is positive will be removed from the Project and required to surrender their Project credentials. Refusal to submit to drug or alcohol testing, or attempts to tamper with, adulterate, dilute, or otherwise tamper with a test sample will be treated the same as a positive test result.

H. Contractor shall adopt collection, chain-of-custody, and other related procedures consistent with sound industry practice.

I. JWA’s drug and alcohol testing requirements may be more stringent than the Contractor minimums. If so, JWA requirements shall be enforced.

J. If JWA suspects that a worker is in possession of illegal drugs, alcohol, or contraband, JWA may request the individual to submit to a search of his or her person, personal effects, vehicles, lockers, and baggage. Any suspected contraband will be confiscated and turned over to law enforcement, as appropriate. JWA shall have the right to review the Contractor’s Drug, Alcohol, and Contraband Policy and to audit the Contractor’s implementation of their program at the jobsite.

K. Contractors shall comply with all applicable federal, state, and local alcohol and drug-related laws and regulations.
4.14. MEDICAL AND EXPOSURE MONITORING

A. In the event that the Contractor is involved with operations, such as those involving hazardous waste, asbestos or lead abatement, or certain carcinogenic compounds, the Contractor shall describe its medical and exposure monitoring procedures and its proposed compliance methods in their HSE Action Plan or HSP.

B. Employees involved in these operations shall have met, prior to any fieldwork activity or exposure, the medical requirements of applicable regulations or standards including, but not limited to, a baseline medical exam and periodic update exams, as required.

C. Employee medical requirements and limitations shall be considered prior to the use of certain types of PPE, such as respirators.

4.15. IMMINENT DANGER SITUATIONS

A. Upon discovery of any situation that may, in the opinion of JWA, JWA/Construction Manager/HSE representative, reasonably be expected to cause serious physical harm, illness, death, or significant environmental damage, shall suspend the related Work immediately. Work may resume only after the HSE concern(s) have been corrected, to the satisfaction of JWA. Examples of “imminent danger” situations may include, but are not limited to, the following:

1) Falls from elevations
2) Excavations not properly sloped or shored
3) Electrocution hazards
4) Work activities posing injury hazards to the general public
5) Operation of vehicles, machinery, or heavy equipment in an unsafe manner
6) Improper Lock Out/Tag Out procedures

B. In addition to the immediate suspension of Work, the procedure for correction of imminent danger situations follows the “HSE Adherence Policy” set forth below.

4.16. HSE ADHERENCE POLICY

The following three-step, progressively administered system shall be followed to correct compliance problems; however, noncompliance issues may be cause for termination of the Contract.

A. Action Level One – A written “Notice of HSE Non-Compliance” (Exhibit 7) shall be issued by JWA or the Construction Manager if a Contractor fails to comply with an applicable HSE standard. JWA or the Construction Manager may inform other company officials.

B. Action Level Two – If item(s) of HSE noncompliance are not corrected by Action Level One, or if the Contractor repeatedly fails to comply with the
applicable HSE regulations, then JWA/Construction Manager will issue a “Written Notice of Temporary Job Suspension” (Exhibit 8) to the Contractor. The Contractor’s Work may not resume until the Contractor has proposed corrective actions that are acceptable to JWA. Actions that may be considered include, but are not limited to:

1) Removal of certain Contractor personnel from the project;
2) Alteration of the Contractor’s job procedures; or
3) Implementation of corrective action by JWA with back charges to the Contractor.

The Contractor shall not resume Work until JWA Management accepts the proposed corrective actions. Contractor shall be responsible for, and shall not have any right for additional time or compensation due to the stoppage.

C. Action Level Three – If Action Levels One and Two do not result in the Contractor’s HSE performance being brought into compliance, then Contract termination may result. JWA Management may terminate the Contract after verifying with JWA Site/Project Management that the HSE adherence procedure has been followed and after giving the Contractor applicable notice.

4.17. EXHIBITS

Exhibit 1, Contractor HSE Data Form
Exhibit 2, Monthly Subcontractor HSE Statistics Report
Exhibit 3, Safe Plan of Action
Exhibit 4, Safety Observation Report
Exhibit 5, Accident/Incident Investigation Report
Exhibit 6, Witness Statement
Exhibit 7, HSE Notice of Non-Compliance
Exhibit 8, HSE Temporary Stop Work Notice
### Exhibit 1 — Contractor HSE Data Form

Provide HSE Performance History for Last Three Full Years

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<thead>
<tr>
<th>Enter Year</th>
<th>20__</th>
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<td>Workers Compensation Experience Modification Rate (EMR)</td>
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<td>If self-insured, provide employee work hours per claim</td>
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<td>Number of employee hours worked</td>
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<td>Number of fatalities (Column G on OSHA Form 300; provide explanation on separate sheet for each fatality)</td>
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<td>Number of cases involving days away from work (Column H on OSHA Form 300)</td>
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<td>Number of job transfer or restricted duty cases (Column I on OSHA Form 300)</td>
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<tr>
<td>Number of “other recordable cases” (Column J on OSHA Form 300)</td>
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<tr>
<td>Total of all cases above (fatalities, days away from work, transfers or restricted duty, and other recordable cases, i.e., the total of Columns G, H, I, and J)</td>
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<td>OSHA Incidence Rate (total recordable cases x 200,000/total work hours)</td>
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<td>Number of citations by OSHA and other HSE regulatory agencies (provide details for each on a separate sheet)</td>
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<td>Number of miles driven on company business</td>
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<td>Miles driven divided by number of vehicle accidents</td>
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### HSE Program

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<td>Do you have a written HSE program?</td>
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<td>Do you have a written drug and alcohol abuse prevention program, which includes pre-employment, reasonable suspicion, and post incident testing?</td>
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<td>Do you have a written respiratory protection program?</td>
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Do you have a training program for newly hired or promoted first line supervisors? If yes, does it contain instructions on:

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</tr>
<tr>
<td>First Aid Procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazard Recognition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE Supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Reporting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Employee Orientation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe Work Practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailgate/Toolbox HSE Meetings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Supervisor HSE meetings are conducted:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bi-weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly</td>
<td></td>
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<tr>
<td><strong>Yes</strong></td>
<td><strong>No</strong></td>
<td></td>
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<tr>
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<tr>
<td><strong>Less often, as needed</strong></td>
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</tbody>
</table>

**Do you conduct field HSE inspections of work in progress?**

**If yes, who conducts the inspections?** ______________________________

**How often?** ________________

**Are accident reports circulated to your management?**

**Is HSE a (documented) weighted factor in evaluating in the performance of:**

- Foreman
- Supervisor
- Management

**Does your firm hold “Toolbox” HSE Meetings? If yes, how often:**

- Weekly
- Bi-weekly
- Monthly
- Less often, as needed

### **HSE Staff**

<table>
<thead>
<tr>
<th><strong>Number</strong></th>
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</thead>
</table>

**How many full time HSE professionals do you have on staff?**

**How many full time industrial hygienists do you have on staff?**

**How many full time physicians do you have on staff?**

**Who is the most senior staff HSE professional at your company?**

<table>
<thead>
<tr>
<th><strong>Name:</strong></th>
<th><strong>Title:</strong></th>
<th><strong>Phone:</strong></th>
</tr>
</thead>
</table>

**Who should we contact to discuss the details of the information contained in this document?**

<table>
<thead>
<tr>
<th><strong>Name:</strong></th>
<th><strong>Title:</strong></th>
<th><strong>Phone:</strong></th>
</tr>
</thead>
</table>
Exhibit 2—Monthly Contractor HSE Statistics Report
Monthly Project Safety Performance Summary Form

Month/Year: 

College: 

Project Manager: 

<table>
<thead>
<tr>
<th>Project No.:</th>
<th>Title/Description:</th>
</tr>
</thead>
</table>

Contractor/Subcontractor Name(s): 

Date: 

Contractor Project Manager/Superintendent: 

Reporting Period: 

<table>
<thead>
<tr>
<th></th>
<th>This Month</th>
<th>Year to Date</th>
<th>Project to Date</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours Worked</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Aid Cases</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Doctor Cases</td>
<td></td>
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<tr>
<td>Recordable Cases</td>
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</tr>
<tr>
<td>Lost-Time Cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days Lost</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recordable Incident Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lost-Time Incident Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days-Lost Incident Rate</td>
<td></td>
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</tbody>
</table>

Notes:

Recordable Incident Rate = $\frac{\text{Recordable Cases} \times 200,000}{\text{Hours Worked}}$

Lost-Time Incident Rate = $\frac{\text{Lost Time Cases} \times 200,000}{\text{Hours Worked}}$

Days-Lost Incident Rate = $\frac{\text{Days Lost} \times 200,000}{\text{Hours Worked}}$
Exhibit 3 — Safe Plan of Action

Project No.: ________________________________________________

Activity/Task: ________________________________________________

Work Area: ________________________________________________

Date: ________________________________________________

<table>
<thead>
<tr>
<th>Steps of Activity/Task</th>
<th>Hazard/Reaction to Change</th>
<th>Safe Plan</th>
<th>Resources</th>
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</thead>
<tbody>
<tr>
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Signatures of Persons Involved in Development of SPA

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Supervisors Signature: _____________________________________________________

Date: ___________________________________________________________________

Review checklist while completing front page of SPA. Check all that apply.
A new SPA is required if the job scope or work conditions change.

### Required Permits

<table>
<thead>
<tr>
<th>Permits</th>
<th>Hazards</th>
<th>Safe Plan</th>
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</thead>
<tbody>
<tr>
<td>Critical Space</td>
<td>Overhead Utilities</td>
<td>Power de-energization required, Insulation blankets required</td>
</tr>
<tr>
<td>Hot Work</td>
<td>Crane or other Lifting Equipment</td>
<td>Wire watcher required, Required clearance distance = _____Ft. Safe work zone marked</td>
</tr>
<tr>
<td>Lock Out/Tag Out</td>
<td>Signalman assigned, Tag lines in use, Area around crane barricaded, Lifting equipment inspected, Personnel protected from overhead load</td>
<td></td>
</tr>
<tr>
<td>Soil Disturbance (Over 12&quot;)</td>
<td>Reviewed as-builds, Subsurface surveys, Received dig permit, Required clearance distance = _____Ft. Safe work zone Marked</td>
<td></td>
</tr>
<tr>
<td>Utility Clearance</td>
<td>Underground Utilities</td>
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</tbody>
</table>

### Required PPE

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<tr>
<th>PPE</th>
<th>Hazards</th>
<th>Safe Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Hat, Class C</td>
<td>Overhead Utilities</td>
<td>Permit required? Confirm that equipment is de-energized, Reviewed electrical safety procedures</td>
</tr>
<tr>
<td>Hard Hat, Class E (Elect. Protect)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ear Plugs/Ear Muffs</td>
<td>Excavations</td>
<td>Proper sloping/shoring, Proper protection from accumulated water</td>
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</table>

### Eye Protection:

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<thead>
<tr>
<th>Protection</th>
<th>Hazards</th>
<th>Safe Plan</th>
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</thead>
<tbody>
<tr>
<td>Safety Glasses</td>
<td>Fire Hazard</td>
<td>Inspect general cond., PPE required, Inspect electrical safety procedures, Review fire extinguishers, Fire watch</td>
</tr>
<tr>
<td>Face Shield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Goggles</td>
<td>Vehicular Traffic or Heavy Equipment</td>
<td></td>
</tr>
<tr>
<td>Welding Hood</td>
<td>Noise &gt;85 dB</td>
<td>Hearing protection required, Ear plugs, Ear Muffs, Both</td>
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</table>

### Hand Protection:

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<tr>
<th>Protection</th>
<th>Hazards</th>
<th>Safe Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut Resistant Gloves</td>
<td>Hand &amp; Power Tools</td>
<td>Inspect general condition, List sharp tools, material, equipment: PPE gloves, etc. Properly cut, sharp edges as necessary</td>
</tr>
<tr>
<td>Welders Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrile Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elect. Insulated Gloves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arm Sleeves</td>
<td></td>
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</tbody>
</table>

### Foot Protection:

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<thead>
<tr>
<th>Protection</th>
<th>Hazards</th>
<th>Safe Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sturdy Work Boots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Toe Boots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber Boots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber Boot Covers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dielectric Footwear</td>
<td>Pinch Points List potential pinch points: Working near operating equipment, Hand/Body positioning</td>
<td></td>
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</table>

### Respirator Protection:

<table>
<thead>
<tr>
<th>Protection</th>
<th>Hazards</th>
<th>Safe Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust Mask</td>
<td>Working w/ Chemicals</td>
<td>List specific chemicals involved and list hazards and precaution on front side. Reviewed MSDS, Exposure Monitoring required</td>
</tr>
<tr>
<td>Air Purifying Respirator</td>
<td>Asbestos or Lead Paint Potential</td>
<td>Have proper containers and labels. Asbestos controls incorporated, Lead based point controls in place</td>
</tr>
<tr>
<td>Supplied Air Respirator</td>
<td>Heat Stress Potential</td>
<td>Exposure monitoring conducted, Cool down periods, Sun Screen, Reviewed Heat Stress symptoms</td>
</tr>
<tr>
<td>SCBA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency Escape Respirator</td>
<td></td>
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</tr>
</tbody>
</table>

### Special Clothing:

<table>
<thead>
<tr>
<th>Protection</th>
<th>Hazards</th>
<th>Safe Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyvek ®</td>
<td>Cold Stress Potential</td>
<td>Proper clothing (i.e. gloves, coat, coveralls), Warm up periods</td>
</tr>
<tr>
<td>Poly Coated Tyvek ®</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Resistant Coveralls</td>
<td>Natural or Site Hazards</td>
<td></td>
</tr>
<tr>
<td>Rain Suit</td>
<td></td>
<td></td>
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<tr>
<td>Safety Vest</td>
<td></td>
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</table>

### Fall Protection:

<table>
<thead>
<tr>
<th>Protection</th>
<th>Hazards</th>
<th>Safe Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Anchorage Connector Needed e.g. Cross Arm Strap, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retractable Device Needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal Life Line System Req’d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Clearance Distance Adequate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Rescue/Retrieval Plan Set Up</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Additional Information:

- Caution barricade tape required, Danger barricade tape required
- Rigid railing required, Covers over opening, Warning signs required

---

**GENERAL REQUIREMENTS**

9-50
SAFETY OBSERVATION REPORT (SOR)

Date: ___________ Time: __________ Location: ___________________

Contractor: ______________________________________________________

Person Submitting This Report: ______________________________________

Observation: _______________________________________________________

_________________________________________________________________

_________________________________________________________________

Action Taken:  _____________________________________________________

Action to Prevent Recurrence: _________________________________________

Indirect Cause: _____________________________________________________

Corrective Action: _________________________________________________

Further Action or Help Needed? ______________________________________

_________________________________________________________________

_________________________________________________________________

Signature: _________________________________________________________
Exhibit 5 — Accident/Incident Investigation Report

Date of Accident: _________  Time of Accident: _______  Company: ______________

Date of Investigation: ____________  Job Number:____________  Client:  ___________

Location of Accident: ______________________________________________________

Did injury result?  Yes / No  If yes, provide Employee Name(s):  ____________________

S.S. No.:__________  Skill: ___________  Yrs. in this Skill: __  Yrs. with Company: ___

Describe Type of Injury: ___________________________________________________

Was JWA property damaged?  Yes / No  If yes, describe damage: ___________________

Was Other Contractor property damaged? Yes/No  If yes, describe damage:___________

Is damaged property secured / maintained?  Yes / No,  Person Maintaining __________

Names of Witnesses/Coworkers (With Social Security No.):  _______________________

Weather / Wind Conditions: _________________________________________________

List/Describe all personal protective equipment (PPE) in use by person exposed or injured:

______________________________________________________________________________

If Chemicals Involved:

Name(s) of Chemical(s) Encountered: ____________________________________________

Form of Chemicals (Solid, Liquid, Gas, Vapor, Dust, Mist Fume):____________________

Describe Radiological Materials (if any):___________________________________________

Volume or Quantity Released: __________________________________________________

Description of Accident:
**Contributing Factors:**

What corrective actions are being taken to prevent recurrence? Also list the person responsible for implementing and the target completion date for each item.

Was an SPA/JSA developed for the task being performed? Yes / No  If yes, attach a copy.

Was a permit issued? Yes / No  If yes, attach a copy of the permit in effect at time of the accident.

Indirect cause of accident: **Lack of:** Training___, Resources___, Belief___ (*explain)

---

Basic cause of accident: **Failure to:** Plan__, Direct__, Organize__, Control__(*explain)

---

**INVESTIGATION TEAM MEMBERS:**

Injured / Involved: ________________________ _____________________

Name ________________________ Signature ________________________

Supervisor: ________________________ _____________________

Name ________________________ Signature ________________________

Site Manager: ________________________ _____________________

Name ________________________ Signature ________________________

Health and Safety Representative: ________________________ _____________________

Name ________________________ Signature ________________________

Name (Others) ________________________ _____________________

Title ________________________ Signature ________________________

Name (Others) ________________________ _____________________

Title ________________________ Signature ________________________

Client Representative(s) Contacted: ___________________________________________

Agency Representative(s) Contacted: __________________________________________

* Attach additional sheets and supplemental data & information as necessary.

** Distribution: Original must be filed onsite; 1 copy must be sent promptly to the Corporate Health and Safety Department.
Exhibit 6 — Witness Statement

DATE:__________________________

NAME:_________________________________________ TITLE:__________________________

TEMPORARY ADDRESS:________________________ PHONE NO:________

PERMANENT ADDRESS:________________________ PHONE NO:________

LOCATION AT TIME OF ACCIDENT:_____________________________________________

DESCRIBE, TO THE BEST OF YOUR KNOWLEDGE, HOW THE ACCIDENT HAPPENED:

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________

_________________________________________________________________________
Exhibit 7

NOTICE OF SAFETY NON-COMPLIANCE

To: _______________________, Site Representative for _______________________

Your company has been found to be in non-compliance with one or more Federal, State, Company or JWA/Construction Management’s safety requirements as specified below. This safety non-compliance must be corrected immediately for your company to meet the requirements of your subcontract.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item of Non-compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>______</td>
<td>______________________</td>
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</table>

Applicable Safety Requirement _______________________________________

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item on Non-compliance</th>
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<tbody>
<tr>
<td>______</td>
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Applicable Safety Requirement _______________________________________

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item of Non-compliance</th>
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<tbody>
<tr>
<td>______</td>
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<td>______________________</td>
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</tbody>
</table>

Applicable Safety Requirement _______________________________________

Issued By: _______________________
Signature of Project Manager or Site Manager Date

Received By: _______________________

GENERAL REQUIREMENTS
Signature of Representative Receiving Notice   Date
Contractor’s Response(s)

cc:   Area Company Operations Manager
      Corporate Health & Safety Representative
## Stop-Work Order Form

<table>
<thead>
<tr>
<th>John Wayne Airport</th>
<th>Stop-Work Order</th>
<th>Project:</th>
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<tbody>
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<tr>
<th>Contract Number:</th>
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<tr>
<th>Issued To:</th>
<th>Contractor/Subcontractor:</th>
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<tr>
<th>Issued By:</th>
<th>Project Manager:</th>
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<thead>
<tr>
<th>Date:</th>
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<thead>
<tr>
<th>Verbal Stop-Work Notice Given To:</th>
<th>Date:</th>
<th>Time:</th>
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<tr>
<th>Reason for Stop-Work Order:</th>
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<tr>
<th>Corrective Action to Be Taken by Contractor:</th>
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|                               |       |       |
GENERAL REQUIREMENTS 9-58

Section 1.01 Corrective Action
Completed:

Authorized by:

Date:  Time:

Date:  Time:
5. ENVIRONMENTAL

5.1. COMPLIANCES

Contractor shall fully comply with all Environmental Laws and other relevant federal, state, common law and local laws, regulations, orders, and permits protecting human health and the environment including, but not limited to, A and B below. Contractor shall provide JWA with copies of all permits obtained, and reports filed pursuant to federal, state, or local Environmental Laws and regulations.

A. OSHA HAZARD COMMUNICATION STANDARD

Contractor shall fully comply with the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200 Revised, and furnish to their employees and JWA MSDSs for all hazardous materials that shall be furnished to and/or used on this project.

B. PROPOSITION 65

California's "Safe Drinking Water and Toxic Enforcement Act of 1986" (California Health and Safety Code Chapter 6.6 Division 20") requires identification of any chemicals on the California list of chemicals known to cause cancer or reproductive toxicity that are contained in any products being furnished for this project.

A list of currently regulated chemicals is available from the State of California Health and Welfare Agency, 1600 Ninth Street, Room 450, Sacramento, California 95814. For Contractor to be assured of knowing the chemicals currently on the list, and those that will be listed, it is necessary that the Contractor request to be included on the Health and Welfare Agency distribution list of Proposition 65 materials.

5.2. EROSION, STORM WATER CONTROL, AND CONTAMINATION

A. STORM WATER LAWS AND REGULATIONS

Federal regulations for storm water discharges were issued by EPA (40 CFR Parts 122, 123, and 124). The regulations require operators of specific categories of facilities, such as airports, where discharges of storm water associated with industrial activity (i.e., storm water) occur, to obtain an NPDES permit.

Three types of activities are required to be permitted. The airside airfield of JWA is considered an industrial activity; therefore, it is covered by an industrial permit. The landside of the airport, parking lots, and roadways are considered a municipal activity and are covered by a municipal permit issued to the County. Construction activities are regulated by a construction permit issued to JWA.

The County’s Water Quality Ordinance (OCCO Title 4, Division 13, Sections 4-13-10 et seq.) regulates the Non-Storm Water Discharge into the
County’s Separate Storm Water Sewer System to reduce the discharge of pollutants into the waters of the State. The Clean Water Act (CWA) and the resulting NPDES permit (CAS 618030) require the County to take steps to reduce pollutants leaving its systems to the maximum extent practicable. In early 2002, the California RWQCB, Santa Ana Region, issued revised NPDES permit (Board Order R8-2002-0010) to the County of Orange, OCFCD, and all incorporated cities as co-permitees hereinafter referred to as the Orange County Municipal Permit (OCMP). The revised permit requires the County to adapt and implement a Local Implementation Plan (LIP) to implement new and stricter programs and procedures and the revision of applicable ordinances. The purpose of the LIP is to eliminate all prohibited discharges that contain any pollutant from public or private property to the storm water drainage system.

In the furtherance of these regulations and Section 402 of the CWA, the State of California has adopted a General Permit for discharges of Storm Water associated with industrial activities: "State Water Resources Control Board (State Water Board) Water Quality Order No. 97-03-DWQ, NPDES General Permit No. CAS 000001 (General Permit).” JWA and its tenants have applied for and received coverage for Storm Water and authorized Non-Storm Water Discharge pursuant to the general permit for the industrial activities and are subject to the permit’s requirements, conditions, and penalties. The permit prohibits discharges of materials other than Storm Water (i.e., Non-Storm Water Discharges) that discharge either directly or indirectly to waters of the United States. The permit requires the development and implementation of an effective Storm Water Pollution Prevention Plan (SWPPP) and Monitoring Program Plan (MPP).

JWA will file a Notice of Intent (NOI) to be covered by the statewide General Storm Water Permit for construction activities for all projects that disturb 1-acre or more of soil. Unless Contractor is conducting Work solely within the confines of a building or structure and they have no construction lay-down areas, Contractor shall submit to JWA for approval an SWPPP. Contractor shall comply with all applicable laws, regulations, and permits pertaining to storm water control and discharge.

Where provisions of the pertinent specifications, standards, codes, etc., conflict with one another, the most stringent provisions shall govern. See Section 1.1 for a list of definitions and terms as used throughout this Contract.

JWA’s NPDES permit does not allow for any discharge into the Storm Drain System. Non-Storm Water Discharge that results from discharges of water from fire-fighting or training, or flushing of fire hydrants is excluded from Non-Storm Water Discharge regulations. Likewise, irrigation water and water used to establish erosion control landscaping are excluded from prohibition.
Contractor is advised that the NPDES permit does not allow water from the hydrants to be used to wash down or clean Work areas and/or equipment. Contractor agrees that any water or other fluid used for such purposes shall be contained within the site and prevented from discharging to the storm drains or other areas. Such requirement includes groundwater or any other water obtained from on or off site. Contractor agrees that excess water used onsite shall be disposed of appropriately offsite, unless otherwise specified by this Contract. Contractor is advised that temporary onsite storage of fluids may be allowed in tanks or by using other methods, subject to approval by JWA.

Discharge from dewatering activities will require the Contractor to obtain a separate NPDES permit. JWA will take reasonable measures to assist Contractor in acquiring such separate NPDES permit. Contractor shall meet the permitting and reporting requirements of the RWQCB, Santa Ana Region.

Prior to the issuance of a certificate of use and occupancy, the Contractor shall demonstrate to JWA the Contractor’s compliance with the Water Quality Management Plan (WQMP) in a manner meeting the satisfaction of the Manager, Inspection Services Division, including (Ref. MMT, WQ-7):

1) Demonstrate to JWA that all structural Best Management Practices (BMPs) described in the Project's WQMP have been implemented, constructed, and installed in conformance with approved plans and specifications.

B. STORM WATER PLAN AND METHODOLOGY

1) Contractor shall prepare a site-specific SWPPP, which will demonstrate how storm water runoff will be controlled, how the discharge of unauthorized non-storm water discharges will be contained and prevented, and how soil erosion and sedimentation of surface runoff will be prevented at the site (Ref. MMT, WQ-1-5)

2) Contractor shall select BMPs for the site-specific SWPPP. The plan must cover the construction area, construction lay-down areas, haul routes, and offsite migration or tracking of contaminants such as mud. This includes keeping Airport Operations Areas (AOAs) clear of mud and debris. The plan must minimize potential soil and water quality impacts, including impacts resulting from total suspended solids (TSS), oil and grease, total petroleum hydrocarbons (TPH), or chemicals or materials used for construction. The plan must also include leak or spill cleanup procedures.

3) The BMPs must address the materials and chemicals used for construction including, but not limited to:
   a) Adhesives, resins, sealers, tars, batteries, and tires
   b) Cleaners, polishes, bleaching agents, and curing compounds
c) Plumbing materials, solder, and pipe shavings  
d) Paints, solvents, lacquers, MEK, strippers, and hydraulic fluids  
e) Coolant, fuels, oils, and grease  

4) Examples of BMPs include, but are not limited to:  
a) Using drip pans under construction equipment and trucks  
b) Lining Work areas with plastic sheeting  
c) Creating sand bag barriers to contain/prevent runoff and spills  
d) Providing secondary containment for all hazardous material  
e) Appropriate offsite disposal of hazardous materials  
f) Creating onsite settlement basins and filters for potential runoff  
g) Prevent soil erosion and potential sedimentation of surface water by using landscaping or other means  
h) Sweeping paved areas  

5) Training meetings shall be held and documented at the preconstruction meetings and at the introduction of new personnel onsite. The meetings shall discuss the environmental pollution prevention issues in the SWPPP.  

6) Prior to the start of construction, Contractor must receive approval of a final SWPPP for the project from JWA. Upon approval, Contractor must implement the SWPPP and make all required inspections, repairs, and improvements to BMPs, as noted below, to comply with permit requirements.  

7) Contractor shall furnish street sweeping equipment for dust control and to clean up mud and debris from paved surfaces, and maintain it in operation, “as deemed necessary” or “as directed” to control offsite tracking of pollutants, such as mud, or interference with aircraft operations.  

8) Maintenance, Inspection, and Repair  
The SWPPP shall include a discussion of the program to inspect and maintain all BMPs as identified in the site plan or other narrative documents throughout the entire duration of the Project. Contractor shall designate a qualified person to conduct inspections. The name and telephone number of that person shall be listed in the SWPPP document. Contractor shall perform inspections before and after storm events and once each 24-hour period during extended storm events to identify BMPs effectiveness and implement repairs or design changes as soon as feasible depending upon field conditions.
Equipment, materials, and workers must be available for rapid response to failures and emergencies. Contractor shall perform all corrective maintenance to BMPs as soon as possible after the conclusion of each storm depending upon worker safety.

Contractor shall complete an inspection checklist, to include the following:

a) Inspection date.

b) Weather information: best estimate of beginning of storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall (inches).

c) List observations of all BMP erosion controls, sediment controls, chemicals and waste controls, and non-storm water controls. If the inclement weather prevents access to BMPs, then Contractor shall list results of visual inspection at relevant outfall, discharge point, or downstream location and projected required maintenance activities.

d) Corrective actions required, including any changes, to SWPPP necessary and implementation dates.

e) Inspector’s name, title, and signature.

Contractor shall prepare their inspection checklists using the inspection checklist form provided by the State Water Resources Control Board (SWRCB) or RWQCB or on forms that contain the equivalent information.

Contractor shall retain these checklists onsite and will submit them to JWA upon completion of Work, and assist JWA to file a Notice of Completion.

9) Training

Contractor shall train its personnel responsible for SWPPP preparation, implementation, and permit compliance, and the SWPPP shall document all training. This includes those personnel responsible for installation, inspection, maintenance, and repair of BMPs. Those responsible for overseeing, revising, and amending the SWPPP shall also document their training. Training should be both formal and informal, occur on an ongoing basis when it is appropriate and convenient, and should include training workshops offered by the SWRCB, RWQCB, or other locally recognized agencies or professional organizations.

10) List of Responsible Parties

Contractor shall include a list of names of all Contractors or Subcontractors and individuals responsible for implementation of the SWPPP. This list shall include telephone numbers and
addresses. Specific areas of responsibility of each Subcontractor and emergency contact numbers shall also be included.

5.3. HAZARDOUS MATERIALS OR SUBSTANCES

Contractor shall comply with all material usage limitations, permit record keeping, and reporting requirements imposed by federal, state, and local laws and regulations. All products used in construction must be free of PCBs, asbestos, and mold. Before bringing any material subject to requirements under this section onto the jobsite, Contractor is to notify JWA what type and quantity of material will be used and shall provide JWA with the Manufacturer's MSDSs as required by law. Contractor shall provide JWA with copies of all permits obtained and reports filed pursuant to federal, state, or local laws or regulations concerning materials brought onto and/or used at the jobsite. By this requirement, JWA does not assume responsibility for assuring or controlling Contractor's environmental compliance.

A. COMPLIANCE WITH ENVIRONMENTAL LAWS

Contractor shall comply with all Environmental Laws, rules, and regulations including, but not limited to, those applicable to:

1) Underground storage tanks (USTs) or aboveground storage tanks (ASTs), pipelines, pumps, and other equipment; and

2) The storage, distribution, use, processing, handling and/or disposal of hazardous materials including, but not limited to, gasoline, aviation fuel, jet fuel, diesel fuel, lubricants, coolants, pesticides, herbicides, fertilizers, PCBs, mold, ACM, batteries, and/or solvents; whether the obligation for such compliance is placed on the owner of the land, owner of the improvements, or user of the improvements.

Whenever references are made to published documents (e.g., specifications, standards, codes), it shall be understood that the applicable editions are those in effect, or which bear the latest publication date, on the date that the Work is advertised for bids, unless otherwise specified. Where provisions of the pertinent specifications, standards, codes, etc., conflict with one another, the most stringent provisions shall govern. See Section 1.1 for a list of definitions and terms as used throughout this Contract.

B. REMEDIATION

Contractor agrees that it shall be responsible for the investigation, characterization, containment, clean up, removal, and remediation of any hazardous materials or contamination caused by Contractor or any of its Subcontractors or agents.

Contractor shall promptly take all actions at its sole cost and expense as are necessary to investigate, characterize, contain, clean, remove, and restore any spills or contamination of JWA property to its condition prior to the introduction of such hazardous materials. If this involves clean-up of a significant spill or leak, then Contractor shall notify JWA, and first have
obtained approval by County/JWA and the approval of any necessary governmental entities before commencing clean-up procedures unless the spill is of a life threatening nature or would allow the spill to continue to spread (see Section 4.9.C - Spills).

C. **SPILLS**

1) Contractor shall, when engaged in fueling or defueling, take appropriate care to prevent the overflow of fuel.

2) Contractor shall be prepared to clean up small-scale fuel spills. Inert, absorbent materials shall be available onsite in a visible area at all times. Contractor’s fueling personnel shall be trained in fuel spill response (to be reviewed at Health & Safety meetings). Contractor shall properly transport and dispose of all used absorbent material.

3) Contractor shall immediately notify the Orange County Sheriff at JWA at (949) 252-5000 and then notify the CM of any fuel or hazardous materials spill or leak.

4) Contractor shall be responsible to clean up or pick up and properly dispose of all other hazardous materials spills or leaks that they are qualified to safely remove.

5) Contractor shall have a licensed Hazardous Materials Contractor on call to clean up all spills or leaks (a) that are of a significant size; or (b) that cannot be cleaned up quickly; or (c) when the safety of any persons or property may be in question. This condition will be upon direction of the OCFA or JWA Operations or Facilities Division personnel. Disputes over responsibility for clean-up costs must be submitted in writing to JWA within 48 hours of completion of clean-up activity.

D. [not used]

6. **CONSTRUCTION EXECUTION PLAN**

The Contractor shall submit a Construction Execution Plan in accordance with Section 15 - CONSTRUCTION EXECUTION PLAN of the Agreement. The Contractor has the sole responsibility to identify means and methods in accordance with the specifications, drawings, plans, site conditions, and Contractor’s own experience and expertise. The Construction Execution Plan shall contain, but not be limited to, the following items:

A. **GENERAL AND ADMINISTRATIVE**

1) Purpose of the Plan
   a) Project description
   b) Strategic plan
   c) Project organization
   d) Project Team directory and emergency phone numbers
   e) Subcontracting strategy
f) Contractual constraints

g) Assumptions

h) Payroll records requirements

i) Record drawings

j) Progress payments

k) Project closeout requirements

l) Public Relations

m) DBE requirements

n) Insurance requirements summary

2) **Communications**

a) Owner interface (meetings, correspondence, etc.)

b) Forms of communication and their use

c) Reporting requirements

d) JWA Project Management System use (Oracle Primavera Unifier)

e) Partnering

3) **Risk Management**

a) Identification and cause of risks

b) Strategy (eliminate or mitigate)

4) **Site Logistics**

a) Temporary construction items

b) Staging and lay-down areas

c) Crane types, heights, and access

d) Employee parking

e) Jobsite office

f) Temporary utilities

g) Access and haul routes

h) Maintenance of traffic plans

i) Phasing and sequencing

j) Operational maintenance of existing facilities

5) **Utilities and Systems**

a) Identification of existing

b) Points of connection

c) Switchover process

d) Decommissioning

6) **Permit Requirements**

7) **Labor**

a) Overall labor requirements
b) Typical crew types and size
c) Planned production rates

8) Materials
   a) Submittal process
   b) Procurement
   c) Salvage of materials
   d) Disposal and recycling plan

9) Equipment
   a) Equipment type and usage
   b) Quantity

10) Safety
    a) Refer to Safety requirements

11) Security
    a) Site security plan
       i) Engineered requirements
       ii) Operational requirements

12) Quality
    a) Refer to Quality Control Plan requirements

13) Schedule
    a) Refer to Schedule requirements

14) Cost
    a) Request for Information process
    b) Cost Reduction Incentives
    c) Change Order management process
    d) Claims resolution process

15) Environmental
    a) SWPPP compliance (refer to SWPPP requirements)
    b) Hazardous materials or substances

END OF GENERAL REQUIREMENTS
10. SPECIAL CONDITIONS
JOB ORDER
SPECIAL CONDITIONS

Job Orders

1. CONTRACT ADMINISTRATION:

Work under this contract will be initiated by individual Job Orders. All cost associated with a line item shall be included in the line item unit prices.

Use Job Order Form C-19-2.1 for this purpose. An example of this form is attached to the Special Conditions as attachment 1.

2. JOB ORDER REQUIREMENTS:

- Description of work to be performed must be clear and concise.

- Engineered plans and/or sketches that help clarify the work and locations of work are performed.

- Work described on the job order must reflect accurately the line items listed in the contractor’s proposal.

- Work in the field will be carefully monitored and documented in order to establish that the actual work in place reflects what is being paid for on the Job Order.

3. CONTRACTOR’S RESPONSIBILITY IN ESTABLISHING JOB ORDERS:

- Contractor is required to collaborate with the Airports staff in the development of each Job Order.

- Job Order work must comply with the contract documents.

- Contractor shall perform only the work described in the job order. If additional work is required to fulfill the intent of the job order but is not described in the job order, a new job order must be written that incorporated the new work into the original Job Order thereby amending the original Job Order. The job order that amends a job order shall bear the same number as the original Job Order followed by a lower case a,b,c, etc. Example Job Order #4 Amendment would be Job Order #4a.

- After establishing a final scope of work for the job order, Contractor shall submit his draft proposal for doing the work on Job Order form C-19-2.1. The Airport project manager will review and discuss with the Contractor. Any lump
sum items on the job order will be renewed and if necessary negotiated to ensure costs are fair and reasonable.

- Once the Job Order is finalized the Contractor reviews and signs any formally submits to the Airport.
- Work shall not start until the Job Order is approved by the Airport.
- Contractor will only be paid for work described in the Job Order.
- Contractor will only be paid for actual work in place.

4. **PAYMENT OF RETENTION:**

The County may pay all or a portion of retention held on any Job order after satisfactory completion of the work listed on the Job Order. Payment of such retention is at the sole discretion of the County.
JOHN WAYNE AIRPORT
3160 Airway Avenue
Costa Mesa, CA 92626

PROJECT: __________________________
PROJECT NO: __________________________
CONTRACTOR: __________________________

JOB ORDER NO: __________________________
DATE: __________________________

DESCRIPTION OF WORK:

A. LINE ITEM SERVICES/SUPPLIES

<table>
<thead>
<tr>
<th>Line Item Number</th>
<th>Description</th>
<th>Qty</th>
<th>Unit</th>
<th>Unit Price</th>
<th>Total Cost</th>
</tr>
</thead>
</table>

LINE ITEM SUBTOTAL

B. LUMP SUM SERVICES/SUPPLIES

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Total Cost</th>
</tr>
</thead>
</table>

LUMP SUM SUBTOTAL

Allowable Mark Ups:
- Labor 20%
- Material 15%
- Equipment Rental 15%
- Bond 1%

Allowable Mark Ups Subcontract Work:
- 10% First $2,000
- 5% work in excess of $2,000

C. MOBILIZATION

TOTAL THIS JOB ORDER

TIME TO COMPLETE THIS JOB ORDER:
CONTRACTOR agrees to complete the work described in this Job Order within ____ calendar days commencing on date this Job Order is approved by the Deputy Airport Director, Facilities, John Wayne Airport. In accordance with the Contract Agreement, the CONTRACTOR agrees
to pay to the COUNTY the sum of _____dollars ($_____) per day for each calendar day of delay beyond this time.

OFFER TO JOHN WAYNE AIRPORT BY CONTRACTOR:
_____ offers to perform this work for the total cost of $_____.
(I certify that I have reviewed the items of work on this Job Order and concur with the estimated quantities for the described work. I also certify that all cost comply with the contract.)

BY: __________________________ DATE: _________________
TITLE: __________________________

ACCEPTANCE OF CONTRACTOR OFFER BY JOHN WAYNE AIRPORT:

Your offer to provide the work described in this JOB ORDER is accepted. You are authorized to proceed immediately.

Declining Balance Summary:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Contract Amount</td>
<td>$</td>
</tr>
<tr>
<td>Previous Accepted Job Orders</td>
<td>$</td>
</tr>
<tr>
<td>Balance Before This Job Order</td>
<td>$</td>
</tr>
<tr>
<td>This Job Order</td>
<td>$</td>
</tr>
<tr>
<td>New Contract Balance</td>
<td>$</td>
</tr>
</tbody>
</table>

I certify that I have reviewed the items of work on this Job Order and they are within the scope of work of the contract and that the cost of $_____ is in accordance with the contract for the work to be performed.

By: __________________________ Project Manager

I certify that the job order file, complies with procedure C-19.2.

______________________________
Manager, Airport Development

Approval: __________________________ Date: __________________________
Deputy Airport Director, Facilities
SECTION IV
SPECIFICATIONS
11. Technical Specifications
Non-airfield
## TECHNICAL SPECIFICATIONS – NON-AIRFIELD

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1. **DEMOLITION AND REMOVAL OF PAVEMENT**

1.1. **GENERAL REQUIREMENTS**

1.1.1. The work includes the demolition and/or removal of all construction indicated or specified. All materials resulting from demolition work, except as indicated or specified otherwise, shall become the property of the Contractor and shall be removed from the limits of JWA property. There shall be no stockpiling of these materials on JWA property.

1.1.2. **SUBMITTALS:** Submit for approval a plan for the demolition and removal work to the Owner’s Representative. After the contract is awarded, prior to the commencement of each Delivery Order, the Contractor shall meet with the Owner’s Representative or his representative and discuss the demolition and removal plan. The plan shall include procedures for coordination with other work in progress. Include in the plan a detailed description of the methods and equipment to be used for each operation and the sequence of operations.

1.1.3. **DUST CONTROL:** Dust resulting from demolition and removal work shall be controlled to prevent the spread of dust and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous objectionable conditions such as in, flooding and pollution. Comply with all dust regulations imposed by local air pollution agencies.

1.1.4. **PROTECTION**

1.1.4.1. **PROTECTION OF UTILITY LINES:** Protect from damage existing utility lines the locations of which are made known to the Contractor prior to demolition work. Repair damaged utility lines as directed at no additional cost to JWA.

1.1.4.2. **PROTECTION OF PERSONNEL:** Where the safety of pedestrians and drivers are endangered in the area of removal work, barricades for traffic shall be used and advance notice shall be given to the Owner’s Representative prior to beginning any such work.

1.1.5. **USE OF EXPLOSIVES:** Use of explosives will not be permitted.

1.2. **DEMOLITION**

1.2.1. **REMOVAL OF EXISTING PAVEMENT:** Within the area designated for replacement of existing pavement, the existing surfacing shall be removed to a total depth as required to prepare the surface. The edges of areas of removal shall be sawcut neatly and vertically. Each area of removal shall be left in a condition suitable for base preparation as specified.
1.3. CLEAN-UP

1.3.1. DISPOSAL OF DEBRIS: Upon completion of demolition, the job area shall be cleared of all debris at the expense of the Contractor. Broken asphalt and/or Portland cement concrete and base material that resulted from demolition shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas. Stockpiling of demolition debris within the limits of JWA is not permitted.

1.3.2. REGULATIONS: Hauling and disposal shall comply with federal, state and local regulations.

1.4. METHOD OF MEASUREMENT

1.4.1. Demolition and removal of pavement shall be measured for each type of pavement by the cubic yard of demolition and removal, completed and accepted by JWA.

1.5. BASIS OF PAYMENT

Payment will be made under:

Bid Item no 1 Demolition and Removal of Asphalt (including curbs) - per CY
Bid Item no 2 Demolition and Removal of PCC (including curbs) - per CY

END OF SPECIFICATION 1
2. REPLACEMENT PAVEMENT CONSTRUCTION (SUBGRADE PREPARATION)

2.1. GENERAL

2.1.1. APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.


Whenever this specification is referenced, the following is understood:

Wherever the term Commission or Department occurs, it shall mean JWA. Whenever the term Director or Executive Officer occurs, it shall mean JWA Director.

Whenever the term Engineer occurs, it shall mean JWA Director.

All references to statistical testing are deleted.

Whenever a discrepancy occurs between the Standard Specification and this specification, it is understood that this specification governs.

All references to measurement and payment are deleted.

2.1.1.2. AMERICAN SOCIETY FOR TESTING & MATERIALS (ASTM) PUBLICATIONS (Latest Editions):

<table>
<thead>
<tr>
<th>ASTM Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C136</td>
<td>Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates</td>
</tr>
<tr>
<td>D1556</td>
<td>Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method</td>
</tr>
<tr>
<td>D1557</td>
<td>Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort</td>
</tr>
<tr>
<td>D2419</td>
<td>Standard Test Method for Test for Sand Equivalent Value of Soils and Fine Aggregates</td>
</tr>
<tr>
<td>D6398</td>
<td>Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depths)</td>
</tr>
<tr>
<td>D2487</td>
<td>Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)</td>
</tr>
</tbody>
</table>
2.1.3. DESCRIPTION

This section covers all earthwork requirements for replacement pavement required as a result of non-pavement construction, as directed by the Engineer. This section also covers requirements for excavation and for compaction of succeeding layers after backfill has been placed. Pavement construction for this work is covered in Section 6, Full Depth Patch Repair of HMA Pavement.

2.1.4. SUBMITTALS

2.1.4.1. CERTIFIED TEST REPORTS

Submit certified test reports for the following:

Sand, gravel, or common soil fill tested in accordance with ASTM C136 and ASTM D2487. Granular fill tested in accordance with ASTM C136 and ASTM D2419.

2.2. PRODUCTS

2.2.1. SOIL MATERIALS: In general, shall be free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials.

2.2.2. GRANULAR FILL CAPILLARY WATER BARRIER: Granular fill for capillary water barrier shall conform to the general requirements for soil materials above and shall be a clean, coarse grained crushed stone, uncrushed gravel, or crushed gravel conforming to the following gradation: 90 to 100 percent passing the 3/4-inch sieve and zero to five percent passing the No. 4 sieve, and with a sand equivalent of not less than 50 when tested in accordance with ASTM D2419.

2.2.3. FILL AND BACKFILL: For drainage ditches, and under paving or concrete on grade shall consist of native materials which are free of boulders, cinders, roots, debris, wood scrap material, and other unsatisfactory material.

2.3. EXCAVATION

2.3.1. SURFACE PREPARATION

2.3.1.1. CUTTING PAVEMENT, CURBS, AND GUTTERS: Make cuts with neat, vertical, parallel, straight lines one foot wider than trench width on each side of trenches and one foot beyond each edge of pits.

2.3.1.2. EXCAVATION FOR SURFACE PREPARATION: Excavation for surface preparation shall be to the contours and dimensions of the surrounding area. Keep excavations free from water while construction is in progress. Notify the Owner’s Representative immediately in writing in the event that it becomes necessary to remove hard, soft, weak, or wet material to a depth greater than indicated and an adjustment in contract
price will be considered in accordance with "Differing Site Conditions" paragraph of the contract clauses. Excavations cut below the depths indicated shall, unless otherwise specified, be refilled in 6 inch lifts with common soil and be compacted to 90 percent of ASTM D1557, maximum density. Soil disturbed or weakened by the Contractor's operations and soils permitted to soften from exposure to weather shall be excavated and refilled with sand or gravel and be compacted to 95 percent of ASTM D1557, maximum density. All Additional work of this nature will be at the Contractor's expense.

2.3.2. FILLING AND BACKFILLING

2.3.2.1. BACKFILL: Under pavement and concrete slabs, shall be placed in lifts of 4 inches thick and each lift shall be compacted as specified herein, before the overlying lift is placed. Backfill adjacent to structural elements shall be placed, as far as practicable, as the adjacent structural elements have been completed and accepted. Backfill against newly constructed concrete or masonry only after 8 curing days have passed.

2.3.2.2. FILL FOR CAPILLARY WATER BARRIER: Granular fill shall be placed on a 2-inch layer of filter material over compacted subgrade in lifts of 4 inches and compacted with a minimum of two passes of hand-operated plate type vibratory compactor.

2.3.3. GENERAL COMPACTION: Use hand-operated type vibratory or other suitable hand tampers in areas not accessible to larger rollers or compactors. Be careful to avoid damaging pipes and protective pipe coatings. Compaction shall be in accordance with the following unless otherwise specified. If necessary, the Contractor's selected equipment and construction procedure shall be altered, changed or modified in order to meet the specified compaction requirements.

2.3.3.1. COMPACTION OF BEDDING: Compaction of bedding in rock compact to 95 percent and in soil compact to 90 percent of ASTM D1557, maximum density.

2.3.3.2. SUBGRADE SOILS IN CUT: For subgrade preparation, except for primary roads or airfield pavements, soils shall have a density of 95 percent of ASTM D1557, maximum density to a depth of 12 inches; if the existing subgrade natural density is less then 95% percent of ASTM D1557, maximum density, it shall be compacted to that value. If exposed soils are unstable or pumping they shall be undercut 8 inches and replaced with bridging aggregate meeting the following minimum criteria:
AGGREGATE GRADING REQUIREMENTS

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>Percentage Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/4” Maximum</td>
</tr>
<tr>
<td></td>
<td>Operating Range</td>
</tr>
<tr>
<td>2”</td>
<td>—</td>
</tr>
<tr>
<td>1 1/2”</td>
<td>—</td>
</tr>
<tr>
<td>1”</td>
<td>100</td>
</tr>
<tr>
<td>3/4”</td>
<td>90-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>35-60</td>
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<tr>
<td>No. 30</td>
<td>10-30</td>
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<tr>
<td>No. 200</td>
<td>2-9</td>
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QUALITY REQUIREMENTS

<table>
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<tr>
<th>Test</th>
<th>Operating Range</th>
<th>Contract Compliance</th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Sand Equivalent</td>
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<td>22 Min.</td>
</tr>
<tr>
<td>Durability Index</td>
<td>—</td>
<td>35 Min.</td>
</tr>
</tbody>
</table>

2.3.4. PAVEMENT REPAIR: See Section 6 of this specification.

2.3.4.1. BASE COURSE: Refer to Section 10 of this specification – Select Aggregate Base.

2.3.5. LANDSCAPE RESTORATION

2.3.5.1. LAWNS: Where excavations cross lawn areas, sod shall be replaced following backfilling. Carefully remove sod prior to excavation. Store and maintain sod until earthwork is completed. Any damaged sod shall be replaced at the Contractor’s expense.

2.3.6. FIELD SAMPLING AND TESTING: In addition to provisions set forth elsewhere in this contract, all sampling and testing shall be conducted by an approved testing laboratory. Test granular fill, bedding, and backfill for conformance to gradation limits in accordance with ASTM C136, ASTM D2419 and ASTM D2487. Test bedding and backfill materials for moisture density relations in accordance with ASTM D1557, Method D. Perform at least one of each of the required tests for each material used. Provide additional tests as specified above for each source change. Perform density tests in randomly selected locations and in accordance with ASTM D1556 as follows: one test per 400 lineal feet in each lift.

2.4. METHOD OF MEASUREMENT

2.4.1. Earth Work shall be measured by the cubic yard of line item works completed and accepted by JWA. Aggregate base shall be measured by the ton of line item works completed and accepted by John Wayne Airport.
2.5. BASIS OF PAYMENT

Payment will be made under:

- Bid Item no 3 Surface preparation, excavate, and dispose - per CY
- Bid Item no 4 Bridging Aggregate, In-Place - per TN
- Bid Item no 6 Select Aggregate Base, In-Place - per CY

END OF SPECIFICATION 2
3. **SEALING CRACKS IN HMA PAVEMENTS**

3.1. **DESCRIPTION**

3.1.1. The work of this Section consists of providing and installing a resilient and adhesive crack sealant, hot-applied, capable of effectively sealing cracks in the existing HMA pavements with crack sealant, as indicated by Detail 10A of Sheet 10 of these Contract Documents. It includes the removal of existing, loose, or damaged sealant material where applicable, preparation of the cracks, preparation of the sealant material, the complete installation of the sealant repair system, and all necessary clean-up work and removal of all debris to an off-site location. The selection of sealant material products will be based on climate conditions, past performance of products, and at the discretion of JWA or appointed representative.

3.2. **MATERIALS**

3.2.1. **SEALANT:** The sealant material shall meet ASTM standards for the type of pavement and service for which the pavement is intended. The sealant material shall be a hot-applied, elastomeric, jet-fuel resistant type for HMA pavements conforming to the requirements of ASTM D6690. The sealant shall be packaged in a liquid state at delivery to site. It shall cure in 1 day for traffic application.

3.2.1.1. **ALTERNATE A FOR CRACK SEALANT:** The use of a silicone sealant is restricted to edge joints between HMA and PCC pavements only. Silicone should not be used to seal HMA pavement to HMA pavement joints. The sealant shall be a one-part silicone material formulation capable of being applied with a pressure applicator. The sealant shall be a self-leveling, nonacid producing and cure on exposure to air. The sealant shall be a low modulus type, as stated by the manufacturer, meet the following requirements of ASTM D5893 and is specifically approved by JWA.

3.2.2. **BACKER ROD:** The backer rod material shall provide a bond-break for the joint sealant, and it shall be a closed cell polyethylene backer rod material, cross linked for hot-applied sealants and capable of withstanding temperatures of 395° F for 30 minutes, and conforming to the requirements of ASTM D5249. The backer rod is a compressible, nonshrinking, nonabsorptive material whose melting point should be higher than the pouring temperature of the sealant. The backer rod shall be approximately 25 percent wider in diameter than the nominal width of the crack. The backer rod shall be placed to a depth that will provide a shape factor (width to depth of sealant ratio) of approximately 1. Backer rod shall be used when depth of reservoir is greater than 

3.3. **SUBMITTALS**

3.3.1. Prior to beginning work, submit to JWA for approval four sets of product data and installation procedures for SEALANT and BACKER ROD. Do not begin work until
written approvals of repair areas and repair types are given by JWA.

CONSTRUCTION METHODS

3.3.2. PREPARATION OF CRACKS: Remove existing loose, or damaged HMA concrete, sealant and backing sealant material where applicable. Crack preparation procedures depend on crack size, and existing HMA layer thickness.

Cracks widths from ¼ to ¾ inch: cracks shall be widened to a nominal width of 1/8 inch greater than the existing nominal or average width. Widening the cracks 1/8 inch will help eliminate the potential for raveling of the pavement along the edges of the crack and will provide a sealant reservoir that has vertical faces. The depth of the routed crack should be approximately ¾ inch.

Crack widening shall be done by means of concrete router or concrete saw. A vertical spindle router with a diamond bit is recommended to minimize damage to the asphalt pavement; however, an impact router may be used if it is equipped with carbide-tipped vertical-sided bits. Impact routers that are not equipped with carbide-tipped bits or those equipped with V-shaped bits shall not be used. When using a vertical spindle router, the router bit shall be belt-driven to help prevent injury to the operator and damage to the pavement if the bit jams in the crack. If damage to the pavement is observed, work shall be discontinued until corrective action is taken. Such corrective action may require replacing worn router bits, changing operators, or replacing the equipment completely.

When sawing/routing cracks, the reservoir ratio should be 1:1 with a 1/2-inch minimum width recommended.

Immediately before sealing, the surfaces shall be thoroughly cleaned of all laitance and other foreign material. Cleaning shall be accomplished by thorough and careful application of HCA heat lance. Upon completion of HCA heat lance application, the exposed surfaces shall be blown out with compressed air free of oil and water. Only air compressors with operable oil and water traps will be used to prepare the cracks for sealing.

3.3.3. INSTALLATION OF SEALANT: The cracks shall be inspected and approved by JWA immediately prior to sealing. Inspections shall include crack reservoir preparation, backer rod size and placement when necessary, and cleanliness of the exposed surface.

When necessary, installation of backer rod shall be continuous with no void spaces at lapped splices and interactions. Sealant shall be applied uniformly solid from bottom to top of crack, and it shall be installed without the formation of entrapped air or voids. The surface of the installed sealant material will be 1/4-inch to 3/8-inch below the existing pavement surface. A squeegee may be used to remove excess sealant from the pavement surface when a crack is overfilled.
The heating kettle for the hot-applied sealant shall be an indirect heating type, constructed as a double boiler. A positive temperature control and mechanical agitation shall be provided. The joint sealant shall not be heated to more than 20°F below the safe heating temperature. The safe heating temperature can be obtained from the manufacturer's shipping container. A direct connecting pressure type extruding device with nozzle shaped for insertion into the joint shall be provided.

Any cracks that are not sealed the same day they are prepared should be blown out with compressed air before the sealing operation continues. If rain delays the sealing operation, the cracks should be allowed to dry and shall be cleaned with HCA heat lance and compressed air free of oil and water.

3.3.4. INSTALLATION OF HMA PATCH METRIALS: For Crack Repair Types 2 and 3: The use of commercial products formulated to fill the crack and remain pliable is desired. Products such as Road Works 306 or equal may be used upon approval of JWA. Follow manufacturer’s instructions for preparation and placement of these materials.

3.3.5. CLEAN-UP: Any sealant spilled on the surface of the HMA pavement shall be removed immediately. Then clean surface of the adjacent HMA pavement by thorough sweeping and/or vacuuming of all debris to prevent ingestion by aircraft engines; remove debris to an off-site location.

3.4. METHOD OF MEASUREMENT
3.4.1. Crack repairs shall be measured by the linear foot of crack repair, measured in place, completed and accepted by JWA.

3.5. BASIS OF PAYMENT
3.5.1. Payment for Crack Repair shall be made at the contract unit price per linear foot of repair placed. The price shall be full compensation for cleaning, and filling the prepared crack with hot applied sealant, for overhead and profit, furnishing all materials, all preparation, delivering, placing of these materials, and for all labor, equipment, tools and incidentals necessary to complete the crack repair.

Bid Item No. 7 Crack Sealing Asphalt Pavement - per LF

END OF SPECIFICATION 3
4. PARTIAL DEPTH PATCH REPAIR OF HMA PAVEMENT

4.1. DESCRIPTION

4.1.1. The work of this section consists of removal and replacement of distressed, existing HMA pavement to a required depth, approved by JWA. It includes the removal of existing distressed HMA by saw cutting and/or chipping and/or milling, the preparation of exposed surface, the preparation of patch materials, the installation of patch materials, and all necessary clean-up work and removal of all debris to an off-site location. The patch material hot plant mixed and hot laid. Maximum aggregate size shall be 1-inch and asphalt cement shall be PG 64-10 and shall conform to Section 92 of the Standard Specification. Asphalt concrete shall be spread and compacted in one or more layers. Each layer of asphalt concrete shall not be less than 2 inches nor more than 4 inches in compacted thickness. Distress types observed and proposed repair depth must be submitted and be approved by JWA.

4.2. MATERIALS

4.2.1. AGGREGATES: The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements. Aggregates for asphalt concrete shall conform to Section 39 of the Standard Specifications, Type B, for individual test result conforming to 1/2-inch maximum size, medium gradation. Aggregates for base course shall conform to Section 26 of the Standard Specification, Class 2, for 1-1/2 inch maximum size gradation.

4.2.2. MINERAL FILLER: If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242.

4.2.3. BITUMINOUS BINDER: Asphalt binder to be mixed with aggregate shall be a steam-refined paving asphalt in conformance with the provisions in Section 92, "Asphalts," and shall be of the grade designated in the special provisions or as approved by JWA.

4.2.4. TACK COAT: Tack coat shall conform to the to the requirements of ASTM D 2397, or Section 94 "Asphaltic Emulsions," for the rapid-setting type, and approved by JWA.

4.2.5. COMPOSITION AND COMPACTION TESTING OF MATERIALS: The HMA materials shall be considered acceptable for use where plant inspection is maintained by the California DOT and production samples are taken on a regular basis for conformance with California DOT standards based on the approved job mixture formula for maximum size of 3/4-inch.

4.3. SUBMITTALS

4.3.1. Prior to beginning work, submit to JWA for approval four sets of product data and installation procedures for AGGREGATES, BITUMINOUS BINDER, JOB MIX
FORMULA, TACK COAT, AND SEALANT. Do not begin work until written approvals are given by JWA.

4.4. CONSTRUCTION METHODS

4.4.1. SURFACE PREPARATION: Mark the repair area. A string line or straight edge should be used to mark straight lines around the repair area. The lines shall be marked with spray paint so they are easily visible when sawing the pavement. Repair areas shall be marked to form a square or rectangle with at least 12 inches beyond the distressed area.

Saw cut the repair area, with concrete saw equipped with a diamond-tip or abrasive blade. Saw cuts shall overlap so that a vertical and square corner is formed. Since diamond-tip blades usually require water, the repair area should be completely dry before it is repaired. However, there are some types of diamond-tip blades designed to dry cut asphalt pavements. The abrasive saw blade has advantages of lower cost and does not require water when sawing.

Remove existing deteriorated concrete by milling (for larger repair area) or using jackhammer (for smaller repair area). Pneumatic hammer weight for chipping shall not exceed 30 pounds (to protect adjacent HMA). Make additional saw cuts as needed to speed removal. After milling or jack hammering, remove and discard the loose materials.

4.4.2. APPLICATION OF TACK COAT: Tack coat shall be applied at the rate of 0.05 to 0.10 gallons per square yard.

4.4.3. INSTALLATION OF HMA PATCH: The material shall be placed and compacted in one lift (maximum 3-inch thickness). In order for the patch to be level with the surrounding pavement, the patch area shall be overfilled (by approximately 40%, depending on the field test of the mix used) to allow for compaction. The type of compactor shall be compatible and appropriate with the patch size. For small patch areas, a vibratory plate tamper can be used. Larger areas require the use of a steel-wheel roller. Using the appropriate compactor, the patch shall be compacted, starting from the edges, following by the center of the patch area, following direction of traffic. Upon completion of compaction, the patch shall be level or no higher than 1/8 inch above the surrounding patch surface.

4.4.4. TEMPORARY PROTECTION OF EXCAVATION: Should the patch completion need to be delayed and traffic allowed to pass the excavation shall be covered by steel plates (minimum 1 inch thickness spanning the excavation and fixed in place to prevent movement).

4.4.5. SAW AND SEAL PATCH BOUNDARY: After completing the patch, the final step is to saw cut and seal the edges with an appropriate sealant material.
4.4.6. CLEAN-UP: Clean surface of the adjacent HMA pavements by thorough sweeping and/or vacuuming of all debris to prevent ingestion by aircraft engines; remove debris to an off-site location.

4.5. METHOD OF MEASUREMENT

4.5.1. The partial depth HMA repair by removal and replacement of HMA layer shall be measured by the square feet of surface area of the area repairs and thickness to determine the appropriate quantities, completed and accepted by JWA.

4.6. BASIS OF PAYMENT

4.6.1. Payment for partial depth HMA repair by removal and replacement of HMA layers shall be made at the contract unit price per unit rates for the materials required for the repairs. The price shall be full compensation for overhead and profit, furnishing all materials, all preparation, delivering, placing of these materials, and for all labor, equipment, tools and incidentals necessary to complete the partial depth HMA repair.

Bid Item No. 8  Asphalt Concrete, Installed for Non-Airfield Pavements - per TN
Bid Item No. 57  Temporary Protection – Steel Plates - per SF per day of use

END OF SPECIFICATION 4
5. FULL DEPTH PATCH REPAIR OF HMA PAVEMENT

5.1. DESCRIPTION

5.1.1. The work of this Section consists of replacement of distressed, existing HMA pavement and base layer, to a required depth, approved by JWA. Demolition and subgrade preparation are described in Sections 1 and 2 of this specification. This specification includes the preparation of exposed surface, the preparation of patch materials, the installation of patch materials, and all necessary removals and clean-up work and removal of all debris to an off-site location. The patch material will be The patch material hot plant mixed and hot laid. Maximum aggregate size shall be 1-inch and asphalt cement shall be PG 64-10 and shall conform to Section 92 of the Standard Specification. Asphalt concrete shall be spread and compacted in one or more layers. Each layer of asphalt concrete shall not be less than 2 inches nor more than 4 inches in compacted thickness. Distress types observed and proposed repair depth must be submitted and be approved by JWA.

5.2. MATERIALS

5.2.1. AGGREGATES: The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements. Aggregates for asphalt concrete shall conform to Section 39 of the Standard Specifications, Type B, for individual test result conforming to 1/2-inch maximum size, medium gradation. Aggregates for base course shall conform to Section 26 of the Standard Specification, Class 2, for 1-1/2 inch maximum size gradation.

5.2.2. MINERAL FILLER: If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242.

5.2.3. BITUMINOUS BINDER: Asphalt binder to be mixed with aggregate shall be a steam-refined paving asphalt in conformance with the provisions in Section 92, "Asphalt," and shall be of the grade designated in the special provisions or as approved by JWA.

5.2.4. TACK COAT: Tack coat shall conform to the to the requirements of ASTM D 2397, or Section 94, "Asphaltic Emulsions," for the rapid-setting type, and approved by JWA.

5.2.5. COMPOSITION AND COMPACTION TESTING OF MATERIALS: The HMA materials shall be considered acceptable for use where plant inspection is maintained by the California DOT and production samples are taken on a regular basis for conformance with California DOT standards based on the approved job mixture formula for maximum size of ¾-inch.
5.3. **SUBMITTALS**

5.3.1. Prior to beginning work, submit to JWA for approval four sets of product data and installation procedures for AGGREGATES, BITUMINOUS BINDER, JOB MIX FORMULA, TACK COAT, AND SEALANT. Do not begin work until written approvals are given by JWA.

5.4. **CONSTRUCTION METHODS**

5.4.1. **SURFACE PREPARATION:** Refer to Section 1 of this specification for demolition. Refer to Section 2 for preparation of subgrade and base.

5.4.2. **APPLICATION OF TACK COAT:** Tack coat shall be applied at the rate of 0.05 to 0.10 gallons per square yard.

5.4.3. **INSTALLATION OF HMA PATCH:** The material shall be placed and compacted in multiple of 2-inch lifts. In order for the patch to be level with the surrounding pavement, the patch area shall be overfilled (by approximately 40%, depending on the field test of the mix used) to allow for compaction. The type of compactor shall be compatible and appropriate with the patch size. For small patch areas, a vibratory plate tamper can be used. Larger areas require the use of a steel-wheel roller. Using the appropriate compactor, the patch shall be compacted, starting from the edges, following by the center of the patch area, following direction of traffic. Upon completion of compaction, the patch shall be level or no higher than 1/8 inch above the surrounding patch surface.

5.4.4. **TEMPORARY PROTECTION OF EXCAVATION:** Should the patch completion need to be delayed and traffic allowed to pass the excavation shall be covered by steel plates (minimum 1 inch thickness spanning the excavation and fixed in place to prevent movement).

5.4.5. **SAW AND SEAL PATCH BOUNDARY:** After completing the patch, the final step is to saw cut and seal the edges with an appropriate sealant material.

5.4.6. **CLEAN-UP:** Clean surface of the adjacent HMA pavements by thorough sweeping and/or vacuuming of all debris to prevent ingestion by aircraft engines; remove debris to an off-site location.

5.5. **METHOD OF MEASUREMENT**

5.5.1. The full depth HMA repair by removal and replacement of HMA layer and base shall be measured by the square feet of repair surface areas and the thicknesses and weights of materials as appropriate, completed and accepted by JWA.
5.6. BASIS OF PAYMENT

5.6.1. Payment for full depth HMA repair by removal and replacement of HMA layers and base shall be made at the contract unit prices necessary to complete the patch. The price shall be full compensation for overhead and profit, furnishing all materials, all preparation, delivering, placing of these materials, and for all labor, equipment, tools and incidentals necessary to complete the full depth HMA Repair.

Bid Items for Full Depth HMA Patch:

Bid Item No.6  Aggregate Base In Place - per CY
Bid Item No.8  Asphalt Concrete, Installed for Non-Airfield Pavements - per TN
Bid Item No. 57  Steel Plates for Temporary Protection of Patch areas - per SF / Day

END OF SPECIFICATION 5
6. ASPHALT CONCRETE OVERLAY - FOR VEHICULAR TRAFFIC

6.1. GENERAL

6.1.1. APPLICABLE PUBLICATIONS

The following publications of the issues listed below, but referred to hereinafter by basic designation only, form a part of this specification to the extent required by the references thereto:

6.1.1.1. U.S. DEPARTMENT OF COMMERCE STANDARDS

PS20-05, American Softwood Lumber Standard

6.1.1.2. STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION


Whenever this specification is referenced, the following is understood:

- Wherever the term Commission or Department occurs, it shall mean JWA. Whenever the term Director or Execute Officer occurs, it shall mean JWA Director.

- Whenever the term Engineer occurs, it shall mean JWA Director.

- All references to statistical testing are deleted.

- Whenever a discrepancy occurs between the Standard Specification and this specification, it is understood that this specification governs.

- All references to measurement and payment are deleted.

6.1.1.3. AMERICAN SOCIETY FOR TESTING & MATERIALS (ASTM) PUBLICATIONS (Latest Editions):
6.1.2. DESCRIPTION

This section covers requirements for asphalt concrete overlays, prime coat, weed control, patch and crack repairs for vehicular street, roads, and parking areas. The methods of construction shall be as specified herein.

6.1.3. SUBMITTALS

6.1.3.1. GENERAL

Preparation of mix design, sampling and testing of materials and equipment for compliance with the specifications shall be performed by a JWA-approved independent commercial testing laboratory at the expense of the Contractor. All samples and tests specified for the conformance and quality control shall be taken to correctly reflect the construction work. Certified copies of all tests shall be delivered to the Owner’s Representative. Test methods shall be in accordance with procedures of the applicable publications.

6.1.3.2. CERTIFICATES

Notarized manufacturer's certificate of compliance shall be submitted for the following:

a. asphalt cement

b. liquid asphalt

c. asphalt emulsion

6.1.3.3. SAMPLING

After Contractor has selected and designated the source of any proposed materials, the Contractor shall visit the source and determine if the source has adequate supply of material for the project needs, shall secure samples and arrange for the specified testing for each separate source before such materials are required for use in the work.
Sampling of asphalt concrete aggregates and bituminous materials shall be accomplished in accordance with methods of the Standard Specifications.

6.1.3.4. SUITABILITY TESTS OF PROPOSED MATERIALS

Tests for conformance with the specifications shall be performed in accordance with Table 1 and Note 1 presented in Section 3.3.11.6. The samples shall be identified to show the name of the material, aggregate source, name of the supplier, contract number and the segment of the work where the material represented by the sample is to be used. Results of all tests shall be submitted.

6.1.3.5. HERBICIDE

Refer to Section 12 of this specification

6.1.3.6. MIX DESIGN

Mix design shall be submitted by the Contractor prior to placing of the bituminous mixture. The design shall be prepared by the Contractor's laboratory and shall conform to the requirements of the Standard Specification. The design shall include test results of the aggregates and proposed batch plant weights and shall be within the specified limits.

6.1.4. SURFACE PREPARATION

Existing pavement may be overlaid with a compacted 2-inch minimum layer of new asphalt concrete pavement provided new grade is met and not exceeded. Existing pavement that is to be overlaid shall be cleaned and all pavement defects patched as provided for in this section. Adjust to finished grade all manhole covers, junction boxes, catch basin grades, monument frames, valve boxes and other existing utility covers as required within the work area to conform and other existing utility covers as required within the work area to conform with Section 15 of the Standard Specifications. If ordered by the Owner’s Representative or his authorized representative, a surfacing mixture shall be placed to level irregularities, dips, depressions, and sags to provide a smooth base of uniform grade and cross-section conforming to existing drainage patterns. The use of pavement reinforcing fabric must be approved by the owner.

6.2. PRODUCTS

6.2.1. AGGREGATES: The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements. Aggregates for asphalt concrete shall conform to Section 39 of the Standard Specifications, Type B, for individual test result conforming to 1/2-inch maximum size, medium gradation. Aggregates for base course shall conform to Section 26 of the Standard Specification, Class 2, for 1-1/2 inch maximum size gradation.
6.2.2. **ASPHALT MATERIALS**

6.2.2.1. Asphalt cement (Binder) shall conform to Section 92 of the Standard Specification, PG 64-10.

6.2.2.2. Liquid asphalt (Prime Coat), MC-70, shall conform to Section 93 of the Standard Specification.

6.2.3. **WEED CONTROL:** Refer to Section 12 of this specification.

6.2.4. **BASE COURSE:** One day before the application or placement of bituminous materials, the surface shall be sterilized with herbicide.

6.2.5. **CRACK REPAIRS:** Refer to Section 3 of this specification.

6.2.6. **PATCH REPAIRS:** Refer to Section 4 (Partial Depth Patching) or 5 (Full Depth Patching) of this specification.

6.2.7. **PRIME COAT:** Prior to the application of the asphalt concrete, a bituminous prime coat of liquid asphalt shall be applied on the surface of aggregate base or re-compacted base in accordance with Section 39 of the Standard Specification. Liquid asphalt shall be applied by pressure distributors. Sufficient time shall be allowed before placing asphalt concrete surfacing to permit the prime coat asphalt to penetrate the base.

6.2.8. **TACK COAT:** Asphalt emulsion shall be applied in accordance with Section 39 and Section 94 of the Standard Specifications to the existing pavements surfaces at a rate of 0.10 gallons per square yard and to the exposed edges and surfaces against which asphalt concrete is to be placed. Before application of tack coat, the surface shall be cleaned with a stiff broom and, if necessary, with compressed air to remove all deleterious and loose material.

6.2.9. **ASPHALT CONCRETE**

6.2.9.1. **CONTRACTOR FURNISHED:** All materials shall be furnished by the Contractor. The bituminous concrete used in reconstructing or overlaying pavements shall consist of mineral aggregate uniformly mixed with 5 to 7 percent, by weight, asphalt cement binder bituminous material in a central plant. The mixing of materials, the mixing plant, and construction equipment shall be in accordance with Section 39 of the Standard Specification.

6.2.9.2. **PLACING:** Bituminous mixtures shall be delivered to the road bed at temperatures specified in the Standard Specification. Spreading of the mixture shall be in accordance with the Standard Specification. Tarpaulin shall be furnished at the Contractor's expense and used to cover all loads during transportation.
6.2.9.3. COMPACtion: Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be compacted in accordance with Section 39 of the Standard Specification. Compaction by vehicular traffic shall not be permitted.

6.2.9.4. JOINTING PAVEMENT: The joints between old and new pavements or between successive days work shall be carefully made in such manner as to insure a continuous bond between old and new sections of the course. Edges of existing pavement shall be exposed and cleaned and edges saw cut to straight, vertical surfaces. All joints shall be painted with a uniform coat of paint binder (tack coat) before the fresh mixture is placed. Joints in the new pavement shall be prepared in accordance with Section 39 of the Standard Specification.

6.2.9.5. PROTECTION OF PAVEMENT: After final rolling, no vehicular traffic of any kind shall be permitted on pavement until it has cooled and hardened and in no case less than 6 hours.

6.2.10. HEADERBOARDS: Where indicated, boards shall be 2" X 4" secured in place using adequately sized stakes spaced not more than 6 feet apart. All forms shall be set to true alignment and grade. Headerboard and stakes shall be either redwood (rough sawn construction, heart grade), Western Red Cedar or pressure treated Douglas Fir at the Contractor's option, conforming to U.S. Department of Commerce Standard PS20. Untreated headerboards shall be stored to prevent warping. Soil shall be placed against the outside shoulder of forms and compacted sufficiently to prevent forms from spreading during the compaction of the pavements.

6.2.11. EXTRUDED ASPHALT CURBS: Extruded asphalt curbs shall be replaced with 6 inches high by 6 inches top and 8 inches bottom curbs and shall be fastened to the existing asphalt concrete pavement by epoxy cement.

6.3. FIELD TESTS

6.3.1. SAMPLING AND TESTING: At random locations at the job site suitable sized sample of bituminous pavement mixture and compacted pavement shall be sampled and tested in accordance with Table 1, except Note 1. The Contractor shall replace the materials at his expense.

6.3.2. JOB-MIX TEST: Samples of the plant mixtures shall be tested to determine gradation and bitumen content in accordance with ASTM D2172. Gradation shall be performed in accordance with ASTM C136. Lay-down variations from the job mix formula shall not exceed the following:

<table>
<thead>
<tr>
<th>Aggregate Size</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2-inch or larger</td>
<td>+/- 8 percent</td>
</tr>
<tr>
<td>3/8 inch to No.4</td>
<td>+/- 7 percent</td>
</tr>
</tbody>
</table>
The bitumen ratio (pounds of asphalt per 100 pounds of dry aggregate including supplemental fine aggregate if used) shall not vary by more than 0.5-pound of asphalt above or 0.5-pound of asphalt below the amount specified in the Job Mix (0.05% by weight). When required, the Contractor shall make all necessary corrections to the bituminous proportions to conform to the specified requirements.

6.3.3. SMOOTHNESS: The wearing course and binder course or any single course shall be tested in accordance with Section 39 of the Standard Specifications in the presence of the Airport's representative.

6.3.4. THICKNESS TEST: The thickness of each layer of compacted asphalt concrete shall be measured at intervals such that there will be not less than one test for each 1000 square yards of pavement surface or fraction thereof. The depth measurements shall be made by test cores not less than 3 inches in diameter through the compacted material. The Contractor shall replace and compact the materials at his own expense.

6.3.5. INSPECTION OF PLANT AND EQUIPMENT: The Owner’s Representative shall have access at all times to all parts of the paving plant for checking the adequacy of the equipment in use, checking calibration of equipment, inspecting the operation of the plant, verifying weight, proportions and character of materials and checking temperatures being maintained in the preparation of the mixtures.

6.3.6. FREQUENCY OF TESTS: The minimum number and type of tests shall be in accordance with Table 1. Sampling and testing of materials and equipment for compliance with the specifications shall be performed by a JWA approved independent commercial testing laboratory at the expense of the Contractor. The Contractor shall not be limited by the minimum number of tests shown in Table 1 and shall require additional tests at the Contractor's expense as he deems necessary to determine compliance with the minimum requirements of the contract.

### TABLE 1

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>TEST FOR</th>
<th>TEST METHOD</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregates</td>
<td>Gradation, each size</td>
<td>Ca. 202</td>
<td>Note (1)</td>
</tr>
<tr>
<td>Filler, composition</td>
<td>Ca. 202</td>
<td></td>
<td>Note (1)</td>
</tr>
<tr>
<td>% of Crushed Particles</td>
<td>Ca. 205</td>
<td></td>
<td>Note (2)</td>
</tr>
<tr>
<td>LA Rattler (500 Rev.)</td>
<td>Ca. 211</td>
<td></td>
<td>Note (2)</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>Ca. 217</td>
<td></td>
<td>Note (1)</td>
</tr>
<tr>
<td>Mix Design</td>
<td>Stabilometer Value</td>
<td>Ca. 366</td>
<td>Note (1)</td>
</tr>
</tbody>
</table>
**MATERIAL** | **TEST FOR** | **TEST METHOD** | **FREQUENCY**
---|---|---|---
Moisture Vapor Susceptibility | Ca. 307 | Note (2) |
Swell | Ca. 305 | Note (2) |
Laydown Extraction Test and Gradation | ASTM D2172 & Ca. 202 | Note (3) |
Completed Smoothness | Section 39 | Note (4) |

**NOTES:**

(1) At least one complete set of tests before start of job.
(2) Test reports during last 12 months from a laboratory acceptable at start of job.
(3) One test for each 800 tons placed.
(4) Continuous inspection for compliance and one surface test for each 2000 square yards of surface area.

6.3.7. **EVALUATION**

6.3.7.1. The asphalt pavement shall be sampled, tested, and accepted by a test lot, which shall not exceed 800 tons of asphalt concrete. The materials shall be sampled either at the plant or job site. The location of tests shall be randomly selected by the Owner’s Representative using a table of random numbers.

6.3.7.2. Acceptance of asphalt concrete shall be determined by the average results of two (2) samples taken from a test lot. A lot shall be deemed acceptable when the average of the results obtained from two (2) samples fall within the following process tolerances permitted for deviation from the job-mix formula.

<table>
<thead>
<tr>
<th>Property</th>
<th>Process Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand Equivalent</td>
<td>+/- 3 percent</td>
</tr>
<tr>
<td>Stabilometer Value</td>
<td>+/- 4 percent</td>
</tr>
<tr>
<td>Moisture Vapor Susceptibility</td>
<td>+/- 2 percent</td>
</tr>
<tr>
<td>Swell</td>
<td>+/- 0.002 inch</td>
</tr>
</tbody>
</table>

6.4. **METHOD OF MEASUREMENT**

6.4.1. Preparation and placement of asphalt concrete overlay pavement shall be measured by the square feet area, completed and accepted by JWA.

6.5. **BASIS OF PAYMENT**

Payment will be made under:

Bid Item No. 5 Weed Control, Spray Herbicide - per SY

Bid Item No. 7 Sealing Cracks in Asphalt Pavements - per LF
Bid Item No. 8  Asphalt Concrete, Installed for Non-Airfield Pavements - per TN

Bid Item No. 16  Raise or Lower Covers, Frames, or Grates of Existing Manholes & Storm Inlets to Grade - per EA

Bid Item No. 17  AC Curb installed - per LF

END OF SPECIFICATION 6
7. ASPHALT SLURRY SEAL

7.1. GENERAL

7.1.1. APPLICABLE PUBLICATIONS

The following publications of the issues listed but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the reference thereto:

7.1.1.1. STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION


Whenever this specification is referenced, the following is understood:

- Wherever the term Commission or Department occurs, it shall mean JWA. Whenever the term Director or Executive Officer occurs, it shall mean JWA Director.

- Whenever the term Engineer occurs, it shall mean JWA Director.

- All references to statistical testing are deleted.

- Whenever a discrepancy occurs between the Standard Specification and this specification, it is understood that this specification governs.

- All references to measurement and payment are deleted.

7.1.1.2. AMERICAN SOCIETY FOR TESTING AND MATERIAL (ASTM) PUBLICATIONS (Latest Editions):

<table>
<thead>
<tr>
<th>ASTM Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C117</td>
<td>Standard Test Method for Material Finer Than No. 200 Sieve in Mineral Aggregates by Washing</td>
</tr>
<tr>
<td>C136</td>
<td>Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates</td>
</tr>
<tr>
<td>D242</td>
<td>Standard Specification for Mineral Filler for Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>D977</td>
<td>Standard Specification for Emulsified Asphalt</td>
</tr>
<tr>
<td>D2172</td>
<td>Standard Test Method Quantitative Extraction of Bitumen from Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>D2397</td>
<td>Standard Specification for Cationic Emulsified Asphalt</td>
</tr>
</tbody>
</table>
7.1.2. DESCRIPTION

This section covers requirements for asphalt slurry seal, prime coat, tack coat, weed control, patch and crack repairs for vehicular streets, roads, and parking areas. The methods of construction shall be as specified herein.

7.1.3. SUBMITTALS

7.1.3.1. CERTIFIED TEST REPORTS

Certified test reports are required for the following:

Percentage of wear test shall be performed in accordance with ASTM C131.

Wet track abrasion test will be performed in accordance with ASTM D3910.

Sand equivalent test will be performed in accordance with ASTM D2419.

The asphalt emulsion test shall be performed on the materials to be used in the project within 30 days of submittal of the reports for approval.

7.1.3.2. JOB MIX FORMULA: A job mix formula shall be submitted and approved. The formula shall indicate the type and quantity of asphalt emulsion, the residual asphalt content, the water content, aggregate type and gradation, rate of application, and the abrasion loss from the wet track abrasion test. Samples of materials to be used on the job shall be used to determine the job mix.

7.1.3.3. EQUIPMENT: Descriptive information on the slurry mixing and application equipment to be used shall be submitted for approval not less than 21 days prior to commencement of work.

7.1.4. REQUIREMENTS

7.1.4.1. DELIVERY AND STORAGE: Materials shall be delivered and maintained in an undamaged condition. Aggregates shall be stockpiled as to preclude contamination and segregation.

7.1.4.2. WEATHER LIMITATIONS: The slurry seal shall be applied only when the existing surface is clean and free of visible moisture. Slurry seal shall be applied only when the pavement is above 50 degrees F and the atmospheric temperature is at least 50 degrees F and rising. (An effective means of measuring pavement temperature is obtained by filling a crack or small drill hole in the pavement with water which is allowed to stand for 15 minutes, then inserting a thermometer and reading the temperature.) Slurry seal
with anionic emulsion shall not be applied if rainfall is forecast at a 40% or greater probability for the next eight hours or if air temperatures below 35 degrees F are predicted for the next 72 hours. Slurry seal with cationic or quick-set emulsion shall not be applied if rainfall is forecast for the next four hours or if air temperatures below 35 degrees F are predicted for the next 24 hours.

7.2. PRODUCTS

7.2.1. MATERIAL

7.2.1.1. AGGREGATE: Aggregates shall consist of sound durable crushed stone or crushed gravel, and approved mineral filler, and shall be free from dirt, organic matter, clay balls, adherent films of clay, dust, and other objectionable matter. Aggregates shall be 100 percent crushed. The grading of the aggregate shall conform to the following requirements.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4</td>
<td>100</td>
</tr>
<tr>
<td>No. 8</td>
<td>90-100</td>
</tr>
<tr>
<td>No. 16</td>
<td>65-90</td>
</tr>
<tr>
<td>No. 30</td>
<td>40-60</td>
</tr>
<tr>
<td>No. 50</td>
<td>25-42</td>
</tr>
<tr>
<td>No. 100</td>
<td>15-30</td>
</tr>
<tr>
<td>No. 200</td>
<td>10-20</td>
</tr>
</tbody>
</table>

The gradation shall be determined in accordance with ASTM C136 and ASTM C117. The maximum percentage of wear shall be not more than 35 percent when tested in accordance with ASTM C131, Grading D. When tested in accordance with ASTM D2419, the aggregate, excluding the mineral filler, shall have a sand equivalent of not less than 45 excepting that the minimum sand equivalent shall be 60 when used with a cationic emulsion.

7.2.1.2. MINERAL FILLER: Mineral fillers shall be Portland cement or hydrated lime and conform to the requirements of ASTM D242.

7.2.1.3. EMULSIFIED ASPHALT: Emulsified asphalt shall confirm to Section 37-2 and 94 of the Standard Specification.

7.2.1.4. WATER: Potable.

7.2.1.5. EMULSIFIED ASPHALT SLURRY MIXTURE: The asphalt emulsion content and aggregate weight per square yard shall conform to the following requirements.
The slurry mixture shall be composed of a mixture of asphalt emulsion, aggregate, mineral filler, and water within the ranges indicated. The amount of emulsified asphalt shall be determined by trial laboratory mixes and the wet track abrasion test results. If the amounts used are more or less than the specified range, an adjustment in the contract price will be made as provided in the Contract Clauses. The aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula. The combined aggregate and filler shall be graded smoothly and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve. The slurry seal mixture shall have the following additional characteristics:

7.2.1.6. RESISTANCE TO ABRASION: The allowable wear of the cured slurry mix shall not exceed 75 grams per square foot when tested for wet track abrasion in accordance with ASTM D3910. The cured slurry being tested shall not pick up on the roller of the apparatus.

7.2.1.7. FLUIDITY: The slurry seal mixture shall contain the minimum amount of water necessary to obtain a fluid and homogeneous mixture.

7.2.1.8. NONSEGREGATION: The mixture shall not segregate during or after application to the pavement.

7.2.1.9. SURFACE TEXTURE: The mixture shall have a non-skid texture.

7.3. EXECUTION

7.3.1. CONSTRUCTION EQUIPMENT

7.3.1.1. EQUIPMENT: The equipment used in the performance of the work shall be approved and shall be maintained in satisfactory working condition at all times. JWA reserves the right to order the discontinuance of the use of any equipment that, in the opinion of the Owner’s Representative, fails to produce satisfactory work.

7.3.1.2. MIXER: The slurry mixing machine shall be a continuous flow mixing unit and be capable of delivering accurately a pre-determined proportion of aggregate, water and emulsified asphalt to the mixing chamber and to discharge the thoroughly mixed product on a continuous basis. The aggregate shall be pre-wetted immediately prior to mixing.
with the emulsified asphalt. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients together. The mixing machine shall be equipped with an approved fines feeder that provides a method to accurately introduce a predetermined proportion of mineral filler at the same time and locations that the aggregate is fed into the mixer. The fines feeder shall be used whenever added mineral filler is a part of the aggregate blend. The mixing machine shall be equipped with a water pressure system and fog type spray bar adequate for complete fogging of the surface ahead of the spreading equipment with an application up to 0.05 gallon per square yard. Sufficient machine storage capacity to mix properly and apply a minimum of 5 tons of the slurry shall be provided. Proportioning devices shall be calibrated prior to placing slurry seal.

7.3.1.3. SELF-CONTAINED SLURRY MACHINE: The machine shall be capable of rapid discharge of the mixed materials into a spreader having suitable controls to allow adjustment for variations in pavement grades and slope. The spreader shall be similar to the spreader box as hereinafter specified. The spreader box may be either an integral part of self-contained slurry machine or a separate towed unit. The self-contained slurry unit shall be mounted on a truck or other vehicle capable of producing evenly controlled low rates of spread throughout the operation so that the slurry is spread evenly and all cracks are filled.

7.3.1.4. SLURRY SPREADING EQUIPMENT: Attached to the mixer machine shall be a mechanical type squeegee distributor equipped with flexible material in contact with the surface to prevent loss of slurry on varying grades and crown by adjustment to assure uniform spread. There shall be a lateral control device and a flexible strike-off. The spreader box shall have an adjustable width. The box shall be kept clean, and build-up of asphalt and aggregate on the box shall not be permitted. The use and condition of burlap drags or other drags shall be approved by the Owner’s Representative.

7.3.1.5. TRAFFIC PAINT REMOVAL EQUIPMENT: Shall be specifically designed for traffic paint removal, and shall be a self-propelled machine using a cutting head assembly with steel cutters or a self-propelled machine using a cutting head assembly with a series of abrasive saw blades.

7.3.1.6. CLEANING EQUIPMENT: Power brooms, power blowers, air compressors, water flushing equipment, and hand brooms shall be suitable for cleaning the surface and cracks of the old surface.

7.3.1.7. HAND TOOLS: Hand squeegees, shovels, hand burlap drags, and other equipment shall be available as necessary to perform the work.

7.3.2. CONSTRUCTION PROCEDURE

7.3.2.1. WEED CONTROL: Refer to Section 12 of this specification.
7.3.2.2. **CRACK REPAIRS**: Cracks shall be repaired as specified in section 3, "Sealing Cracks in HMA Pavement."

7.3.2.3. **PREPARATION OF SURFACE**: Immediately prior to applying the tack coat, remove all vegetation and clean the surface of all loose or objectionable material. Any Standard cleaning method used to clean pavements will be acceptable, except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. Remove and repair areas of pavement impregnated with grease, oil or fuel. Scrub surface oil and grease thoroughly with an approved detergent and water, and flush the surface clean of the detergent. Water flushed areas shall be swept free of puddles. Surface cracks shall be cleaned and blown out with compressed air (90 psi at the nozzle) immediately before sweeping or vacuum operations.

7.3.2.4. **MIXING OF SLURRY**: The mixing of slurry shall be sufficient to produce a uniform mixture of the desired consistency in accordance with the job mix formula. Under no circumstances shall the emulsion content be changed to control the consistency of the mix. If breading, hardening, segregation, balling, or lumping occurs during the mixing process, the batch shall be discarded.

7.3.2.5. **APPLICATION OF SLURRY SEAL**: Slurry mix shall not be applied during periods of low temperature or pending rainfall previously specified. The surface shall be fogged with water directly preceding the spreader. The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. The water content shall be controlled and be in accordance with the job mix formula. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is obtained. No segregation of the emulsion and aggregate fines from the coarse shall be left in the finished surface. No excessive build-up or unsightly appearance shall be permitted on longitudinal or transverse joints. Hand burlap dragging shall be used to spread slurry in areas inaccessible to the slurry mixer. Care shall be exercised to leave no unsightly appearance form hand work. Burlap drags suitable to even the surface and leave a rough texture of slurry application shall be used. Slurry seal shall be cured for at least 4 hours after that traffic may resume if permitted by the Owner’s Representative. Suitable methods such as barricades, flagmen, pilot cars, etc., shall be used to protect the uncured slurry surface for all type of traffic. The Contractor shall provide temporary making to delineate traffic lanes until permanent striping is applied.

7.3.2.6. **REMOVAL OF BARRICADES**: Barricades shall not be removed until the final slurry sealed surface has been approved by the Owner’s Representative.

7.3.3. **SAMPLING**: Method of sampling aggregates shall be in accordance with ASTM D75. Methods of sampling bituminous material shall be in accordance with ASTM D140.

7.3.3.1. **SAMPLING AGGREGATES**: At least one initial sample shall be taken from each stockpile. Each sample shall be collected by taking incremental samples at random from the source material to make a composite sample of not less than 50 pounds. Three
random samples shall be taken from each 200 tons of material, or a day’s run thereafter, during the course of the project. Each random sample shall be made when the source of material is changed or when variations in gradation exceeding those hereafter specified are found in testing.

7.3.3.2. SAMPLING BITUMINOUS MATERIAL: The asphalt emulsion shall be sampled immediately after delivery to the project site and at any time thereafter if the source of material is changed. Additional samples shall be taken directly from the emulsion storage tanks of the slurry seal machine when so directed.

7.3.3.3. SAMPLING SLURRY MIX: Samples of the slurry seal mixture shall be taken at the rate of at least two samples per day from each slurry seal machine used on the project. Samples shall be taken in clean plastic containers at the diverter after the slurry machine has traversed sufficient distance to be providing a uniform mixture. Each sample shall be immediately capped, and marked for identification.

7.3.3.4. SAMPLE IDENTIFICATION: Each sample of aggregate, emulsion, and slurry mixture shall be placed in a clean container, which shall be securely fastened to prevent loss of material. Each sample shall be identified with the following information:

- Contract Number
- Sample Number
- Date of Sample
- Sample
- Source
- Intended Use
- For Testing

7.3.4. TESTING

7.3.4.1. AGGREGATES: Each aggregate sample shall be tested for gradation in accordance with ASTM C117 and ASTM C136. Additional tests for Los Angeles abrasion and sand equivalent shall be conducted whenever the aggregate source job is changed or when otherwise directed.

7.3.4.2. BITUMINOUS MATERIALS: Each sample of asphalt emulsion shall be tested for conformance Guard top specifications or to ASTM D977 for the anionic type and ASTM D2397 for the cationic type if an approved equal is used. Tests on asphalt emulsions shall include determination of residual asphalt content.
7.3.4.3. **SLURRY MIXTURE:** Each sample of slurry mixture shall be tested for conformance to the job mix formula. The following tests shall be performed:

a. Water content as percent of dry weight of slurry before extraction.

b. Residual asphalt content as percent of dry weight of aggregate shall be determined in accordance with ASTM D2172.

c. Gradation of extracted aggregate shall be determined in accordance with ASTM C136.

d. Percent of emulsified asphalt in slurry mixture based on weight of dry aggregates shall be calculated.

7.3.4.4. **VARIATION:** Variations from the approval job mix formula shall not exceed the following:

<table>
<thead>
<tr>
<th>Aggregate Size</th>
<th>Tolerance (plus or minus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8-inch to No. 4</td>
<td>7 percent</td>
</tr>
<tr>
<td>No. 8 and No. 16</td>
<td>6 percent</td>
</tr>
<tr>
<td>No. 30 and No. 50</td>
<td>5 percent</td>
</tr>
<tr>
<td>No. 100</td>
<td>4 percent</td>
</tr>
<tr>
<td>No. 200</td>
<td>2 percent</td>
</tr>
<tr>
<td>Asphalt Emulsion</td>
<td>1 percent</td>
</tr>
<tr>
<td>Water Content</td>
<td>1 percent</td>
</tr>
</tbody>
</table>

7.3.5. **TRIAL APPLICATION:** The Contractor shall place a test strip of at least 60 square yards in area designated by the Owner’s Representative. The test section shall be placed using the same equipment and methods as will be used on the job. Slurry mixture placed in test strip shall conform to job mix. The Contractor shall also demonstrate that his equipment has been properly calibrated and is clean and in good working order. Work shall not proceed prior to approval of the rest strip.

7.4. **DUST CAP SLURRY SEAL**

7.4.1. **DUST CAP SLURRY SEAL** shall meet Specification 7.4.2 or JWA approved equal.

7.4.2. **PAVEGUARD** is a single package, water dispersed, mineral filled, black cementicious asphalt coating with inorganic mineral and organic polymer chemistry.

7.4.2.1. **PAVEGUARD** properties are:

a. Adhesive binder shall be a composite rubber modified asphalt containing a minimum 5% by weight (expressed as a percentage of the combined neat asphalt and tire mass) of a uniformly embedded recycled tire. The recycled tire fragments
shall have tension, compression and elastic characteristics similar to whole, recyclable tires consisting of a maximum particle size of 180 microns (80 mesh).

d. Solids content: 48% Minimum (summer), 52% Min. (cool weather/high traffic areas/airports), free of bacterium food source such as wood fiber.

c. Biocide content: None (no formaldehyde or other biocides are present in the basic stock formula.

7.4.2.2. Physical Properties for PAVEGUARD:

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>MIN</th>
<th>MAX</th>
<th>METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density (lbs. per gallon)</td>
<td>9.5</td>
<td>10.0</td>
<td>ASTM D-1475</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>&lt;4%</td>
<td></td>
<td>ASTM D-570</td>
</tr>
<tr>
<td>Percent Solids</td>
<td>48%</td>
<td>52%</td>
<td>ASTM D-3960</td>
</tr>
<tr>
<td>Biocide Content</td>
<td>NONE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet Track Abrasion (6 Day)</td>
<td>&lt;35 grams/S.F.</td>
<td></td>
<td>ISSA A-105, T-100, ASTM 3910</td>
</tr>
<tr>
<td>VOC</td>
<td>&lt;10 grams/liter</td>
<td></td>
<td>BAAQMD Vol. 3 Lab 22</td>
</tr>
<tr>
<td>Settlement</td>
<td>&lt;1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity (CPS)</td>
<td>800</td>
<td>1700</td>
<td>ASTM D 2196-86</td>
</tr>
<tr>
<td>Fuel Resistance (w/FR additive)*</td>
<td>Pass</td>
<td></td>
<td>ASTM D 2939, RP-355e</td>
</tr>
<tr>
<td>Flexibility - Will Not Crack</td>
<td>180° Arc (60 mils) 4°C</td>
<td></td>
<td>ASTM A 105 No. 146</td>
</tr>
<tr>
<td>Softening Point (adhesive)</td>
<td>&gt;120 F</td>
<td></td>
<td>ASTM D 36-95</td>
</tr>
</tbody>
</table>

*when specified by engineer

7.4.2.3. LIGHTWEIGHT EQUIPMENT: Pavement thickness in dust cap areas requires the use of lightweight equipment only. The equipment used in the performance of the work shall be approved by JWA prior to operation. JWA reserves the right to order the discontinuance of the use of any equipment that, in the opinion of the Owner’s Representative, fails to produce satisfactory work.

7.4.2.4. Application down to 75°F by proprietary spray hardware or standard squeegee equipment at spread rates of 0.15-0.30 gal/yd² is performed after a typical field dilution of 5-20%. Excessive field dilution should be avoided as it will lead to adhesive flushing and premature failure.

7.5. BASIS OF PAYMENT

Payment will be made under:
Bid Item No. 12  Slurry Seal Coat - per SY

Bid Item No. 13  Dust Cap Slurry Seal - per SY

END OF SPECIFICATION 7
8. MODIFIED ASPHALTS AND SLURRIES

8.1. RUBBERIZED EMULSION – AGGREGATE SLURRY

8.1.1. APPLICABLE PUBLICATIONS

The following publication listed below, but referred to hereafter by basic designation “Greenbook” only, form a part of this specification to the extent required by the references thereto:


8.1.2. General

This work shall consist of formulating a mix design, cleaning pavement surfaces, mixing and applying a crumb rubber asphalt slurry-seal surface treatment, and protecting the completed slurry seal until set. All work shall be in accordance with this specification, the dimensions, and details shown on the plans, and as approved by the Engineer.

8.1.3. Materials

Rubberized Emulsion - Aggregate Slurry (REAS) shall consist of Rubberized Polymer Modified Emulsion (RPME) and aggregate. Materials for REAS shall conform to the following, immediately prior to mixing.

8.1.3.1. RUBBERIZED POLYMER MODIFIED EMULSION: The RPME shall be a slow-set or a quick-set type of emulsion as determined by the Engineer. RPME shall contain asphalt, crumb rubber, and polymer modifiers.

8.1.3.2. POLYMER MODIFIER: Polymer modifier shall be latex which is added at a minimum of 2 percent by weight of the RPME.

8.1.3.3. CRUMB RUBBER: The material shall be granulated scrap tire rubber free from fabric wires and other contaminants. Rubber shall be dry and free flowing. Calcium carbonate or talc may be added to a maximum of 4 percent by weight of rubber to prevent rubber particles from sticking together. The rubber shall have a specific gravity between 1.15 and 1.20 one hundred percent of the rubberized material shall pass a 1.18 mm (No. 16) sieve, 95 percent shall pass a 900 µm (No. 20) sieve, and a maximum of 2 percent shall pass a 75 µm (No. 200) sieve. The RPME shall contain between 66 g/L (0.55 lbs/gal) and 78 g/L (0.65 lbs/gal) of crumb rubber.
8.1.3.4. Quality Requirements

Manufacturers shall certify that materials meet the following requirements:

TABLE 4-3.2.4 (A)

TESTS ON RUBBERIZED POLYMER MODIFIED EMULSION

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity, 25°C (77°F), Brookfield, Model RVT #6</td>
<td>2,500 min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle @ 10 RPM (Centipoise)</td>
<td></td>
<td>20,000 max.</td>
<td></td>
</tr>
<tr>
<td>Residue by Evaporation % ASTM D 244</td>
<td></td>
<td>50 min.</td>
<td></td>
</tr>
<tr>
<td>Sieve Test % retained on No. 20 screen ASTM D 244</td>
<td></td>
<td>2.0 max.</td>
<td></td>
</tr>
<tr>
<td>Weight per Liter (Gallons)</td>
<td>1.0 kg/L (8.33 lbs/gal)</td>
<td>1.05 kg/L (8.75 lbs/gal)</td>
<td></td>
</tr>
<tr>
<td>Penetration of Residue, 25°C (77°F), 100 g. 5 sec.</td>
<td>20 min. - 40 max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASTM D 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Residue Soluble in Trichloroethylene ASTM D 2042</td>
<td>75 min.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Sieve test of original emulsion is 0.10 max.

TABLE 4-3.2.4 (B)

TEST ON POLYMER MODIFIER

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Solids (residue)</td>
<td>ASTM D1417</td>
<td>60% min.</td>
</tr>
</tbody>
</table>

TABLE 4-3.2.4 (C)

COMPOSITION OF REAS

<table>
<thead>
<tr>
<th>Aggregate Type</th>
<th>RPME % of Dry Aggregate Weight</th>
<th>Residual RPME % of Dry Aggregate Weight</th>
<th>kg of Dry Aggregate Per Liter of RPME</th>
<th>Pounds of Dry Aggregate per Gallon of RPME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Slurry Aggregate</td>
<td>60-80</td>
<td>30-40</td>
<td>1.27-1.70</td>
<td>10.6-14.2</td>
</tr>
<tr>
<td>Type I Slurry Aggregate</td>
<td>50-75</td>
<td>25-38</td>
<td>1.35-2.00</td>
<td>11.3-17.0</td>
</tr>
</tbody>
</table>
8.1.3.5. Aggregate

The aggregate shall consist of sound and durable natural or manufactured sand, crushed stone, or crushed stone and rock dust, or a combination thereof, free of deleterious amounts of organic material, mica, and other substances not suitable for the purpose. Smooth-textured sand of less than 1.25 percent water absorption, as tested by ASTM C 128, shall not exceed 50 percent of the total combined aggregate. Aggregate retained on the 300 µm sieve (No. 50) shall be 100 percent crushed.

The combined aggregate shall meet the requirements of Table 203-5.2(B) of Greenbook prior to any chemical additions.

The combined aggregate shall conform to the gradation shown in Table 4-3.2.5(A) when tested in accordance with ASTM C 136.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>% By Weight Passing Sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fine Slurry Aggregate</td>
</tr>
<tr>
<td>4.75 mm (No. 4)</td>
<td>100</td>
</tr>
<tr>
<td>2.36 mm (No. 8)</td>
<td>95-100</td>
</tr>
<tr>
<td>1.18 mm (No. 16)</td>
<td>75-92</td>
</tr>
<tr>
<td>4 µm (No. 30)</td>
<td>50-75</td>
</tr>
<tr>
<td>300 µm (No. 50)</td>
<td>35-50</td>
</tr>
<tr>
<td>150 µm (No. 100)</td>
<td>15-30</td>
</tr>
<tr>
<td>75 µm (No. 200)</td>
<td>10-20</td>
</tr>
</tbody>
</table>

8.1.3.6. WATER: All water used in making the slurry shall be potable and free from harmful soluble salts.

8.1.3.7. ADDITIVES: Additives up to 1.5 percent of the dry aggregate weight, as approved in the mix design, may be used in the slurry to modify viscosity, setting, and curing characteristics. Field adjustments to additives may be made only if approved by the Engineer.

8.1.3.8. Mix Design Submittal

Mix designs and calibration shall be per 203-5.4 of Greenbook and the following. Mix design results shall include any proposed additives. The completed slurry shall have a minimum skid resistance of 40 when tested per California Test No. 342. The standard Wet Track Abrasion Test (WTAT) template may be modified to a thickness of 3.18 mm (0.125 in), when using slow-set emulsion. The mix design shall include the weight per liter (weight per gallon) of REAS.
8.1.4. Slurry Mixing and Spreading Equipment

The REAS shall be mixed either by a continuous flow mixer per 302-4.2.2 of Greenbook or a central mixing plant. A central mixing plant shall not be used for quick set REAS.

If a central mixing plant is used, combining of the RPME and aggregate in the mixing tank shall be in the presence of the Engineer. The tank shall be calibrated in liters and gallons and equipped with load cells and a full sweep agitator capable of producing a homogeneous slurry mix. All storage tanks and delivery vehicles shall be equipped with an agitator. The REAS shall be delivered to the slurry site and spread directly behind the truck with a mechanical-type squeegee distributor, or the slurry may be pumped into smaller trucks equipped with mechanical-type squeegee distributors. All spreading equipment shall contain fog/water systems per 302-4.3.2 of Greenbook. The mixing tank shall not be used to batch more than one job at a time. Storage tanks for RPME and REAS shall not be used to supply more than one job at a time.

The weight per liter (weight per gallon) of REAS delivered to the spreader box shall be within 0.11 kg/L (0.92 lbs/gal) of the mix design.

8.1.4.1. Field Mixing and Spreading Equipment Calibration

Calibration shall conform with 203-5.4 of Greenbook and the following. Calibration shall be per International Slurry Surfacing Association (ISSA). If the tests do not meet specification requirements, additional tests shall be performed at the Contractor's expense until an acceptable mix is obtained.

8.1.5. APPLICATION OF REAS: The application of REAS shall conform to 302-4.3.2 of Greenbook, except for the following conditions, and RPME application rates specified in Table 4-3.4(A). REAS shall not be applied when the atmospheric temperature is less than 10 °C (50 °F) or when the atmospheric temperature at 7 a.m. is 24 °C (75 °F) or over, and rising to a forecast high of 39 °C (100 °F). The total time of mixing in the slurry machine shall not exceed 5 minutes.

<table>
<thead>
<tr>
<th>Aggregate Type</th>
<th>Application Rate meter²/liter of RPME</th>
<th>Application Rate feet²/gallon of RPME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Slurry Aggregate</td>
<td>0.86 to 0.98</td>
<td>35 to 40</td>
</tr>
<tr>
<td>Type I Slurry Aggregate</td>
<td>0.69 to 0.86</td>
<td>28 to 35</td>
</tr>
</tbody>
</table>

8.1.6. FIELD SAMPLING: Field sampling shall conform to 302-4.3.3 of Greenbook.
8.1.7. PUBLIC CONVENIENCE AND TRAFFIC CONTROL: Public convenience and traffic control shall conform to 302-4.3.3 of Greenbook.

8.2. Measurement and Payment

The REAS shall be paid based on the liters (gallons) of RPME used. Measurement of RPME shall be the liter (gallon) computed by dividing the weight obtained from Certified Weighmaster Certificates by 1.02 kg/L (8.5 lbs/gal). The Contractor shall also present Weighmaster's Certificates for the amount of such material remaining unused at the completion of the work at no cost to the Agency. Payment will be determined by deducting the amount of the unused material from the total amount of material delivered.

The pay quantity for REAS shall be the total number of liters (gallons) for RPME (excluding aggregate) used on the project. Such price shall include full compensation for specified surface preparation, removals, sweeping, aggregate required in the mix design, and for constructing the REAS in place.

Payment reduction for noncompliance shall conform to 302-4.6.1 and 302-4.6.2 of Greenbook.

8.3. CRUMB RUBBER MODIFIED (CRM) BINDERS AND PAVEMENTS – DRY PROCESS.

8.3.1. Crumb Rubber Modified Asphalt Concrete-Gap Graded (CRUMAC-GG)

8.3.1.1. General

CRUMAC-GG shall be the product of mixing mineral aggregate, asphalt binder, and Crumb Rubber Modifier (CRM) at a central mixing plant and shall conform to 203-6 of Greenbook except as modified herein.

8.3.2. Materials.

8.3.2.1. ASPHALT RUBBER: Asphalt Rubber shall consist of Paving Grade Asphalt per 203-1 of Greenbook and CRM. The proportions of the two materials, by weight, shall be 82 ± 2 percent paving asphalt and 18 ± 2 percent CRM.

8.3.2.2. CRUMB RUBBER MODIFIER (CRM): CRM shall be scrap tire CRM as required in 203-11.2.3 of Greenbook. Gradation of the CRM shall be per Table 4-4.2.2(A).

TABLE 4-4.2.2 (A)
CRUMB RUBBER GRADATION

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT PASSING (by weight)</th>
<th>TOLERANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00 mm (No. 10)</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>1.18 mm (No. 18)</td>
<td>40-60</td>
<td>±10%</td>
</tr>
<tr>
<td>4 µm (No. 30)</td>
<td>10-20</td>
<td>±7%</td>
</tr>
<tr>
<td>300 µm (No. 50)</td>
<td>25</td>
<td>±5%</td>
</tr>
<tr>
<td>150 µm (No. 100)</td>
<td>8</td>
<td>±3%</td>
</tr>
</tbody>
</table>

8.3.3. Composition and Grading

Crumb Rubber Modified Asphalt Concrete-Gap Graded (CRUMAC-GG) will be designated by class, i.e., CRUMAC-GG-C and shall conform to the requirements of this subsection and Table 203-11.3 (A) of Greenbook.

8.3.4. Mix Designs and Certifications

Mix designs for CRUMAC shall conform to 203-11.6 of Greenbook. Once the percent asphalt rubber binder is determined by the mix design, the production tolerance shall be ±0.5% as determined by California Test Method 382.

8.3.5. Proportioning

Proportioning shall conform to 203-6.6 of Greenbook, except that proportioning of CRM shall be performed using an automatic batching system and the only manual operation required for proportioning of all materials shall be the single operation of a switch or starter. The CRM feeder system shall be able to deliver CRM to the mixture at an accuracy of 0.1% of the total weight of mix. The Contractor shall submit to the Engineer, in writing, the method proposed to deliver the CRM to the mixture. The method and equipment proposed for use shall be so designated and accessible that the Engineer can visually observe the materials being incorporated into the mixture. All weighing and metering devices used in the production of CRUMAC shall be calibrated. When batch-type plants are used, the CRM shall be proportioned by weight.

8.4. METHOD OF MEASUREMENT

8.4.1. SURFACE Treatment shall be measured by the square yard of treated area completed and accepted by JWA. Crack sealing and weed control will be paid separately.

8.5. BASIS OF PAYMENT

Payment will be made under:

Bid Item No. 11 Rubberized Emulsion-Aggregate Slurry - per SY

END OF SPECIFICATION 8
9. TRAFFIC CONTROLS (STRIPING), PARKING STALL BUMPERS, GUARD RAIL, DELINEATOR & PAVEMENT MARKERS

9.1. GENERAL

9.1.1. APPLICABLE DOCUMENTS

The following specification standards of the issues listed in this paragraph (including the amendments, addenda and errata designated), but referred to hereinafter by basic designation only, form a part of this specification to the extent required by the references thereto.

9.1.1.1. FEDERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>TT-P-1952D</th>
<th>Paint, Traffic and Airfield Marking, Waterborne</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT-B-1325C</td>
<td>(Glass Spheres); Reflective Additive to Paint</td>
</tr>
</tbody>
</table>


Whenever this specification is referenced, the following is understood:

- Wherever the term Commission or Department occurs, it shall mean JWA. Whenever the term Director or Execute Officer occurs, it shall mean JWA Director.
- Whenever the term Engineer occurs, it shall mean JWA Director.
- All references to statistical testing are deleted.
- Whenever a discrepancy occurs between the Standard Specification and this specification, it is understood that this specification governs.
- All references to measurement and payment are deleted.


9.1.2. REQUIREMENTS: The work includes the following:

9.1.2.1. Maintenance of all pavement traffic control markings and parking stall stripes.

9.1.2.2. Placement and removal of temporary reflective pavement markings.

9.1.2.3. Replacement of parking stall bumpers with new concrete bumpers.

9.1.2.4. Replacement of metal guard rail as directed.
9.1.3. SUBMITTALS

Prior to commencement of any work, the Contractor shall submit striping plan for approval of the Owner’s Representative. The striping plan shall show markings and parking stripes, and placement of concrete bumpers.

9.1.3.1. CERTIFICATES

Before delivery of materials, three (3) certified copies of certificates certifying compliance with applicable paint and beads specifications shall be submitted to and approved by the Owner’s Representative.

9.2. PRODUCTS

9.2.1. MATERIALS

9.2.1.1. PAINT

a. Reflectorized paint shall be TT-P-1952, white, red, or yellow, with glass spheres, TT-B-1325, Type II, Grade A, free of dust or rust.

b. Nonreflectorized traffic paint shall be TT-P-1952, white, yellow, red, blue, green or black. All paint materials shall be delivered in unbroken original containers bearing the manufacturer's name and data required by applicable specification.

9.2.1.2. REFLECTIVE BEADS: Glass beads shall conform to the requirements of TT-B-1325.

9.2.1.3. RAISED PAVEMENT MARKERS: Raised pavement markers shall conform to the provisions of Section 85 of the Standard Specifications.

9.2.1.4. PARKING STALL BUMPERS: Parking stall bumpers shall be prefabricated reinforced concrete 7 inches to 8 inches wide, 6-1/2 inches to 7 inches high and 72 inches long. Concrete shall develop a minimum compressive strength of 2500 psi at age of 28 days and shall have a minimum of two No. 3 reinforcing bars and two pipe sleeves for anchors for each bumper.

9.2.1.5. STREET PAVEMENT STRIPES: Work and symbol markings shall conform to the applicable requirements of the "Manual on Uniform Traffic Control Devices" unless otherwise indicated. Temporary pavement delineation shall consist of temporary reflective raised pavement markers placed on lane lines and centerlines at longitudinal intervals of not more than 24 feet apart, or 12 feet apart on radii, and reflective tape to establish obliterated pavement markings including, but not limited to, crosswalks, stop bars and turn arrows. Temporary reflective raised pavement markers and temporary reflective tape shall be the same color as the lane line, centerline, or pavement marking the markers/tape replace.
9.2.1.6. STREET SIGNS: Work and symbol markings shall conform to the applicable requirements of the "Manual on Uniform Traffic Control Devices" and Standard Specification section 56 unless otherwise indicated.

9.2.1.7. METAL BEAM GUARD RAILING: Metal Beam Guard Railing shall conform to the Standard Specifications Section 83-1.02B and related state standard plans.

9.3. EXECUTION

9.3.1. PREPARATION OF SURFACES

All surfaces to receive paint shall be free of all substances which will damage or deteriorate the paint film. Painting and marking shall be done only when the surfaces are dry and clean and when the weather is not excessively windy, dusty or foggy. Removal of existing paint shall be performed using abrasive wheels or high pressure water blasting, as directed based on the quantity to be removed. Pavement markings to be removed as shown on the plans. The surface of asphalt concrete pavements subject to the pavement markings removal shall be sealed with a quick-set grade of emulsion – QS-1h or CQS-1h.

9.3.2. STORAGE AND MIXING

The Contractor shall provide his own storage facilities and assume responsibility for their security. Such storage facilities shall meet the state safety requirements and the Airport safety requirements and shall be located as directed. All mixing of paint materials shall be done in the area adjoining the work and shall be applied when the air temperature is above 50 degrees F to a clean dry surface.

9.3.3. ALIGNMENT

The alignment of the proposed stripes shall be determined by spotting with paint in advance of machine application. Stripes 25 feet and longer shall be spotted along the center line of the proposed stripe by locating the spots with either a survey instrument or a rope stretched between established center line points. The rope shall be approximately 1/2-inch in diameter. Spotting shall be effected by marking the pavement surface with narrow paint brush or spraying apparatus at the survey points or over the top of the rope. Spotting shall be made at intervals of not more than 10 feet apart.

9.3.4. APPLICATION OF PAINT TO PAVEMENT

Paint shall be applied at its original consistency, without the addition of thinner, by means of stripe painting spray equipment, having the proper nozzle to avoid paint splatter outside the limit lines. The stripes and markings shall be of the required width, with clean, true edges without sharp breaks, and shall be applied within 1/2-inch of the
average center line of the spotted line. Any deviation to either side of the spotted line which exceeds 1/2-inch in any 50-foot length, shall be obliterated and the stripe corrected. A uniform covering of paint shall be applied and the finished stripes and markings shall be free from light spot and skips. Paint shall be applied at the rate of not less that one gallon per 100 square feet.

9.3.4.1. Glass beads shall be applied at a minimum rate of 5.5 pound of beads for each gallon of paint for streets and roads.

9.3.4.2. The Contractor shall provide all warning devices required to protect the painting operations and the finished work. The Contractor shall repaint, at his own expense, any portion of the stripe damaged by any type of traffic within 24 hours after the stripe had been applied.

9.3.4.3. If necessary, the surface of new and existing bituminous pavement shall be washed with a detergent solution followed by a water rinse to remove any clay coating or other foreign material. On new or existing Portland cement pavement, the surface shall be abrasive blast cleaned to remove laitance, curing seal, or other foreign material.

9.3.4.4. The newly extruded stripes shall be protected from damage, and any traffic stripe damaged or failing to properly adhere to the surface of the pavement, shall be replaced with stripe meeting the requirements of these specifications.

9.3.5. Parking stall bumpers shall have two No. 4 x 15-inch reinforcing bars driven through asphalt concrete pavement or set in an epoxy adhesive approved by the Owner’s Representative.

9.3.6. Reflectoerized pavement markers shall conform to Section 85 of the Standard Specification.

9.3.7. Raised pavement buttons (markers) shall conform to Section 85-1.04 of the Standard Specification.

9.3.8. Road signs shall conform to the plans and directions of JWA. Materials and construction shall conform to the Standard Specifications Section 56.

9.3.9. METAL BEAM GUARD RAILING

9.3.9.1. Removal of existing guard rail shall be performed so as to minimize damage to the existing railing and posts. Posts shall be extracted and the holes backfilled with select material.

9.3.9.2. New railing shall be placed as directed by JWA. Materials and execution shall be in accordance with Standard Specification 83-102B.
9.4. METHOD OF MEASUREMENT

9.4.1. Traffic controls (striping), parking stall bumpers, guard rail, pavement markers shall be measured by the unit of line items completed and accepted by JWA. Removal of existing paint will be measured by the unit of line item completed and accepted by JWA.

9.5. BASIS OF PAYMENT

Payment will be made under:

Bid Item No. 20 Concrete Wheel Stop Installed – per EA

Bid Item Nos. 23 – 27 Repaint Roads & Parking Lot Pavement with Reflective Glass Beads – per LF

Bid Item No. 28 Repaint Roads & Parking Lot Pavement with Reflective Glass Beads Symbols and Markings – per SF

Bid Item Nos. 29 - 34 New Paint Roads & Parking Lot Pavement with Reflective Glass Beads – per LF

Bid Item No. 35 New Paint Roads & Parking Lot Pavement with Reflective Glass Beads Symbols and Markings – per SF

Bid Item No. 36 New Paint Curb – per LF

Bid Item No. 37 Repaint Curb – per LF

Bid Item Nos. 38 - 42 Repaint Roads & Parking Lot Pavement without Reflective Glass Beads – per LF

Bid Item No. 43 Repaint Roads & Parking Lot Pavement without Reflective Glass Beads Symbols and Markings – per SF

Bid Item Nos. 44 - 48 New Paint Roads & Parking Lot Pavement without Reflective Glass Beads – per LF

Bid Item No. 49 New Paint Roads & Parking Lot Pavement without Reflective Glass Beads Symbols and Markings – per SF

Bid Item No. 50 Provide, Place, Remove Temporary Reflective Pavement Markers - per EA

Bid Item No. 51 Paint Removal – per SF

Bid Item No. 52 Guard Railing (New) Post & Rails – per LF
Bid Item No. 53  Remove and Dispose Guard Rails – per LF
Bid Item No. 54  Delineators White or Yellow – per EA
Bid Item No. 55  Provide In-Place Raised Reflective (Single or Double Faced) Pavement Markers (Blue/White/Yellow) – per EA
Bid Item No. 56  Road Signs on Single Post – per EA

END OF SPECIFICATION 9
10. **SELECT AGGREGATE BASE**

10.1. **GENERAL**

10.1.1. **APPLICABLE PUBLICATIONS**

The following publications of the issues listed below, but referred to hereinafter by basic designation only, form a part of this specification to the extent required by the references thereto:


Whenever this specification is referenced, the following is understood:

- Wherever the term Commission or Department occurs, it shall mean JWA. Whenever the term Director or Executive Officer occurs, it shall mean JWA Director.

- Whenever the term Engineer occurs, it shall mean JWA Director.

- All references to statistical testing are deleted.

- Whenever a discrepancy occurs between the Standard Specification and this specification, it is understood that this specification governs.

- All references to measurement and payment are deleted.

10.1.1.2. **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

<table>
<thead>
<tr>
<th>ASTM Method Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 1556</td>
<td>Test Method for Density of Soil in Place by the Sand Cone Method</td>
</tr>
<tr>
<td>D 1557</td>
<td>Test Method for Moisture-Density Relations of Soils Using 10-lb Rammer and 18-inch Drop</td>
</tr>
</tbody>
</table>

10.1.2. **GENERAL**

Sampling and testing of materials and equipment for compliance with the specifications shall be performed by a JWA approved independent commercial testing laboratory at the expense of the Contractor. All samples and tests specified for the conformance and quality control shall be taken to correctly reflect the construction work.

Certified copies of all tests shall be approved by the Contractor and submitted to JWA.

10.1.2.1. **CERTIFICATES**
Before delivery of materials, three certified copies of certificates certifying compliance with applicable aggregate specifications shall be submitted to and approved by the Owner’s Representative.

10.2. REQUIREMENTS

10.2.1. GENERAL

The aggregate base for area to be reconstructed as shown on the plans shall conform to the requirements of the Standard Specifications Section 26 and the following special provisions.

10.3. PRODUCTS

10.3.1. MATERIALS

10.3.1.1. AGGREGATES

Aggregates for base course shall conform to Section 26 of the Standard Specification, Class 2, for 1-1/2-inch maximum size gradation.

10.4. SUBGRADE PREPARATION

Prior to construction of base course, the subgrade shall be compacted and graded for trueness to line and grade. Rutts or soft-yielding areas in the subgrade shall be corrected by removing or adding material, aerating or wetting the subgrade materials and compacting to 95% of ASTM D1557 maximum density.

10.4.1. BASE COURSE

10.4.1.1. Aggregate base shall be placed in accordance with requirements of Section 26 of the Standard Specifications. The materials shall be graded and compacted in 4-inch layers to 100 percent of maximum density.

10.4.1.2. MAINTENANCE

The base course shall be maintained until the pavement is in place. Maintenance shall include drainage, rolling, shaping and water as necessary to maintain the course in proper condition. Sufficient moisture shall be maintained at the surface to prevent a dusty condition by light sprinkling with water. Areas of completed base course that are damaged by freezing shall be conditioned, reshaped and re-compacted in accordance with the requirements of this specification, without additional cost to JWA.

10.4.1.3. FINISH SURFACE

Surface tolerance shall comply with the Standard Specifications.
10.4.2. COMPACTATION

Each layer shall be uniformly compacted to the percentage of maximum density specified. The Contractor shall add moisture or aerate each layer to bring the moisture content of the materials to the optimum moisture content. When necessary, the Contractor selected equipment and construction procedures shall be altered, changed or modified in order to meet the specified compaction requirements. Optimum moisture, maximum density (OMMD) shall be determined for the specified maximum density in accordance with ASTM D1557. During compaction the dry unit weight of the compacted materials shall be determined for the specified in-place density in accordance with ASTM D1556.

10.4.3. FIELD INSPECTION, SAMPLING AND TESTING

10.4.3.1. INSPECTION

Job inspection shall be performed in accordance with Standard Specification section 5-1.08 and shall include verification of the quality of the base course materials. All sampling and testing shall be performed by a JWA-approved, independent commercial testing laboratory at the Contractor's expense.

10.4.3.2. TESTS

Minimum number of tests shall be in accordance with Paragraph "FREQUENCY OF TESTS", Section 3.3.10.6 of this specification. One Moisture-Density relationship test shall be made in accordance with ASTM D1557 for each type of material which requires in-place compaction determination.

10.4.3.3. ACCEPTANCE

The acceptance or rejection of the base course shall be determined by the results of the conformance and quality control performed as the work commences and progress for each incremental stage or unit of work. The moisture content of the compacted base course shall be within 1 percent of the optimum.

10.4.3.4. TESTING

A minimum of 1 base course compaction test shall be made for each area to be reconstructed.

10.5. METHOD OF MEASUREMENT

10.5.1. Aggregate base in place shall be measured by the weight (ton) of materials compacted completed and accepted by JWA
10.6. BASIS OF PAYMENT

Payment will be made under:

Bid Item No. 6 Aggregate base in place - per CY

END OF SPECIFICATION 10
11. PAVEMENT, PORTLAND CEMENT CONCRETE, MINOR AND REPAIRS

11.1. GENERAL

11.1.1. APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

11.1.1.1. AMERICAN CONCRETE INSTITUTE (ACI), Latest Editions.

ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 301 Specification for Structural Concrete
ACI 304R Guide for Measuring, Mixing, Transporting and Placing Concrete
ACI 305R Hot Weather Concreting
ACI 306R Cold Weather Concreting
ACI 309 Guide for Consolidation

11.1.1.2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), Latest Editions.

ASTM A185 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A497 Standard Specification for Steel Welded Wire Reinforcement, Deformed for Concrete
ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A996 Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A706/A706M Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C33 Standard Specification for Concrete Aggregates
ASTM C94 Standard Specification for Ready-Mixed Concrete
<table>
<thead>
<tr>
<th>ASTM Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C143</td>
<td>Standard Test Method for Slump of Hydraulic-Cement Concrete</td>
</tr>
<tr>
<td>C150</td>
<td>Standard Specification for Portland Cement</td>
</tr>
<tr>
<td>C171</td>
<td>Standard Specification for Sheet Materials for Curing Concrete</td>
</tr>
<tr>
<td>C172</td>
<td>Standard Practice for Sampling Freshly Mixed Concrete</td>
</tr>
<tr>
<td>C173</td>
<td>Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method</td>
</tr>
<tr>
<td>C231</td>
<td>Standard Test Method for Air Content for Freshly Mixed Concrete by the Pressure Method</td>
</tr>
<tr>
<td>C260</td>
<td>Standard Specification for Air-Entraining Admixtures for Concrete</td>
</tr>
<tr>
<td>C309</td>
<td>Standard Specification for Liquid Membrane-Forming Compound for curing Concrete</td>
</tr>
<tr>
<td>C494</td>
<td>Standard Specification for Chemical Admixtures for Concrete</td>
</tr>
<tr>
<td>C595</td>
<td>Standard Specification for Blended Hydraulic Cements</td>
</tr>
<tr>
<td>C618</td>
<td>Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan For Use in Portland Cement Concrete</td>
</tr>
<tr>
<td>C666</td>
<td>Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing</td>
</tr>
<tr>
<td>C989</td>
<td>Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars</td>
</tr>
<tr>
<td>D6690</td>
<td>Standard Specification for Joint and Crack Sealant, Hot-Applied, for Concrete and Asphalt Pavements</td>
</tr>
<tr>
<td>D1751</td>
<td>Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)</td>
</tr>
<tr>
<td>D1752</td>
<td>Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction</td>
</tr>
</tbody>
</table>
11.1.1.3. ARMY CORPS OF ENGINEERS (COE) HANDBOOK FOR CONCRETE AND CEMENT, Latest Editions

<table>
<thead>
<tr>
<th>COE CRD-C 572</th>
<th>Specification for Polyvinylchloride Waterstop</th>
</tr>
</thead>
<tbody>
<tr>
<td>COE CRD-C 621</td>
<td>Nonshrink Grout</td>
</tr>
</tbody>
</table>

11.1.2. SUBMITTALS

11.1.2.1. CONTRACTOR FURNISHED MIX DESIGN

Twenty one (21) days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Furnish a complete list of materials including type, brand, source and amount of cement, fly ash, pozzolan, admixtures, and applicable reference specifications.

11.1.2.2. LABORATORY TEST REPORTS

Submit results of fly ash and pozzolan testing and show that the mix has been successfully tested to produce concrete with properties specified and will be suitable for the job conditions. Obtain approval before concrete placement. An identical concrete mix design previously approved within the past 12 months by the Western Division, Naval Facilities Engineering Command, may be used without further approval, provided that copies of the previous approval and fly ash and pozzolan test results performed within 6 months of submittal date are submitted. Obtain acknowledge of receipt prior to concrete placement. Submit additional data regarding concrete aggregates, if the source of aggregate changes.

11.1.2.3. FIELD TEST REPORTS

Submit testing results in accordance with ASTM C31 and as required in paragraph entitled “Testing” under section 9.3.6.2.

11.1.2.4. CERTIFICATES OF CONFORMANCE

a. Aggregates
b. Admixtures
c. Cement
d. Reinforcement
e. Joint Filler
f. Joint Sealant
g. Fly ash & Pozzolan
11.1.2.5. MANUFACTURER'S DATA
   a. Materials for curing concrete
   b. Admixtures
   c. Bond breaker

11.1.3. DELIVERY AND STORAGE
   ACI 304R Delivery: Do not deliver concrete until ready for concrete placement.

11.1.3.1. STORAGE
   Store concrete aggregates to prevent contamination or segregation.

   Store reinforcement of different sizes and shapes in separate pile or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Provide for accurate identification after bundles are broken and tags removed.

11.2. PRODUCTS
   ACI 211.1: Except as modified herein, concrete shall have a 28-day compressive strength of minimum 3000 psi. Slump shall be between 1 and 3 inches with ASTM C143. Provide ASTM C33 aggregate Size No. 57 or 67 and 4 to 6 percent air entrainment for concrete expose to freeze-thaw conditions. Accomplish air-entrainment using an air-entraining admixture.

11.2.1. MATERIALS

11.2.1.1. CEMENT
   ASTM C150, Type II or V

11.2.1.2. WATER
   Fresh, clean, and potable.

11.2.1.3. AGGREGATES
   Free from any substance which may be deleteriously reactive with the alkalis in the cement.

11.2.1.4. FINE AGGREGATES
   ASTM C33

11.2.1.5. COARSE AGGREGATES
ASTM C33, Size No. 67

11.2.1.6. ADMIXTURES

Where not shown or specified, the use of admixtures is subject to written approval of the Owner’s Representative.

11.2.1.7. AIR-ENTRAINING

ASTM C666

11.2.1.8. RETARDING

ASTM C494, type B or D

11.2.1.9. ACCELERATING

ASTM D98

11.2.1.10. WATER REDUCING

ASTM C494, Type A, D, E, F, or G

11.2.1.11. FLY ASH AND POZZOLAN

ASTM C618, type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for type N and F

11.2.1.12. FORMS

Wood, Plywood, steel, or other suitable material

11.2.1.13. REINFORCEMENT

Tie Bars-Bar shall conform to ASTM A 615 including supplementary requirements.

11.2.1.14. REINFORCEMENT FOR SLABS

Welded steel wire fabric shall conform to ASTM A 185 and welded deformed steel wire fabric shall conform to ASTM A 497. Deformed steel bar mats shall conform to ASTM A184. Bar reinforcement shall conform to ASTM A615 including supplementary requirements.

11.2.1.15. CURING MATERIALS

a. Impervious Sheeting: ASTM C171 with a minimum sheet thickness of 10 mils.
b. **Liquid Membrane-forming Compound**: ASTM C309, white pigmented, Type 2, Class B, free of paraffin or petroleum.

### 11.2.1.16. JOINT FILLERS AND SEALANTS

Provide as required.

### 11.2.1.17. BONDBREAKER

ASTM D41

### 11.2.2. CONTRACTOR-FURNISHED MIX DESIGN

Design mix in accordance with ACI 211.1. The concrete shall conform to the following:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Compressive Strength 28 days (psi)</td>
<td>3000</td>
</tr>
<tr>
<td>Minimum Flexural Strength 28 days (psi)</td>
<td>650</td>
</tr>
<tr>
<td>Maximum Aggregate Size (inches)</td>
<td>3/4</td>
</tr>
<tr>
<td>Min. Cement Content lbs./yd</td>
<td>517</td>
</tr>
<tr>
<td>Maximum Water-Cement Ratio (by Weight)</td>
<td>0.50</td>
</tr>
<tr>
<td>Range in Slump (In.)</td>
<td>1-3</td>
</tr>
</tbody>
</table>

a. Allowable air content: 5 ± 1.5 percent by volume.

b. The minimum cement content is required for durable concrete with local aggregates but may be insufficient to obtain the specified strength, in which case, increase the cement content as necessary, without additional compensation under the contract.

c. Do not include fly ash content when calculating the cement content.

### 11.3. EXECUTION

#### 11.3.1. FORMS

#### 11.3.1.1. GENERAL

Construct forms to be removable without damaging the concrete. In lieu of setting forms, the edge of an existing pavement section may be used as a form.

#### 11.3.1.2. COATING

Before placing the concrete, coat the contact surfaces of forms except existing pavement sections where bonding is required, with a non-staining mineral oil, nonstaining form coating compound, or two coats of nitro-cellulose lacquer. When
using existing pavement as a form, clean existing concrete and then coat with a bondbreaker before concrete is placed.

11.3.1.3. GRADE AND ALIGNMENT

Check and correct grade elevations and alignment of the forms immediately before placing the concrete.

11.3.2. REINFORCEMENT

11.3.2.1. TIE BARS

Install bars, accurately aligned horizontally and vertically, at indicated locations. For slip form construction, bent tie bars for concrete shoulder lanes shall be inserted by hand.

11.3.2.2. SETTING SLAB REINFORCEMENT

The type and amount of steel reinforcement shall be as shown on the drawings. For pavement thickness of 12 inches or more, install the reinforcement steel by the strike-off method wherein the concrete is deposited on the underlying material, consolidated and struck to the indicated elevation of the steel reinforcement. Place the reinforcement on the pre-struck surface, and then place the remaining concrete and finish in the required manner. If the second lift causes the steel to be displaced horizontally form its original position, increase the thickness of the first lift and depress the reinforcement into the plastic concrete to the required elevation. The increase in thickness shall be only as necessary to permit elevation. The increase in thickness shall be only as necessary to permit correct horizontal alignment to be maintained. Remove and replace portions of the bottom layer of concrete that have been placed more than 30 minutes without being covered with top layer. Wire mesh reinforcement may be placed with mechanical mesh placers and vibrated into place. For pavements less than 12 inches thick, the reinforcement may be positioned on suitable chairs prior to concrete placement or the reinforcement steel may be depressed into the plastic concrete to the required elevation after the concrete has been spread. At expansion, contraction and construction joints, place the reinforcement as indicated. Reinforcement, when placed in concrete, shall be free of mud, oil, scale or other materials that may adversely affect or reduce the bond. Reinforcement shall be accurately placed and wired securely. The laps at splices and the distances from ends and sides of slabs and joints shall be as indicated.

11.3.3. MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE

11.3.3.1. MEASURING

ASTM C94

11.3.3.2. MIXING
ASTM C94, except as modified herein. Begin mixing within 30 minutes after the cement has been added to the aggregates. If the air temperature is greater than 85 degrees F, reduce mixing time and place concrete within 60 minutes. Additional water may be added to bring the slump within required limits as specified in Section 11.7 may be added of ASTM C94, provided that the specified water-cement ratio is not exceeded.

11.3.3.3. TRANSPORTING

ACI 304R, except as modified herein. Do not exceed a free vertical drop of 3 feet from the point of discharge. When placing reinforced concrete in two courses, place second course within 30 minutes of striking off first course.

11.3.3.4. VIBRATION

Immediately after spreading concrete, consolidate the concrete adjacent to forms and joints regardless of slab thickness, and concrete slabs 6 inches or more in thickness using internal vibrating equipment. For reinforced pavement laid in two courses, vibrate only the top course. Vibrate concrete for full depth adjacent to edge forms and joints. Limit the duration of vibration to that necessary to produce consolidation of the concrete. Excessive vibration will not be permitted. Vibrators shall not be operated in the concrete at one location for more than 15 seconds. At the option of the Contractor, vibrating equipment of a type approved by the Owner’s Representative may be used to compact the concrete in un-reinforced pavement slabs less than 6 inches thick.

11.3.3.5. VIBRATING EQUIPMENT

Operate equipment, except hand-manipulated equipment, ahead of the finishing machine. Select the number of vibrating units and power of each unit to properly consolidate the concrete. Mount the units on a frame that is capable of vertical movement and, when necessary, radial movement, so the vibrators may be operated at any desired depth within the slab or be completely withdrawn from the concrete. The clear distance between frame-mounted vibrating units that have spuds that extend into the slab at intervals across the paving lane shall not exceed 30 inches. The distance between the end of the vibrating tube and the side form shall not exceed 2 inches. For pavements less than 10 inches thick, operate the vibrators at mid-depth parallel with or at a slight angle to the subbase. For thicker pavements, angle the vibrators toward the vertical, with the vibrator tip preferably about 2 inches from the subbase, and top of the vibrator a few inches below the pavement surface. The vibrators may be pneumatic, gas driven, or the electric type, and shall be operated at frequencies within the concrete of not less than 8,000 vibrations per minute. The amplitude of vibration shall be such that noticeable vibrations occur at 1.5-foot radius when the vibrator is inserted in the concrete to the depth specified.

11.3.3.6. COLD WEATHER
Maintain required concrete temperature in accordance with Figure 2.1.5 in ACI 305 to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients spread and remove polyethylene sheeting between finishing operations, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing concrete. Recommended practices may be found in ACI 305R.

11.3.4. FINISHING CONCRETE

11.3.4.1. GENERAL REQUIREMENTS

Start finishing operations immediately after placement of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Finish the surface of the pavement on both sides of a joint to the same grade. Finish formed joints form securely supported transverse bridge. Provide hand finishing equipment of use at all times. Transverse and longitudinal surface tolerances shall be 1/4 inch in 10 feet.

11.3.4.2. DEFECTS

Repair formed surfaces by removing minor honeycombs, pits greater than 1 square inch surface area or 0.25 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with non-shrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb (including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects) which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of FAA P-501. Exposed surfaces shall be uniform in appearance and finished to a texture consistent with surrounding pavement, unless otherwise specified.

11.3.4.3. SIDE FORM FINISHING

Strike off and screen the concrete to the required crown and cross-section by a power-driven transverse finishing machine. Transverse rotating tube or pipe shall not be permitted unless approved by the Owner’s Representative. The elevation of the concrete shall be such that, when consolidated and finished, the surface of the pavement shall be adequately consolidated and at the required grade. Equip the finishing machine with two screens which are readily and accurately adjustable for changes in pavement crown and compensation for wear and other causes. Make as many passes over each area of pavement and at such intervals as necessary to give the proper compaction, retention of the coarse aggregate near the finished surface, and a surface of uniform...
texture, true to grade and crown. Do not permit excessive operation over an area, which will result in an excess of mortar and water being brought to the surface.

11.3.4.4. EQUIPMENT OPERATIONS

Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep the tops of the forms clean by a device attached to the machine. During the first pass of the finishing machine, maintain a uniform ridge of concrete ahead of the front screen for its entire length.

11.3.4.5. JOINT FINISH

Before the concrete is hardened, correct any edge slump of the pavement, exclusive of edge rounding, in excess of 0.02 foot. Finish the concrete surface on each side of the construction joints to the same plane, and correct all deviations before the newly placed concrete has hardened.

11.3.4.6. HAND FINISHING

Strike-off and screen the surface of the concrete to elevations slightly above finish grade so that when the concrete is consolidated and finished the surface of the pavement is at the indicated elevation. Vibrate the entire surface until the required compaction and reduction of surface voids is secured with a strike-off template.

11.3.4.7. LONGITUDINAL FLOATING

After the initial finishing, further smooth and consolidate the concrete by means of hand-operated longitudinal floats. Use floats that are not less than 12 feet long and 6 inches wide and stiffened to prevent flexing and warping.

11.3.4.8. PAVEMENT FINISH

Screen the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screening, float the concrete longitudinally. Use a straight edge to check slope and flatness; correct and refloat as necessary. Obtain final finish by dragging a strip of clean, wet burlap form 30 to 10 feet wide and 2 feet longer than the pavement width across the slab. Produce a fine, granular, or sandy textured surface without disfiguring marks. Round edges and joints with an edger having a radius of 1/8 inch.

11.3.4.9. SURFACE FINISH

Surface finish of new pavement shall match existing.

11.3.4.10. PLASTIC GROOVING
After surface irregularities have been removed, give the concrete surface a uniformly roughened finish by use of a wire comb or other approved texturing device similar to a wire comb. Prior to plastic grooving, make one pass with burlap drag in the longitudinal direction. Complete the grooving while the concrete surface is in such condition that it will not be torn or unduly roughened, and before the surface has obtained its initial set. Texture small or irregular areas, or areas not suitable for machine texturing, with a hand operated device producing a textured surface equivalent to that required for machine combing.

11.3.4.11. EDGING

At the time the concrete has attained a degree of hardness suitable for edging, carefully finish all slab edges, including the edges at formed joints, with an edge having a maximum radius of one-eighth inch. Clean by removing all loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill the voids solidly with a mixture of suitable proportions and consistency and refinish. Remove all unnecessary tool marks and edges. All remaining edges shall be smooth and true to line.

11.3.5. CURING AND PROTECTION

11.3.5.1. GENERAL REQUIREMENTS

Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, time marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use impervious-sheeting curing, or liquid membrane-forming compound on surfaces where its appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. Maintain the temperature of the air next to the concrete above 40 degrees F for the full curing periods.

11.3.5.2. IMPERVIOUS-SHEETING CURING

Wet the entire exposed surface thoroughly with a fine spray of water and then cover with impervious sheeting. Lay sheets directly on the concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than the concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets if torn or otherwise damaged during curing. Leave the sheeting on the concrete surface to be cured for at least 7 days.

11.3.5.3. LIQUID MEMBRANE-FORMING COMPOUND CURING

Seal or cover all joint openings prior to application of the curing compound to prevent the curing compound from entering the joint. Compound shall remain on the concrete
11.3.5.4. APPLICATION

Apply the compound immediate after the surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment. The total coverage for the two coats shall be at least one gallon of undiluted compound per 200 square feet. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of the compound immediately to areas where the film is defective. Re-spray concrete surfaces that are subject to heavy rainfall within 3 hours after the curing compound has been applied in the same manner.

11.3.5.5. PROTECTION OF TREATED SURFACES

Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24 hours for inspection proposes. Maintain continuity of the coating for the entire curing period and repair damage to the coating immediately.

11.3.6. SAMPLING AND TESTING

11.3.6.1. SAMPLING

Collect samples of fresh concrete in accordance with ASTM C172 during each working day as required to perform all test specified herein. Make test specimens in accordance with ASTM C31.

11.3.6.2. TESTING

   a. Consistency Tests:

      Determine slump in accordance with ASTM C143. Take samples for slump determination from the concrete while it is being placed. Perform tests at the beginning of a concrete placement operation and at subsequent intervals to ensure that the specification requirements are met. In addition, perform tests each time test beams cylinders are made.

   b. Flexural Tests:

      Determine flexural strength in accordance with ASTM C78. Make four test specimens for each set of tests. Test two specimens at 7 days, and the other two at 28 days. The strength of the concrete will be considered satisfactory if the
average 28-day test results equals or exceeds the specified 28-day flexural strength, and no individual strength test is less than 500 pounds per square inch. Frequency of flexural tests on concrete beams shall be not less than four test beams for each 50 cubic yards of concrete, or fraction thereof, placed. Concrete which is determined to be defective, based on the strength acceptance criteria therein, shall be removed and replaced with acceptable concrete.

c. Air Content:

Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with ASTM C231 on samples taken during placing of the concrete in the forms.

11.3.7. DOWN DRAINS, CURBS, GUTTERS, SWALES, CURBS AND SIDEWALKS

11.3.7.1. PCC concrete for curbs, gutters and swales shall conform to Section 90-10 of the Standard Specification except as modified in Section 73 of the Standard Specification.

11.3.7.2. Construction of PCC concrete curbs and sidewalks shall conform to Section 73 of the Standard Specification.

11.3.7.3. Corrugated metal down drains shall conform to Section 66-1.01 of the Standard Specification; thickness of pipe shall conform to Section 66-1.02. Backfilling and compaction for corrugated pipe shall conform to Section 19-3.02, 19-3.025 of the Standard Specification.

11.3.7.4. CONCRETE WALKS

Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet, unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction, where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space joints not more than 50 feet apart. Provide a transverse slope of 1/4 inch per foot. Limit variation in cross section to 1/4 inch in 5 feet.

11.3.7.5. PITS AND TRENCHES

Place bottoms and walls monolithically or provide waterstops and keys.

11.3.7.6. SWALES

Provide 6 inches thick. Form to line and grade as directed by JWA.

11.3.7.7. CURBS (AND GUTTERS)

Provide contraction joints spaced every 10 feet maximum, unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been
finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum, unless otherwise indicated. Provide a broom finish.

11.4. METHOD OF MEASUREMENT

11.4.1. Miscellaneous Portland cement concrete pavement shall be measured by the cubic yard completed and accepted by JWA. Portland Cement Concrete sidewalk, curb and gutter and swale shall be paid at the unit rate completed and accepted by JWA. Roadway repairs (full depth slab replacement, refer to Sheet 5) shall be measured and paid at the unit rate completed and accepted by JWA.

11.5. BASIS OF PAYMENT

Payment will be made under:

Bid Item No. 9   Portland Cement Concrete Pavement for Non-Airfield - per CY
Bid Item No. 19  Install PCC for Sidewalk, Repairs 4" Thick - per SF
Bid Item No. 21  PCC Curb & Gutter Installed - per LF
Bid Item No. 22  PCC Swale Installed 6" Thick - per CY

END OF SPECIFICATION 11
12. METHACRYLATE RESIN BRIDGE DECK TREATMENT

METHACRYLATE RESIN BRIDGE DECK TREATMENT shall meet specification 12.1 or JWA approved equal.

12.1. GENERAL

Section 12 includes specifications for treating bridge decks with a high-molecular-weight methacrylate resin.

12.2. SUBMITTALS

Submit a work plan for applying the methacrylate resin treatment. Include in the plan:

1. Schedule of work for the test area and for each bridge
2. Description of equipment for applying resin
3. Range of gel time and final cure time for resin
4. Description of absorbent material to be used
5. Description of equipment for applying and removing excess sand and absorbent material
6. Procedure for storing and handling resin components and absorbent material
7. Procedures for disposing of excess resin and containers

Submit an SDS for each resin component and diatomaceous earth shipment before use.

Submit test samples of methacrylate resin components at least 15 days before use.

12.3. QUALITY ASSURANCE

Complete a test area before starting deck treatment activities. Notify the Engineer at least 15 days before treating the test area.

The test area must be:

1. At least 500 sq ft
2. Located within the project limits outside the traveled way at an authorized location
3. Constructed (1) using the same materials, equipment, and construction methods used in the work and (2) under conditions similar to those anticipated when the work will be performed.

The completed test area must demonstrate (1) compliance with these specifications and (2) work will be completed within the time allowed.

The Engineer performs friction testing of the treated test area under California Test 342. Allow 10 days after completion of the test area for the Engineer to perform the test.
Do not perform deck treatment activities until the test area is authorized. The authorized test area is the standard comparison in determining the acceptability of treated deck surfaces.

The Engineer may perform testing under California Test 342 to verify the coefficient of the treated deck surfaces. The coefficient of friction of the treated surfaces must be at least 0.35 when tested under California Test 342.

12.4. MATERIALS

High-molecular-weight methacrylate resin consists of resin, promoter, and initiator.

High-molecular-weight methacrylate resin must be low odor and comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality Characteristic</th>
<th>Test Method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatile contenta (max, %)</td>
<td>ASTM D2369</td>
<td>30</td>
</tr>
<tr>
<td>Viscositya (max, cP, Brookfield RV with UL adapter, 50 RPM at 25°C)</td>
<td>ASTM D2196</td>
<td>25</td>
</tr>
<tr>
<td>Specific Gravitya (min, at 25°C)</td>
<td>ASTM D1475</td>
<td>0.90</td>
</tr>
<tr>
<td>Flash pointa (min, °C)</td>
<td>ASTM D3278</td>
<td>82</td>
</tr>
<tr>
<td>Vapor pressurea (max, mm Hg, at 25°C)</td>
<td>ASTM D323</td>
<td>1.0</td>
</tr>
<tr>
<td>Tack-free time (max, minutes, at 25°C)</td>
<td>Prepare specimens under California Test 551</td>
<td>400</td>
</tr>
<tr>
<td>PCC-saturated surface-dry bond strength (min, psi, at 24 hours and 70 ± 2°F)</td>
<td>California Test 551</td>
<td>500</td>
</tr>
</tbody>
</table>

*aPerform test before adding the initiator

Sand for the abrasive sand finish must be a commercial-quality, dry-blast sand. The size of the sand must be such that not less than 95 percent passes the no. 8 sieve and not less than 95 percent is retained on the no. 20 sieve when test under California Test 205.

Absorbent material must be diatomaceous earth, abrasive blast dust, or an authorized substitute recommended by the resin supplier.
12.5. CONSTRUCTION

Notify the Engineer at least 15 days before delivery of methacrylate resin components in containers larger than 55 gallons to the job site.

The Engineer determines the exact methacrylate resin application rate at time of placement.

High-molecular-weight methacrylate resin applied by machine must be (1) combined in volumetric streams of promoted resin to initiated resin by static in-line mixers and (2) applied without atomization.

You may apply resin manually. Mix at most 5 gallons of resin at a time.

The deck must be dry before applying resin. The concrete surface must be from 50 to 100 degrees F. Relative humidity must be not more than 85 percent during the work shift.

Thoroughly mix all resin components. Apply resin to the deck within 5 minutes of mixing at an approximate application rate of 90 sq ft/gal. Resin that thickens during application is rejected.

Uniformly spread the resin. Completely cover surfaces to be treated and fill all cracks. Redistribute excess resin using squeegees or brooms within 10 minutes of application. For textured or grooved deck surfaces, remove excess resin from the texture indentations.

Apply the abrasive sand finish no sooner than 20 minutes after applying the resin. The sand application rate must be at least 2 lb/sq yd or until saturation as determined by the Engineer. Apply absorbent material before opening the lane to traffic. Remove excess sand and absorbent material by vacuuming or power sweeping.

Traffic or equipment is not allowed on the treated surface until you have verified that the following conditions have been met and the Engineer has authorized the opening of the treated surface to traffic and equipment:

1. Treated deck surface is tack free and not oily
2. Sand cover adheres and resists brushing by hand
3. Excess sand and absorbent material has been removed
4. No material will be tracked beyond the limits of treatment by traffic

Remove resin from the deck surface if the Engineer determines (1) the conditions above have not been met and (2) the allowable lane closure time will be exceeded.
12.6. **BASIS OF PAYMENT**

Furnish bridge deck treatment material is measured by the gallon of mixed high-molecular-weight methacrylate resin placed.

Payment will be made under:

Bid Item No.10 High-molecular-weight methacrylate resin

END OF SPECIFICATION 12
13. PREPAVING HERBICIDE APPLICATION

13.1. APPLICABLE PUBLICATIONS

13.1.1. FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT. (PUBLIC LAW 92-516 AS AMENDED)

13.2. PESTICIDE MANAGEMENT PLAN

Within 10 days after the contract award, the Contractor shall submit a written plan for the use of all herbicides to be applied under this contract to the Owner’s Representative. Submit the location and size of the area to be treated. Include manufacturer's product name and EPA registration number; anticipated herbicide rate of application; the formulation of the herbicide and method of application to be used (e.g., power sprayer, hand sprayer, granule spreader); anticipated quantities of each product to be used, the concentration of active herbicide ingredients in the product and the manufacturer of each product. The plan shall be on state forms and shall be accompanied by a copy of the registered label and Material Safety Data Sheet for each herbicide shown on the plan. Required forms available from the Owner’s Representative.

13.2.1. OWNER’S REPRESENTATIVE’S PESTICIDE USE APPROVAL

Each herbicide use shall be approved in writing by the Owner’s Representative. The Owner’s Representative's approval of the Pest Management Plan shall constitute such approval.

13.2.2. PESTICIDE APPLICATION REPORT

The Contractor shall provide the Owner’s Representative a completed copy of Pest Management Data for Outdoor Operation for each herbicide application within two days following any herbicide application. Required forms are available from the Owner’s Representative.

13.3. PESTICIDES

13.3.1. GENERAL

Weed control shall include applications of herbicides and shall be selected based on the following criteria:

a. Climate

b. Weed species targeted

c. Possible adverse impacts on adjacent natural resources
The herbicides used require prior approval of the Owner’s Representative. The Contractor is responsible for inspection of the contract area and adhering to Federal, State and local laws and regulations.

13.3.2. PESTICIDE ENVIRONMENTAL PROTECTION

The Contractor shall exercise extreme care to prevent any damage or contamination by herbicides other than to specified desired location to be treated. The Contractor shall be held responsible and liable for all such damages, contamination and effects resulting from his herbicide use.

13.3.3. HERBICIDE USE INSPECTION

Herbicide applications will be inspected by the activity-designated Certified Pest Control Coordinator or Certified Pest Control Quality Assurance Evaluator (Pest Contract Surveillance Representative).

13.3.4. DISPOSAL OF HERBICIDE RESIDUE

Herbicide rinse water or excess herbicides from the Contractor's operations shall be collected by the Contractor in an appropriate receptacle and disposed of off JWA property; or shall be applied to the same target area to which the original mix was applied, and in the manner of application.

13.3.5. CONTRACTOR PESTICIDE APPLICATOR PERSONNEL LICENSING AND COMPETENCY REQUIREMENTS

All job site herbicide applications shall be accomplished by or under the personal and direct line of sight supervision of an individual currently licensed by the State of California as a Certified Applicator in Category C right of way, or other category acceptable to the Airport Pest Control Coordinator for the specified work. All job site herbicide applications shall be made by personnel capable of identifying the weed species to be controlled, knowledgeable of control techniques, and able to apply herbicides at prescribed dosages and rates of application, as required to achieve the required control under the job site conditions, without danger to people, pets, or other non-target animals or vegetation.

13.3.6. METHOD OF MEASUREMENT

Weed Control application shall be measured by the square yard of application area completed and accepted by JWA.

13.3.7. BASIS OF PAYMENT

Payment will be made under:
Bid Item No. 5  Pre-Paving Herbicide Application (Weed Control, Spray Herbicide)  
- per SY

END OF SPECIFICATION 13
12. Technical Specifications
Airfield
# Technical Specifications – Airfield

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SECTION 60

60. CONTROL OF MATERIALS

60.1 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

60.1.1 The materials used on the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

(a) Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

   Quality control organization;
   Project Progress Schedule;
   Submittal Schedule;

(b) In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the Owner’s Representative as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

(c) At the Owner’s Representative option, materials may be approved at the source of supply before delivery is stated. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

60.2 SAMPLES, TESTS, AND CITED SPECIFICATIONS

60.2.1 Unless otherwise designated, all materials used in the work shall be approved by the Owner’s Representative before incorporation in the work. Any work in which untested materials are used without approval or written permission of the Owner’s Representative shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Owner’s Representative, shall be removed at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of ASTM, AASHTO, Federal Specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids, will be made by and at the expense of the Contractor. Samples will be taken by a qualified representative of the Contractor. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at his/her request.
60.3 CERTIFICATION OF COMPLIANCE

60.3.1 The Owner’s Representative may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

60.3.2 Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

60.3.3 The form and distribution of certificates of compliance shall be as approved by the Owner’s Representative.

60.3.4 When a material or assembly is specified by “brand name or equal” and the Contractor elects to furnish the specified “brand name,” the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

   (a) Conformance to the specified performance, testing, quality or dimensional requirements; and,

   (b) Suitability of the material or assembly for the use intended in the contract work.

   (c) Should the Contractor propose to furnish an “or equal” material or assembly, he shall furnish the manufacturer's certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the Owner’s Representative shall be the sole judge as to whether the proposed “or equal” is suitable for use in the work.

   (d) The Owner’s Representative reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60.4 PLANT INSPECTION

60.4.1 The Owner’s Representative or his/her authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for his/her acceptance of the material or assembly.

Should the Owner’s Representative conduct plant inspections, the following conditions shall exist:
(a) The Owner’s Representative shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

(b) The Owner’s Representative shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

(c) If required by the Owner’s Representative, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

(d) It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The Owner’s Representative shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60.5 FIELD OFFICE AND LABORATORY

Not Required.

60.6 STORAGE OF MATERIALS

60.6.1 Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Owner’s Representative. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor’s plant and parked equipment or vehicles shall be as directed by the Owner’s Representative. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Owner’s Representative a copy of the property owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at his/her entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

60.7 UNACCEPTABLE MATERIALS

60.7.1 Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The
Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the Owner’s Representative.

60.7.2 Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the Owner’s Representative has approved its used in the work.

60.8 OWNER FURNISHED MATERIALS

60.8.1 The Contractor shall furnish all materials required to complete the work, except those specified herein (if any) to be furnished by the owner. Owner-furnished materials shall be made available to the Contractor at the location specified herein.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such owner-furnished material is used.

After any owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such owner-furnished material. The owner will deduct from any monies due or to become due the Contractor any cost incurred by the owner in making good such loss due to the Contractor's handling, storage, or use of owner-furnished materials.

END OF SECTION 60
SECTION 90

90. MEASUREMENT AND PAYMENT

90.1. MEASUREMENT OF QUANTITIES

90.1.1. All work completed under the contract will be measured by the Owner’s Representative, or his/her authorized representatives, using United States Customary Units of Measurement or the International System of Units.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 square feet or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Owner’s Representative.

Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

In computing volumes of excavation the average end area method or other acceptable methods will be used.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of inches.

The term "ton" will mean the short ton consisting of 2,000 pounds avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, approved scales by competent, qualified personnel at locations designed by the Owner’s Representative. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the Owner’s Representative directs, and each truck shall bear a plainly legible identification mark.

Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable to the Owner’s Representative, provided that the body
All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.

When requested by the Contractor and approved by the Owner’s Representative in writing, material specified to be measured by the cubic yard may be weighed, and such weights will be converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Owner’s Representative and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Bituminous materials will be measured by the gallon or ton as specified in the contract documents. When measured by volume, such volumes will be measured at 60˚ F or will be corrected to the volume at 60˚ F using ASTM D 1250 for asphalts or ASTM D 633 for tars.

Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.

The term “lump sum” when used as an item of payment will mean complete payment for the work described in the contract.

When a complete structure or structural unit (in effect, “lump sum” work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered by the Owner’s Representative in connection with force account work will be measured as agreed in the change order or supplemental agreement authorizing such force account work.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gage, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.
Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales.

Scales shall be accurate within one-half percent of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of 1 percent of the nominal rated capacity of the scale, but not less than 1 pound. The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the inspector can safely and conveniently view them.

Scale installations shall have available ten standard 50-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Scales “overweighing” (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of one-half of 1 percent.

In the event inspection reveals the scales have been “underweighing” (indicating less than correct weight), they shall be adjusted, and no additional payment to the Contractor will be allowed for materials previously weighed and recorded.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.

When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the Owner’s Representative. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

END OF SECTION 90
SECTION 100

100 CONTRACTOR QUALITY CONTROL PROGRAM

100.1 GENERAL

100.1.1 This project requires a Contractor Quality Control Program, the Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The intent of this section is to enable the Contractor to establish a necessary level of control that will:

(a) Adequately provide for the production of acceptable quality materials.

(b) Provide sufficient information to assure both the Contractor and the Owner’s Representative that the specification requirements can be met.

Allow the Contractor as much latitude as possible to develop his or her own standard of control.

The Contractor shall be prepared to discuss and present, at the preconstruction conference, his/her understanding of the quality control requirements. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the Quality Control Program has been reviewed by the Owner’s Representative. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed.

The quality control requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the acceptance testing requirements. Acceptance testing requirements are the responsibility of the Owner’s Representative.

100.2 DESCRIPTION OF PROGRAM

100.2.1 General Description: The Contractor shall establish a Quality Control Program to perform inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work
performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.

100.2.2 Quality Control Program: The Contractor shall describe the Quality Control Program in a written document that shall be reviewed by the Owner’s Representative prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Owner’s Representative for review at least 10 calendar days before the start of the work.

100.2.3 The Quality Control Program shall be organized to address, as a minimum, the following items:

(a) Quality control organization;
(b) Project progress schedule;
(c) Submittals schedule;
(d) Inspection requirements;
(e) Quality control testing plan;
(f) Documentation of quality control activities; and
(g) Requirements for corrective action when quality control and/or acceptance criteria are not met.

The Contractor is encouraged to add any additional elements to the Quality Control Program that he/she deems necessary to adequately control all production and/or construction processes required by this contract.

100.3 QUALITY CONTROL ORGANIZATION

100.3.1 The Contractor Quality Control Program shall be implemented by the establishment of a separate quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. If necessary, different technicians can be utilized for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the Quality Control Program, the personnel assigned shall be subject to the qualification requirements of paragraph 100.3.a and
100.3.b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The quality control organization shall consist of the following minimum personnel:

100.3.1 Program Administrator: The Program Administrator shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall have a minimum of 10 years of experience in airport and/or highway construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

Additional qualifications for the Program Administrator shall include at least 1 of the following requirements:

(a) Professional Engineer with 5 year of airport paving experience acceptable to the Owner’s Representative.

(b) Construction materials technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).

(c) Highway materials technician certified at Level III by NICET.

(d) Highway construction technician certified at Level III by NICET.

(e) A NICET certified Owner’s engineering technician in Civil Engineering Technology with 5 years of highway and/or airport paving experience acceptable to the Owner’s Representative.

100.3.2 The Program Administrator shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract plans and technical specifications. The Program Administrator shall report directly to a responsible officer of the construction firm. The Program Administrator may supervise the Quality Control Program on more than one project provided that person can be at the job site within 2 hours after being notified of a problem.

100.3.2.1 QUALITY CONTROL TECHNICIANS: A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program shall be provided. These personnel shall be experienced craftsmen with qualifications in the appropriate field equivalent to NICET Level II or higher construction materials technician or highway construction technician and shall have a minimum of 2 years of experience in their area of expertise.

The quality control technicians shall report directly to the Program Administrator and shall perform the following functions:
a. Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by Section 100.6.

b. Performance of all quality control tests as required by the technical specifications and Section 100.7.

Certification at an equivalent level, by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

100.3.2.2 Staffing Levels: The Contractor shall provide sufficient qualified quality control personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The Quality Control Program shall state where different technicians will be required for different work elements.

100.4 PROJECT PROGRESS SCHEDULE

100.4.1 The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), PERT, or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.
100.5 SUBMITTALS SCHEDULE

100.5.1 The Contractor shall submit a detailed listing of all submittals (e.g., mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

(a) Specification item number;

(b) Item description;

(c) Description of submittal;

(d) Specification paragraph requiring submittal; and

(e) Scheduled date of submittal.

100.6 INSPECTION REQUIREMENTS

100.6.1 Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by Section 100.7.

(a) Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

(b) During plant operation for material production, quality control test results and periodic inspections shall be utilized to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment utilized in proportioning and mixing shall be inspected to ensure its proper operating condition. The Quality Control Program shall detail how these and other quality control functions will be accomplished and utilized.

(c) During field operations, quality control test results and periodic inspections shall be utilized to ensure the quality of all materials and workmanship. All equipment utilized in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The Program shall document how these and other quality control functions will be accomplished and utilized.

100.7 QUALITY CONTROL TESTING PLAN

100.7.1 As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan
shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

Specification item number (e.g., P-401);

Item description (e.g., Plant Mix Bituminous Pavements);

Test type (e.g., gradation, grade, asphalt content);

Test standard (e.g., ASTM or AASHTO test number, as applicable);

Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated);

Responsibility (e.g., plant technician); and

Control requirements (e.g., target, permissible deviations).

The testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D 3665. The Owner’s Representative shall be provided the opportunity to witness quality control sampling and testing.

All quality control test results shall be documented by the Contractor as required by Section 100.8.

100.8 DOCUMENTATION

100.8.1 The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Owner’s Representative daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor's Program Administrator.

Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:
100.8.1.1 DAILY INSPECTION REPORTS: Each Contractor quality control technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations on a form acceptable to the Owner’s Representative. These technician's daily reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:

1. Technical specification item number and description;
2. Compliance with approved submittals;
3. Proper storage of materials and equipment;
4. Proper operation of all equipment;
5. Adherence to plans and technical specifications;
6. Review of quality control tests; and
7. Safety inspection.

The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible quality control technician and the Program Administrator. The Owner’s Representative shall be provided at least one copy of each daily inspection report on the work day following the day of record.

100.8.1.2 DAILY TEST REPORTS: The Contractor shall be responsible for establishing a system that will record all quality control test results. Daily test reports shall document the following information:

1. Technical specification item number and description;
2. Test designation;
3. Location;
4. Date of test;
5. Control requirements;
6. Test results;
7. Causes for rejection;
(8) Recommended remedial actions; and

(9) Retests.

Test results from each day’s work period shall be submitted to the Owner’s Representative prior to the start of the next day’s work period. When required by the technical specifications, the Contractor shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Program Administrator.

100.9 CORRECTIVE ACTION REQUIREMENTS

100.9.1 The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and utilize statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

100.10 SURVEILLANCE BY THE OWNER’S REPRESENTATIVE

100.10.1 All items of material and equipment shall be subject to surveillance by the Owner’s Representative at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed herein and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Owner’s Representative at the site for the same purpose.

Surveillance by the Owner’s Representative does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

100.11 NONCOMPLIANCE

100.11.1 The Owner’s Representative will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Owner’s
Representative or his/her authorized representative to the Contractor or his/her authorized representative at the site of the work, shall be considered sufficient notice.

100.11.2 In cases where quality control activities do not comply with either the Contractor Quality Control Program or the contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Owner’s Representative, the Owner’s Representative may:

(a) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.

(b) Order the Contractor to stop operations until appropriate corrective actions are taken.

END OF SECTION 100
SECTION 110

110 METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110.1 GENERAL

110.1.1 When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index(s), Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner’s risk is the probability that material produced at the rejectable quality level is accepted.

IT IS THE INTENT OF THIS SECTION TO INFORM THE CONTRACTOR THAT, IN ORDER TO CONSISTENTLY OFFSET THE CONTRACTOR’S RISK FOR MATERIAL EVALUATED, PRODUCTION QUALITY (USING POPULATION AVERAGE AND POPULATION STANDARD DEVIATION) MUST BE MAINTAINED AT THE ACCEPTABLE QUALITY SPECIFIED OR HIGHER. IN ALL CASES, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRODUCE AT QUALITY LEVELS THAT WILL MEET THE SPECIFIED ACCEPTANCE CRITERIA WHEN SAMPLED AND TESTED AT THE FREQUENCIES SPECIFIED.
110.2 METHOD FOR COMPUTING PWL

110.2.1 The computational sequence for computing PWL is as follows:

(a) Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

(b) Locate the random sampling position within the sublot in accordance with the requirements of the specification.

(c) Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

(d) Find the sample average (X) for all sublot values within the lot by using the following formula:

\[ X = \frac{(x_1 + x_2 + x_3 + \ldots + x_n)}{n} \]

Where:  
\( X \) = Sample average of all sublot values within a lot  
\( x_1, x_2 = \) Individual sublot values  
\( n = \) Number of sublots

(e) Find the sample standard deviation (\( S_n \)) by use of the following formula:

\[ S_n = \left[ \frac{(d_1^2 + d_2^2 + d_3^2 + \ldots + d_n^2)}{(n-1)} \right]^{1/2} \]

Where:  
\( S_n = \) Sample standard deviation of the number of sublot values in the set  
\( d_1, d_2, = \) Deviations of the individual sublot values \( x_1, x_2, \ldots \) from the average value \( X \)  
that is:  
\( d_1 = (x_1 - X), d_2 = (x_2 - X), \ldots d_n = (x_n - X) \)  
\( n = \) Number of sublots

(f) For single sided specification limits (i.e., \( L \) only), compute the Lower Quality Index \( Q_L \) by use of the following formula:

\[ Q_L = \frac{(X - L)}{S_n} \]

Where:  
\( L = \) specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with \( Q_L \), using the column appropriate to the total number (n) of measurements. If the
value of $Q_L$ falls between values shown on the table, use the next higher value of PWL.

For double-sided specification limits (i.e. L and U), compute the Quality Indexes $Q_L$ and $Q_U$ by use of the following formulas:

$$Q_L = \frac{X - L}{S_n} \quad \text{and} \quad Q_U = \frac{U - X}{S_n}$$

Where: $L$ and $U =$ specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with $Q_L$ and $Q_U$, using the column appropriate to the total number (n) of measurements, and determining the percent of material above PL and percent of material below PU for each tolerance limit. If the values of $QL$ fall between values shown on the table, use the next higher value of $PL$ or $PU$. Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: $P_L =$ percent within lower specification limit

$P_U =$ percent within upper specification limit
JOHN WAYNE AIRPORT
PAVEMENT MAINTENANCE AND REPAIR
PROJECT NO. 280-280-1400-P305
TABLE 1. TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)
Percent Within
Positive Values of Q (QL and QU)
Limits
(PL and PU)
n=3
n=4
n=5
n=6
n=7
n=8
n=9
99
1.1541
1.4700
1.6714
1.8008
1.8888
1.9520
1.9994
98
1.1524
1.4400
1.6016
1.6982
1.7612
1.8053
1.8379
97
1.1496
1.4100
1.5427
1.6181
1.6661
1.6993
1.7235
96
1.1456
1.3800
1.4897
1.5497
1.5871
1.6127
1.6313
95
1.1405
1.3500
1.4407
1.4887
1.5181
1.5381
1.5525
94
1.1342
1.3200
1.3946
1.4329
1.4561
1.4717
1.4829
93
1.1269
1.2900
1.3508
1.3810
1.3991
1.4112
1.4199
92
1.1184
1.2600
1.3088
1.3323
1.3461
1.3554
1.3620
91
1.1089
1.2300
1.2683
1.2860
1.2964
1.3032
1.3081
90
1.0982
1.2000
1.2290
1.2419
1.2492
1.2541
1.2576
89
1.0864
1.1700
1.1909
1.1995
1.2043
1.2075
1.2098
88
1.0736
1.1400
1.1537
1.1587
1.1613
1.1630
1.1643
87
1.0597
1.1100
1.1173
1.1192
1.1199
1.1204
1.1208
86
1.0448
1.0800
1.0817
1.0808
1.0800
1.0794
1.0791
85
1.0288
1.0500
1.0467
1.0435
1.0413
1.0399
1.0389
84
1.0119
1.0200
1.0124
1.0071
1.0037
1.0015
1.0000
83
0.9939
0.9900
0.9785
0.9715
0.9671
0.9643
0.9624
82
0.9749
0.9600
0.9452
0.9367
0.9315
0.9281
0.9258
81
0.9550
0.9300
0.9123
0.9025
0.8966
0.8928
0.8901
80
0.9342
0.9000
0.8799
0.8690
0.8625
0.8583
0.8554
79
0.9124
0.8700
0.8478
0.8360
0.8291
0.8245
0.8214
78
0.8897
0.8400
0.8160
0.8036
0.7962
0.7915
0.7882
77
0.8662
0.8100
0.7846
0.7716
0.7640
0.7590
0.7556
76
0.8417
0.7800
0.7535
0.7401
0.7322
0.7271
0.7236
75
0.8165
0.7500
0.7226
0.7089
0.7009
0.6958
0.6922
74
0.7904
0.7200
0.6921
0.6781
0.6701
0.6649
0.6613
73
0.7636
0.6900
0.6617
0.6477
0.6396
0.6344
0.6308
72
0.7360
0.6600
0.6316
0.6176
0.6095
0.6044
0.6008
71
0.7077
0.6300
0.6016
0.5878
0.5798
0.5747
0.5712
70
0.6787
0.6000
0.5719
0.5582
0.5504
0.5454
0.5419
69
0.6490
0.5700
0.5423
0.5290
0.5213
0.5164
0.5130
68
0.6187
0.5400
0.5129
0.4999
0.4924
0.4877
0.4844
67
0.5878
0.5100
0.4836
0.4710
0.4638
0.4592
0.4560
66
0.5563
0.4800
0.4545
0.4424
0.4355
0.4310
0.4280
65
0.5242
0.4500
0.4255
0.4139
0.4073
0.4030
0.4001
64
0.4916
0.4200
0.3967
0.3856
0.3793
0.3753
0.3725
63
0.4586
0.3900
0.3679
0.3575
0.3515
0.3477
0.3451
62
0.4251
0.3600
0.3392
0.3295
0.3239
0.3203
0.3179
61
0.3911
0.3300
0.3107
0.3016
0.2964
0.2931
0.2908
60
0.3568
0.3000
0.2822
0.2738
0.2691
0.2660
0.2639
59
0.3222
0.2700
0.2537
0.2461
0.2418
0.2391
0.2372
58
0.2872
0.2400
0.2254
0.2186
0.2147
0.2122
0.2105
57
0.2519
0.2100
0.1971
0.1911
0.1877
0.1855
0.1840
56
0.2164
0.1800
0.1688
0.1636
0.1607
0.1588
0.1575
55
0.1806
0.1500
0.1406
0.1363
0.1338
0.1322
0.1312
54
0.1447
0.1200
0.1125
0.1090
0.1070
0.1057
0.1049
53
0.1087
0.0900
0.0843
0.0817
0.0802
0.0793
0.0786
52
0.0725
0.0600
0.0562
0.0544
0.0534
0.0528
0.0524
51
0.0363
0.0300
0.0281
0.0272
0.0267
0.0264
0.0262
50
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000
0.0000

n=10
2.0362
1.8630
1.7420
1.6454
1.5635
1.4914
1.4265
1.3670
1.3118
1.2602
1.2115
1.1653
1.1212
1.0789
1.0382
0.9990
0.9610
0.9241
0.8882
0.8533
0.8192
0.7858
0.7531
0.7211
0.6896
0.6587
0.6282
0.5982
0.5686
0.5394
0.5105
0.4820
0.4537
0.4257
0.3980
0.3705
0.3432
0.3161
0.2892
0.2624
0.2358
0.2093
0.1829
0.1566
0.1304
0.1042
0.0781
0.0521
0.0260
0.0000


<table>
<thead>
<tr>
<th>Percent Within Limits (PL and PU)</th>
<th>Negative Values of Q (QL and QU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>n=3</td>
</tr>
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<td>48</td>
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</tr>
<tr>
<td>43</td>
<td>n=9</td>
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</table>

END OF SECTION 110
152. **ITEM P-152 EXCAVATION AND EMBANKMENT**

152.1 **DESCRIPTION**

152.1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152.1.2 **CLASSIFICATION:** All material excavated shall be classified as defined below:

152.1.2.1 **UNCLASSIFIED EXCAVATION:** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature, which is not otherwise classified and paid for under the following items. All unclassified excavation consists of material that is in excess of what can be used for embankment on site and shall be hauled off site and disposed of legally.

152.1.2.2 **IMPORT BORROW:** Import borrow shall consist of approved material required for the construction of embankment or for other portions of the work in excess of the quantity of usable material available from required excavations. Import Borrow material shall be obtained from areas outside the airport. All work and materials associated with the delivery, placement and compaction shall be classified and paid for under “Import Borrow” of this section.

152.1.2.3 **OVER-EXCAVATION:** Over excavation shall consist of the excavation, placement and compaction and/or disposal of material, beneath the finished sub-grade elevations which is unsuitable for pavement foundation. Over-excavation shall be identified by the Owner’s Representative.

152.1.2.4 **UNSUITABLE EXCAVATION:** Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, when approved by the Owner’s Representative as suitable to support vegetation, may be used on the embankment slope. All work and materials associated with the excavation and disposal of this material shall be classified and paid for under “Unclassified Excavation” of this section.

152.2 **CONSTRUCTION METHODS**

152.2.1 **GENERAL:** Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared and grubbed in accordance with Item P-151.

The Owner’s Representative shall observe the excavation, moving, placing and disposition of all material and shall determine the suitability of material to be placed in embankments. All unsuitable material shall become the property of the Contractor and disposed off Airport property.
The Contractor shall make himself aware of the vital airport electrical and FAA conduits and duct banks located within and adjacent to the construction area. These vital facilities shall be protected in place. All work performed around these facilities shall be accomplished so as not to damage the facilities in any way.

The Contractor shall satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for any excavated material which is used other than those designated herein.

When the Contractor’s excavating operations encounter artifacts of historical or archeological significance, the operations shall be temporarily discontinued. At the direction of the Owner’s Representative, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Owner’s Representative, who shall arrange for their removal if necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

The Contractor shall excavate the site in such a manner to prevent stockpiling of excavated materials. In addition, all materials brought to the site or within the airport property shall be placed in the order of work in such a manner to prevent stockpiling.

EXCAVATION: No excavation shall be started until the work has been staked out by the Contractor and the Owner’s Representative has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall become the property of the Contractor and be disposed of legally off Airport property.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be used to grade the areas of ultimate development or disposed of off Airport property. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the deficiency shall be obtained from approved borrow material obtained from sources outside of the Airport property.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work.
Water pumped out of excavated areas shall not be discharged onto Airport property or into Airport storm drain inlets. Water pumped from excavated areas shall be deposited into containers suitable for storage of such materials, and the containers shall be removed from Airport property and disposed of by the Contractor. Groundwater removal and disposal methods shall conform to the applicable Federal, State and Local laws and regulations.

152.2.3 SELECTIVE GRADING: The more suitable material as designated by the Owner’s Representative shall be used in constructing the embankment or in capping the pavement subgrade.

152.2.4 UNDERCUTTING: Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turfing shall be excavated to a minimum depth of 12 inches, or to the depth specified by the Owner’s Representative, below the subgrade. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall become the property of the Contractor and disposed of off Airport property. The excavated area shall be refilled with suitable material obtained from the grading operations or borrow fill material and compacted to specified densities. The necessary refilling will constitute a part of the embankment. Where rock cuts are made and refilled with selected material, any pockets created in the rock surface shall be drained as directed by the Owner’s Representative.

152.2.5 OVERBREAK: Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Owner’s Representative. The Owner’s Representative shall determine if the displacement of such material was unavoidable and his/her decision shall be final. All overbreaks shall be graded or removed by the Contractor and disposed of as directed; however, payment will not be made for the removal and disposal of overbreak that the Owner’s Representative determines as avoidable. Unavoidable overbreak will be classified as “Unclassified Excavation.”

152.2.6 REMOVAL OF UTILITIES: The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by someone other than the Contractor, e.g., the utility unless otherwise shown on the plans. All existing foundations shall be excavated for at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed. All foundations thus excavated shall be backfilled with suitable material and compacted as specified herein.

152.2.7 COMPACTION REQUIREMENTS: Prior to compacting the subgrade, the Contractor shall perform “Proof Rolling” as outlined within section 152.2.9. If the Owner’s Representative determines the over excavation will not be necessary, the subgrade shall be scarified and recompacted to a depth of eight inches and to the relative density of 100% of maximum dry density for non-cohesive soils and 95% for cohesive soils. The maximum density and optimum moisture content shall be as determined by ASTM D1557. No separate payment will be made for Proof Rolling but all time, labor,
materials and equipment required to perform Proof Rolling shall be considered incidental and included in other items of work.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 6938. When nuclear density machines are to be used for density determination, the machines shall be calibrated in accordance with ASTM D 6938. The nuclear equipment shall be calibrated using blocks of materials with densities that extend through a range representative of the density of the proposed embankment material.

Stones or rock fragments larger than 4 inches in their greatest dimension will not be permitted in the top 6 inches of the subgrade. The finished grading operations, conforming to the typical cross section, shall be completed and maintained at least 1,000 feet ahead of the paving operations or as directed by the Owner’s Representative.

Payment for suitable materials removed, manipulated and replaced in order to obtain the required depth of density will be paid for as Unclassified Excavation.

In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the plans or as directed by the Owner’s Representative.

Blasting will not be permitted.

152.2.8 IMPORT BORROW: Borrow sources shall be outside the boundaries of the Airport property. It shall be the Contractor's responsibility to locate and obtain the supply, subject to the approval of the Owner’s Representative. The Contractor shall notify the Owner’s Representative at least 15 days prior to beginning the excavation, so necessary measurements and tests can be made. All unsuitable material shall be disposed of by the Contractor. All borrow pits shall be opened up to expose the vertical face of various strata of acceptable material to enable obtaining a uniform product. Borrow pits shall be excavated to regular lines to permit accurate measurements, and they shall be drained and left in a neat, presentable condition with all slopes dressed uniformly.

152.2.9 PREPARATION OF EMBANKMENT AREA: Where an embankment is to be constructed, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken up by plowing or scarifying to a minimum depth of 6 inches. This area shall then be compacted as indicated in paragraph 152-2.6.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.
152.2.10 FORMATION OF EMBANKMENTS: Embankments shall be formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross section, unless otherwise approved by the Owner’s Representative.

The grading operations shall be conducted, and the various soil strata shall be placed, to produce a soil structure as shown on the typical cross section or as directed. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

The material in the layer shall be within ± 2 percent of optimum moisture content before rolling to obtain the prescribed compaction. In order to achieve a uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be required when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Sprinkling of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken for each 1000 cubic yards. Based on these tests, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content in order to achieve the correct embankment density.

Rolling operations shall be continued until the embankment is compacted to not less than 95 percent of maximum density for noncohesive soils, and 90 percent of maximum density for cohesive soils as determined by ASTM D1557. Under all areas to be paved with HMA, the embankments shall be compacted to a depth of 9 inches and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D1557. The material to be compacted shall be within +/- 2 percent of optimum moisture content before being rolled to obtain the prescribed compaction.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 6938. When nuclear density gages are to be used for density determination, testing shall be in accordance with ASTM D6398.

Compaction areas shall be kept separate, and no layer shall be covered by another until the proper density is obtained.
During construction of the embankment, the Contractor shall route his/her equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

The filling in of depressions caused by the removal and/or demolition of structures shall be performed as compacted embankment as described in this section.

There will be no separate measurement of payment for compacted embankment, and all costs incidental to placing in layers, compacting, diskling, watering, mixing, sloping, and other necessary operations for construction of embankments will be included in the contract price for Unclassified Excavation, Import Borrow, or other items.

152.2.11 FINISHING AND PROTECTION OF SUBGRADE: After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unsuitable material which will not compact properly. The resulting areas and all other low areas, holes, or depressions shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans.

Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. He/she shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts or rough places that develop in a completed subgrade shall be smoothed and recompacted.

No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been approved by the Owner’s Representative.

152.2.12 HAUL: All hauling will be considered a necessary and incidental part of the work. Its cost shall be considered by the Contractor and included in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

152.2.13 TOLERANCES: In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 16-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2-inch, or shall not be more than 0.05-foot from true grade as
established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by sprinkling and rolling.

On safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152.2.14 PROOF ROLLING: The existing subgrade soils contain both cohesive and non-cohesive characteristics. The in-place densities and relative compaction of the subgrade soil generally decrease with depth. The in-place moisture content of the subgrade soil is variable, and will require close monitoring to achieve a high relative compaction, as specified herein. The in-place soils are very susceptible to pumping when the moisture content is more than two (2) percent above optimum and compaction to high densities is attempted. Therefore, after the completion of the Unclassified Excavation, and prior to Scarification and Recompaction, the finished subgrade surface shall be proof rolled. Proof rolling shall be done on an exposed subgrade free of water which would promote degradation of an otherwise acceptable subgrade. Proof roll the existing subgrade with six passes per lane of a 15 ton, pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes over all areas, and at speeds between 2 ½ and 3 ½ miles per hour. Notify the Owner’s Representative a minimum of three (3) days prior to proof rolling. Proof rolling shall be performed in the presence of the Owner’s Representative. No separate measurement or payment shall be made for proof rolling. All time, labor, materials and equipment required to perform Proof Rolling shall be considered incidental and included in other items of work.

152.2.15 QUALITY CONTROL: The Contractor shall perform all quality control tests necessary to control the production and construction. In addition the Contractor shall comply with all of the quality control requirements specified in Section 100 of the General Provisions.

152.2.16 UTILITY AND STORM DRAIN TRANCHE BACKFILL: The top two feet of trench backfill shall be compacted to 100% relative density as determined by ASTM D-1557. Trench excavation and backfill shall not be paid for separately but shall be considered included in the contract unit prices bid for the various pipes installed. Excess excavations and spoil material to be hauled off site to accommodate the installation of drainage structures and utility structures shall not be paid for as excavation, but shall be considered incidental to the drainage or utility item being installed, unless indicated otherwise by the pay limit lines shown on the typical sections on the plans.

Excavated materials not used as a backfill shall be hauled offsite and disposed of legally at no additional cost.
152.3  METHOD OF MEASUREMENT

152.3.1  The quantity of excavation to be paid for shall be the number of cubic yards measured in its original position.

Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152.3.2  Borrow material shall be paid for on the basis of the number of cubic yards measured in its original position at the borrow pit.

152.3.3  For payment specified by the cubic yard, measurement for all excavation shall be computed by the average end area method. The end area is that bound by the original ground line established by field cross sections and the final theoretical pay line established by excavation and/or embankment cross sections shown on the plans, subject to verification by the Owner’s Representative. After completion of all excavation and embankment operations and prior to placing of base or subbase material, the final excavation and/or embankment shall be verified by the Owner’s Representative by means of field cross sections taken randomly at intervals not exceeding 500 linear feet.

Final cross sections shall be employed if the following changes have been made:

Plan width of embankments or excavations are changes by more than plus or minus 1.0 foot; or

Plan elevations of embankments or excavations are changes by more than plus or minus 0.5 foot.

152.3.4  Subgrade preparation shall be paid for on the basis of the number of square yards of subgrade that is scarified to the depth specified and recompacted as specified.

152.4  BASIS OF PAYMENT

152.4.1  For “Unclassified Excavation and Embankment” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152.4.2  For “Unclassified Excavation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152.4.3  For “Import Borrow Excavation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.
152.4.4 For “Over Excavation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152.4.5 For “Subgrade Preparation” payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item no 58 P-152 (i) Unclassified Excavation and Embankment - per CY
Bid Item no 59 P-152 (ii) Unclassified Excavation - per CY
Bid Item no 60 P-152 (iii) Import Borrow Excavation - per CY
Bid Item no 61 P-152 (iv) Over-Excavation - per CY
Bid Item no 62 P-152 (v) Subgrade Preparation - per SY

152.5 TESTING REQUIREMENTS

ASTM D 698 Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound (2.49 kg) Rammer and 12-inch (305 mm) Drop

ASTM D 1556 Test for Density of Soil In Place by the Sand-Cone Method

ASTM D 1557 Test for Laboratory Compaction Characteristics of Soil Using Modified Effort

ASTM D 2167 Test for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.

END OF ITEM P-152
ITEM P-153 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

DESCRIPTION

153.1.1 This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Owner’s Representative.

MATERIALS

153.2.1 PORTLAND CEMENT: Portland cement shall conform to the requirements of ASTM C 150 Type II. If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

153.2.2 FLY ASH: Fly Ash shall conform to ASTM C 618, Class C or F.

153.2.3 FINE AGGREGATE (SAND): Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces performance characteristics of the CLSM specified herein will be accepted, except as follows.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 inch (19.0 mm)</td>
<td>100</td>
</tr>
<tr>
<td>No. 200 (0.075 mm)</td>
<td>0 – 12</td>
</tr>
</tbody>
</table>

153.2.4 WATER: Water used in mixing shall be free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product.

MIX DESIGN

153.3.1 PROPORTIONS: The contractor shall submit, to the Owner’s Representative, a mix design including the proportions and source of materials, admixtures, and dry cubic yard batch weights. The mix shall contain a minimum of 50 pounds of cement and 250 pounds fly ash per cubic yard, with the remainder of the volume composed of sand, water, and any approved admixtures.

153.3.2 COMpressive STRENGTH: CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi when tested in accordance with ASTM C39. There should be no significant strength gain after 28 days. Test specimens shall be made in accordance with ASTM C 31 except that the samples will not be rodded or vibrated and shall be air cured in their molds for the duration of the cure period.

153.3.3 CONSISTENCY: Consistency of the fresh mixture shall be such that the mixture may be placed without segregation. A desired consistency may be approximated by filling an open-ended three-inch diameter cylinder, six inches high to the top, with the mixture
and the cylinder immediately pulled straight up. The correct consistency of the mixture will produce an approximate eight-inch diameter circular-type spread without segregation. Adjustments of the proportions of materials should be made to achieve proper solid suspension and flowable characteristics, however the theoretical yield shall be maintained at one cubic yard for the given batch weights.

153.4 CONSTRUCTION METHODS

153.4.1 PLACEMENT

153.4.1.1 PLACEMENT: CLSM may be placed by any reasonable means from a mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed in such a manner that structures or pipes are not displaced from their desired final position and intrusion of CLSM into undesirable areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed to the Owner’s Representative. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one layer, the base layer shall be free of surface water and loose of foreign material prior to placement of the next layer.

153.4.1.2 LIMITATIONS OF PLACEMENT: CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35 degrees F (2 degrees C) and rising. At the time of placement, CLSM shall have a temperature of at least 40 degrees F (4 degrees C). Mixing and placement shall stop when the air temperature is 40 degrees F (4 degrees C) and falling or when the anticipated air or ground temperature will be 35 degrees F (2 degrees C) or less in the 24 hour period following proposed placement.

153.4.2 CURING AND PROTECTION

153.4.2.1 CURING: The air in contact with the CLSM should be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32 degrees F (0 degrees C), the material may be rejected by the Owner’s Representative if damage to the material is observed.

153.4.2.2 PROTECTION: The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi (105 kPa) is obtained. The Contractor shall be responsible for providing evidence to the Owner’s Representative that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

153.5 MATERIAL ACCEPTANCE

153.5.1 ACCEPTANCE: Acceptance of CLSM delivered and placed as shown on the plans or as directed by the Owner’s Representative shall be based upon mix design approval
and batch tickets provided by the Contractor to confirm that the delivered material conforms to the mix design. The Contractor shall verify by additional testing, each 5,000 cubic yards of material used. Verification shall include confirmation of material proportions and tests of compressive strength to confirm that the material meets the original mix design and the requirements of CLSM as defined in this specification. Adjustments shall be made as necessary to the proportions and materials prior to further production.

153.6 METHOD OF MEASUREMENT

153.6.1 MEASUREMENT: Controlled low strength material shall be measured by the number of cubic yards as computed from the neatline plan and section, adjusted for the quantities for any embedments, and as specified, completed, and accepted.

153.7 BASIS OF PAYMENT

153.7.1 PAYMENT: Accepted quantities of controlled low strength material shall be paid for at the contract unit price per cubic yard. Payment shall be full compensation for all materials, equipment, labor, and incidentals required to complete the work as specified.

Payment will be made under:

Bid Item no 63 Controlled Low Strength Material (CLSM) - per CY

153.8 TESTING REQUIREMENTS

ASTM C 31 Making and Curing Concrete Test Specimens in the Field
ASTM C 39 Compressive Strength of Cylindrical Concrete

153.9 MATERIAL REQUIREMENTS

ASTM C 33 Specification for Concrete Aggregates
ASTM C 150 Specification for Portland Cement
ASTM C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete

ASTM C 595 Specification for Blended Hydraulic Cements
ITEM P-154 SUBBASE COURSE

DESCRIPTION

154.1.1 This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course in accordance with these specifications, and in conformity with the dimensions and typical cross section shown on the plans.

MATERIALS

154.2.1 The subbase material shall consist of hard durable particles or fragments of granular aggregates. This material will be mixed or blended with fine sand, clay, stone dust, or other similar binding or filler materials produced from approved sources. This mixture must be uniform and shall comply with the requirements of these specifications as to gradation, soil constants, and shall be capable of being compacted into a dense and stable subbase. The material shall be free from vegetable matter, lumps or excessive amounts of clay, and other objectionable or foreign substances. Pit-run material may be used, provided the material meets the requirements specified.

TABLE 1. GRADATION REQUIREMENTS

<table>
<thead>
<tr>
<th>Sieve designation (ASTM C136 and D422)</th>
<th>Percentage by weight passing sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 10</td>
<td>20-100</td>
</tr>
<tr>
<td>No. 40</td>
<td>5-60</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-8</td>
</tr>
</tbody>
</table>

The portion of the material passing the No. 40 sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 6 when tested in accordance with ASTM D 4318.

The maximum amount of material finer than 0.02 mm in diameter shall be less than 3%.

Testing frequencies for the particle size distribution for preliminary shall be done with a minimum of one per day during construction.
154.3 CONSTRUCTION METHODS

154.3.1 GENERAL: The subbase course shall be placed where designated on the plans or as directed by the Owner’s Representative. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support without movement the construction equipment, shall be mechanically stabilized to the depth necessary to provide such stability as directed by the Owner’s Representative. The mechanical stabilization shall principally include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so that the course will not deform under the traffic of the construction equipment. The addition of the binding medium to the subbase material shall not increase the soil constants of that material above the limits specified.

154.3.2 OPERATION IN PITS: All work involved in clearing and stripping pits and handling unsuitable material encountered shall be performed by the Contractor at his/her own expense. The subbase material shall be obtained from pits or sources that have been approved. The material in the pits shall be excavated and handled in such manner that a uniform and satisfactory product can be secured.

154.3.3 PREPARING UNDERLYING COURSE: Before any subbase material is placed, the underlying course shall be prepared and conditioned as specified. The course shall be checked and accepted by the Owner’s Representative before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, the spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

154.3.4 MATERIALS ACCEPTANCE IN EXISTING CONDITION: When the entire subbase material is secured in a uniform and satisfactory condition and contains approximately the required moisture, such approved material may be moved directly to the spreading equipment for placing. The material may be obtained from gravel pits, stockpiles, or may be produced from a crushing and screening plant with the proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. It is the intent of this section of the specifications to secure materials that will not require further mixing. The moisture content of the material shall be approximately that required to obtain maximum density. Any minor deficiency or excess of moisture may be corrected by surface sprinkling or by aeration. In such instances, some mixing or manipulation may be required, immediately preceding the rolling, to obtain the required moisture content. The final operation shall be blading or dragging, if necessary, to obtain a smooth uniform surface true to line and grade.

154.3.5 PLANT MIXING: When materials from several sources are to be blended and mixed, the subbase material shall be processed in a central or travel mixing plant. The subbase
material, together with any blended material, shall be thoroughly mixed with the required amount of water. After the mixing is complete, the material shall be transported to and spread on the underlying course without undue loss of the moisture content.

154.3.6 MIXED IN PLACE: When materials from different sources are to be proportioned and mixed or blended in place, the relative proportions of the components of the mixture shall be as designated by the Owner’s Representative.

The subbase material shall be deposited and spread evenly to a uniform thickness and width. Then the binder, filler or other material shall be deposited and spread evenly over the first layer. There shall be as many layers of materials added as the Owner’s Representative may direct to obtain the required subbase mixture.

When the required amount of materials have been placed, they shall be thoroughly mixed and blended by means of graders, discs, harrows, rotary tillers, supplemented by other suitable equipment if necessary. The mixing shall continue until the mixture is uniform throughout. Areas of segregated material shall be corrected by the addition of binder or filler material and by thorough remixing. Water in the amount and as directed by the Owner’s Representative shall be uniformly applied prior to and during the mixing operations, if necessary, to maintain the material at its required moisture content. When the mixing and blending has been completed, the material shall be spread in a uniform layer which, when compacted, will meet the requirements of thickness and typical cross section.

154.3.7 GENERAL METHODS FOR PLACING: The subbase course shall be constructed in layers. Any layer shall be not less than 3 inches or more than 8 inches of compacted thickness. The subbase material shall be deposited and spread evenly to a uniform thickness and width. The material, as spread, shall be of uniform gradation with no pockets of fine or coarse materials. The subbase, unless otherwise permitted by the Owner’s Representative, shall not be spread more than 2,000 square yards in advance of the rolling. Any necessary sprinkling shall be kept within this limit. No material shall be placed in snow or on a soft, muddy, or frozen course.

When more than one layer is required, the construction procedure described herein shall apply similarly to each layer.

During the placing and spreading, sufficient caution shall be exercised to prevent the incorporation of subgrade, shoulder, or foreign material in the subbase course mixture.

154.3.8 FINISHING AND COMPACTING: After spreading or mixing, the subbase material shall be thoroughly compacted by rolling and sprinkling, when necessary. Sufficient
rollers shall be furnished to adequately handle the rate of placing and spreading of the subbase course.

The field density of the compacted material shall be at least 100 percent of the maximum density of laboratory specimens prepared from samples of the subbase material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D1557. The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 6938. The moisture content of the material at the start of compaction shall not be below nor more than 2 percentage points above the optimum moisture content.

When nuclear density gages are to be used for density determination, testing shall be in accordance with Section 120.

The course shall not be rolled when the underlying course is soft or yielding or when the rolling causes undulation in the subbase. When the rolling develops irregularities that exceed 1/2 inch when tested with a 16-foot straightedge, the irregular surface shall be loosened and then refilled with the same kind of material as that used in constructing the course and again rolled as required above.

Along places inaccessible to rollers, the subbase material shall be tamped thoroughly with mechanical or hand tampers.

Sprinkling during rolling, if necessary, shall be in the amount and by equipment approved by the Owner’s Representative. Water shall not be added in such a manner or quantity that free water will reach the underlying layer and cause it to become soft.

154.3.9 SURFACE TEST: After the course is completely compacted, the surface shall be tested for smoothness and accuracy of grade and crown; any portion found to lack the required smoothness or to fail in accuracy of grade or crown shall be scarified, reshaped, recompacted, and otherwise manipulated as the Owner’s Representative may direct until the required smoothness and accuracy are obtained. The finished surface shall not vary more than 1/2 inch when tested with a 16-foot straightedge applied parallel with, and at right angles to, the centerline.

154.3.10 THICKNESS: The thickness of the completed subbase course shall be determined by depth tests or sample holes taken at intervals so each test shall represent no more than 500 square yards. When the deficiency in thickness is more than 1/2 inch, the Contractor shall correct such areas by scarifying, adding satisfactory mixture, rolling, sprinkling, reshaping, and finishing in accordance with these specifications. The
Contractor shall replace at his/her expense the subbase material where borings are taken for test purposes.

154.3.11 PROTECTION: Work on subbase course shall not be conducted during freezing temperature or when the subgrade is wet. When the subbase material contains frozen material or when the underlying course is frozen, the construction shall be stopped.

154.3.12 MAINTENANCE: Following the final shaping of the material, the subbase shall be maintained throughout its entire length by the use of standard motor graders and rollers until, in the judgment of the Owner’s Representative, the subbase meets all requirements and is acceptable for the construction of the next course.

154.4 METHOD OF MEASUREMENT

154.4.1 The yardage of subbase course to be paid for shall be the number of cubic yards of subbase course material placed, compacted, and accepted in the completed course. The quantity of subbase course material shall be measured in final position based upon depth tests or cores taken as directed by the Owner’s Representative, or at the rate of 1 depth test for each 500 square yards of subbase course, or by means of average end areas on the complete work computed from elevations to the nearest 0.01 foot. On individual depth measurements, thicknesses more than 1/2 inch in excess of that shown on the plans shall be considered as the specified thickness plus 1/2 inch in computing the yardage for payment. Subbase materials shall not be included in any other excavation quantities.

154.5 BASIS OF PAYMENT

154.5.1 Payment shall be made at the contract unit price per cubic yard for subbase course. This price shall be full compensation for furnishing all materials; for all preparation, hauling, and placing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item no 64 Subbase Course, P-154 Airfield Pavements - per CY

END OF ITEM P-154
ITEM P-209 CRUSHED AGGREGATE BASE COURSE

209.1 DESCRIPTION

209.1.1 This item consists of a base course composed of crushed aggregates constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

209.2 MATERIALS

209.2.1 AGGREGATE: Aggregates shall consist of clean, sound, durable particles of crushed stone, crushed gravel, or crushed slag and shall be free from coatings of clay, silt, vegetable matter, and other objectionable materials and shall contain no clay balls. Fine aggregate passing the No. 4 sieve shall consist of fines from the operation of crushing the coarse aggregate. If necessary, fine aggregate may be added to produce the correct gradation. The fine aggregate shall be produced by crushing stone, gravel, or slag that meet the requirements for wear and soundness specified for coarse aggregate.

The crushed slag shall be an air-cooled, blast furnace slag and shall have a unit weight of not less than 70 pounds per cubic foot when tested in accordance with ASTM C 29.

The coarse aggregate portion, defined as the material retained on the No. 4 sieve and larger, shall not contain more than 15 percent, by weight, of flat or elongated pieces as defined in ASTM D 693 and shall have at least 90 percent by weight of particles with at least two fractured faces and 100 percent with at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 to count as two fractured faces.

The percentage of wear shall not be greater than 45 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, after 5 cycles, when tested in accordance with ASTM C 88.

The fraction passing the No. 40 sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 4 when tested in accordance with ASTM D 4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested in accordance with ASTM D 2419.

209.2.1.1 SAMPLING AND TESTING: Aggregates for preliminary testing shall be furnished by the Contractor prior to the start of production. All tests for initial aggregate submittals necessary to determine compliance with the specification requirements will be made by the Owner’s Representative at no expense to the Contractor.

Samples of aggregates shall be furnished by the Contractor at the start of production and at intervals during production. The sampling points and intervals will be designated...
by the Owner’s Representative. The samples will be the basis of approval of specific lots of aggregates from the standpoint of the quality requirements of this section.

In lieu of testing, the Owner’s Representative may accept certified state test results indicating that the aggregate meets specification requirements. Certified test results shall be less than 6 months old.

Samples of aggregates to check gradation shall be taken by the Owner’s Representative at least two per lot. The lot will be consistent with acceptable sampling for density. The samples shall be taken from the in-place, compacted material. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and ASTM C 117.

209.2.1.2 GRADATION REQUIREMENTS: The gradation (job mix) of the final mixture shall fall within the design range indicated in Table 1, when tested in accordance with ASTM C 117 and ASTM C 136. The final gradation shall be continuously well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

TABLE 1. REQUIREMENTS FOR GRADATION OF AGGREGATE

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Design Range (% by weight)</th>
<th>Job Mix Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in (50.0 mm)</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>1-1/2 (37.0 mm)</td>
<td>95-100</td>
<td>+/- 5</td>
</tr>
<tr>
<td>1 in (25.0 mm)</td>
<td>70-95</td>
<td>+/- 8</td>
</tr>
<tr>
<td>3/4 in (19.0 mm)</td>
<td>55-85</td>
<td>+/- 8</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>30-60</td>
<td>+/- 8</td>
</tr>
<tr>
<td>No. 30 (0.60 mm)</td>
<td>12-30</td>
<td>+/- 5</td>
</tr>
<tr>
<td>No. 200 (0.075 mm)</td>
<td>0-8</td>
<td>+/- 3</td>
</tr>
</tbody>
</table>

1 Where environmental conditions (temperature and availability of free moisture) indicate potential damage due to frost action, the maximum percent of material, by weight, of particles smaller than 0.02 mm shall be 3 percent when tested in accordance with ASTM D 422. It also may be necessary to have a lower percentage of material passing the No. 200 sieve to help control the percentage of particles smaller than 0.02 mm maximum limit of 5 percent is recommended.

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control grading band. The full tolerance still will apply if application of the tolerances results in a job control grading band outside the design range.
The fraction of the final mixture that passes the No. 200 sieve shall not exceed 60 percent of the fraction passing the No. 30 sieve.

209.3 CONSTRUCTION METHODS

209.3.1 PREPARING UNDERLYING COURSE: The underlying course shall be checked and accepted by the Owner's Representative before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon. Material shall not be placed on frozen subgrade.

209.3.2 MIXING: The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

209.3.3 PLACING: The crushed aggregate base material shall be placed on the moistened subgrade in layers of uniform thickness with a mechanical spreader.

The maximum depth of a compacted layer shall be 6 inches. If the total depth of the compacted material is more than 6 inches, it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.

The previously constructed layer should be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

209.3.4 COMPACATION: Immediately upon completion of the spreading operations, the crushed aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

The moisture content of the material during placing operations shall not be below, nor more than 2 percentage points above, the optimum moisture content as determined by ASTM D1557.

209.3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY: Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 square yards. A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 square yards.

Each lot shall be divided into two equal sublots. One test shall be made for each subplot. Sampling locations will be determined by the Owner’s Representative on a random basis in accordance with statistical procedures contained in ASTM D 3665.

Each lot will be accepted for density when the field density is at least 100 percent of the maximum density of laboratory specimens prepared from samples of the base
course material delivered to the job site. The specimens shall be compacted and tested in accordance with ASTM D1557. The in-place field density shall be determined in accordance with ASTM D1556 or D2167. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

In lieu of the core method of field density determination, acceptance testing may be accomplished using a nuclear gage in accordance with ASTM D6938. The gage should be field calibrated in accordance with paragraph 4 of ASTM D6938. Calibration tests shall be conducted on the first lot of material placed that meets the density requirements.

Use of ASTM D6938 results in a wet unit weight, and when using this method, ASTM D3017 shall be used to determine the moisture content of the material. Calibration and Standardization shall be conducted in accordance with ASTM standards.

If a nuclear gage is used for density determination, two random readings shall be made for each sublot.

209.3.6 FINISHING: The surface of the aggregate base course shall be finished by blading or with automated equipment especially designed for this purpose.

In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 inch or more below grade, the top layer of base shall be scarified to a depth of at least 3 inches, new material added, and the layer shall be blended and recompacted to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled.

209.3.7 SURFACE TOLERANCES: The finished surface shall not vary more than 3/8 inch when tested with a 16-foot straightedge applied parallel with or at right angles to the centerline. Any deviation in excess of this amount shall be corrected by the Contractor at the Contractor's expense.

209.3.8 THICKNESS CONTROL: The completed thickness of the base course shall be within 1/2 inch of the design thickness. Four determinations of thickness shall be made for each lot of material placed. The lot size shall be consistent with that specified in paragraph 3.5. Each lot shall be divided into four equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Owner’s Representative on a random basis in accordance with procedures contained in ASTM D3665. Where the thickness is deficient by more than 1/2 inch, the Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

209.3.9 MAINTENANCE: The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base
course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

The Contractor shall remove all survey and grade hubs from the base courses prior to placing any bituminous surface course.

209.4 METHOD OF MEASUREMENT

209.4.1 The quantity of crushed aggregate base course to be paid for will be determined by measurement of the number of cubic yards of material actually constructed and accepted by the Owner’s Representative as complying with the plans and specifications.

209.5 BASIS OF PAYMENT

209.5.1 Payment shall be made at the contract unit price per cubic yard for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item no 65 Crushed Aggregate Base Course, P-209 Airfield Pavements - per CY

END OF ITEM P-209
Item P-401 Hot Mix Asphalt (HMA) Pavements

DESCRIPTION

401-1.1 This item shall consist of pavement courses composed of mineral aggregate and asphalt cement binder (asphalt binder) mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

401-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand and mineral filler, as required. The aggregates should be free of ferrous sulfides, such as pyrite, that would cause “rust” staining that can bleed through pavement markings. The portion retained on the No. 4 (4.75 mm) sieve is coarse aggregate. The portion passing the No. 4 (4.75 mm) sieve and retained on the No. 200 (0.075 mm) sieve is fine aggregate, and the portion passing the No. 200 (0.075 mm) sieve is mineral filler.

a. Coarse aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the bituminous material and free from organic matter and other deleterious substances. The percentage of wear shall not be greater than 40% when tested in accordance with ASTM C131. The sodium sulfate soundness loss shall not exceed 12%, or the magnesium sulfate soundness loss shall not exceed 18%, after five cycles, when tested in accordance with ASTM C88. Clay lumps and friable particles shall not exceed 1.0% when tested in accordance with ASTM C142.

Aggregate shall contain at least 75 percent by weight of individual pieces having two or more fractured faces and 85 percent by weight having at least one fractured face. The area of each face shall be equal to at least 75% of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be achieved by crushing.

The aggregate shall not contain more than a total of 8%, by weight, of flat particles, elongated particles, and flat and elongated particles, when tested in accordance with ASTM D4791 with a value of 5:1.

Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than 70 pounds per cubic foot (1.12 mg/cubic meter) when tested in accordance with ASTM C29.
b. Fine aggregate. Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter.

The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than six (6) and a liquid limit of not more than 25 when tested in accordance with ASTM D4318.

The soundness loss shall not exceed 10% when sodium sulfate is used or 15% when magnesium sulfate is used, after five cycles, when tested per ASTM C88.

Clay lumps and friable particles shall not exceed 1.0%, by weight, when tested in accordance with ASTM C142.

Natural (non-manufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification. The fine aggregate shall not contain more than 15% natural sand by weight of total aggregates. If used, the natural sand shall meet the requirements of ASTM D1073 and shall have a plasticity index of not more than six (6) and a liquid limit of not more than 25 when tested in accordance with ASTM D4318.

The aggregate shall have sand equivalent values of 45 or greater when tested in accordance with ASTM D2419.

c. Sampling. ASTM D75 shall be used in sampling coarse and fine aggregate, and ASTM C183 shall be used in sampling mineral filler.

401-2.2 Mineral filler. If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D242.

401-2.3 Asphalt cement binder. Asphalt cement binder shall conform to ASTM D6373 Performance Grade (PG) 70-10. A certificate of compliance from the manufacturer shall be included with the mix design submittal.

The supplier’s certified test report with test data indicating grade certification for the asphalt binder shall be provided to the Engineer for each load at the time of delivery to the mix plant. A certified test report with test data indicating grade certification for the asphalt binder shall also be provided to the Engineer for any modification of the asphalt binder after delivery to the mix plant and before use in the HMA.

401-2.4 Preliminary material acceptance. Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:
a. Coarse aggregate:

(1) Percent of wear
(2) Soundness
(3) Clay lumps and friable particles
(4) Percent fractured faces
(5) Flat and elongated particles
(6) Unit weight of slag

b. Fine aggregate:

(1) Liquid limit and Plasticity index
(2) Soundness
(3) Clay lumps and friable particles
(4) Percent natural sand
(5) Sand equivalent

c. Mineral filler.

d. Asphalt binder. Test results for asphalt binder shall include temperature/viscosity charts for mixing and compaction temperatures.

The certifications shall show the appropriate ASTM tests for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

401-2.5 Anti-stripping agent. Any anti-stripping agent or additive if required shall be heat stable, shall not change the asphalt cement viscosity beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method, and shall be a material approved by the Department of Transportation of the State in which the project is located.

COMPOSITION

401-3.1 Composition of mixture. The HMA mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and asphalt binder. The
several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

**401-3.2 Job mix formula (JMF).** No hot-mixed asphalt (HMA) for payment shall be produced until a JMF has been approved in writing by the Engineer. The asphalt mix-design and JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.4. The HMA shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. ASTM D6926 shall be used for preparation of specimens using the manually held and operated hammer for the mix design procedure. ASTM D6927 shall be used for testing for Marshall stability and flow.

If material variability exceeds the standard deviations indicated, the JMF and subsequent production targets shall be based on a stability greater than shown in Table 1 and the flow shall be targeted close to the mid-range of the criteria in order to meet the acceptance requirements.

Tensile strength ratio (TSR) of the composite mixture, as determined by ASTM D4867, shall not be less than 75 when tested at a saturation of 70-80% or an anti-stripping agent shall be added to the HMA, as necessary, to produce a TSR of not less than 75 when tested at a saturation of 70-80%. If an anti-strip agent is required, it shall be provided by the Contractor at no additional cost to the Owner.

The JMF shall be submitted in writing by the Contractor at least 10 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates currently being produced.

The submitted JMF shall be stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

a. Percent passing each sieve size for total combined gradation, individual gradation of all aggregate stockpiles and percent by weight of each stockpile used in the job mix formula.

b. Percent of asphalt cement.

c. Asphalt performance grade and type of modifier if used.

d. Number of blows per side of molded specimen.

e. Laboratory mixing temperature.

f. Laboratory compaction temperature.
g. Temperature-viscosity relationship of the PG asphalt cement binder showing acceptable range of mixing and compaction temperatures; and for modified binders include supplier recommended mixing and compaction temperatures.

h. Plot of the combined gradation on a 0.45 power gradation curve.

i. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content.

j. Specific Gravity and absorption of each aggregate.

k. Percent natural sand.

l. Percent fractured faces.

m. Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).

n. Tensile Strength Ratio (TSR).

o. Anti-strip agent (if required).

p. Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

The Contractor shall submit to the Engineer the results of verification testing of three (3) asphalt samples prepared at the optimum asphalt content. The average of the results of this testing shall indicate conformance with the JMF requirements specified in Tables 1 and 3.

When the project requires asphalt mixtures of differing aggregate gradations, a separate JMF and the results of JMF verification testing shall be submitted for each mix.

The JMF for each mixture shall be in effect until a modification is approved in writing by the Engineer. Should a change in sources of materials be made, a new JMF must be submitted within 15 days and approved by the Engineer in writing before the new material is used. After the initial production JMF has been approved by the Engineer and a new or modified JMF is required for whatever reason, the subsequent cost of the Engineer’s approval of the new or modified JMF will be borne by the Contractor. There will be no time extension given or considerations for extra costs associated with the stoppage of production paving or restart of production paving due to the time needed for the Engineer to approve the initial, new or modified JMF.

The Marshall Design Criteria applicable to the project shall meet the criteria specified in Table 1.

Table 1. Marshall Design Criteria
Test Property | Value
---|---
Number of blows | 75
Stability, pounds (Newtons) minimum | 2150 (9560)
Flow¹, 0.01 in. (0.25 mm) | 10-16
Air voids (%) | 3.5
Percent voids in mineral aggregate, minimum | See Table 2

¹ The flow requirement is not applicable for Polymer Modified Asphalts.

Table 2. Minimum Percent Voids In Mineral Aggregate (VMA)

<table>
<thead>
<tr>
<th>Aggregate (See Table 3)</th>
<th>Minimum VMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradation 3</td>
<td>16%</td>
</tr>
<tr>
<td>Gradation 2</td>
<td>15%</td>
</tr>
<tr>
<td>Gradation 1</td>
<td>14%</td>
</tr>
</tbody>
</table>

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 3 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 3 represent the limits that shall determine the suitability of aggregate for use from the sources of supply; be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

Table 3. Aggregate - HMA Pavements

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percentage by Weight Passing Sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gradation 1</td>
</tr>
<tr>
<td>1 inch (25 mm)</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch (19 mm)</td>
<td>76-98</td>
</tr>
<tr>
<td>1/2 inch (12 mm)</td>
<td>66-86</td>
</tr>
<tr>
<td>3/8 inch (9 mm)</td>
<td>57-77</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>40-60</td>
</tr>
<tr>
<td>No. 8 (2.36 mm)</td>
<td>26-46</td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
<td>17-37</td>
</tr>
<tr>
<td>No. 30 (0.600 mm)</td>
<td>11-27</td>
</tr>
</tbody>
</table>
The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

401-3.3 Reclaimed asphalt pavement (RAP). **RAP shall not be used.**

401-3.4 *Job mix formula (JMF) laboratory.* The Contractor’s laboratory used to develop the JMF shall be accredited in accordance with ASTM D3666. The laboratory accreditation must be current and listed on the accrediting authority’s website. All test methods required for developing the JMF must be listed on the lab accreditation. A copy of the laboratory’s current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

401-3.5 *Test section.* A test section is not required.

**CONSTRUCTION METHODS**

401-4.1 *Weather limitations.* The HMA shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

<table>
<thead>
<tr>
<th>Mat Thickness</th>
<th>Base Temperature (Minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°F</td>
</tr>
<tr>
<td>3 inches (7.5 cm) or greater</td>
<td>40</td>
</tr>
<tr>
<td>Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)</td>
<td>45</td>
</tr>
</tbody>
</table>

401-4.2 *HMA plant.* Plants used for the preparation of HMA shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 with the following changes:
Requirements for all plants include:

**a. Truck scales.** The HMA shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor’s expense. Scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of the General Provisions, subsection 90-01.

In lieu of scales, and as approved by the Engineer, HMA weight may be determined by the use of an electronic weighing system equipped with an automatic printer that weighs the total HMA production and as often thereafter as requested by the Engineer.

**b. Testing facilities.** The Contractor shall ensure laboratory facilities are provided at the plant for the use of the Engineer. The lab shall have sufficient space and equipment so that both testing representatives (Engineer’s and Contractor’s) can operate efficiently. The lab shall meet the requirements of ASTM D3666 including all necessary equipment, materials, calibrations, current reference standards to comply with the specifications and a masonry saw with diamond blade for trimming pavement cores and samples.

The plant testing laboratory shall have a floor space area of not less than 200 square feet (18.5 sq m), with a ceiling height of not less than 7-1/2 feet (2 m). The laboratory shall be weather tight, sufficiently heated in cold weather, air-conditioned in hot weather to maintain temperatures for testing purposes of 70°F ±5°F (21°C ±2.3°C). The plant testing laboratory shall be located on the plant site to provide an unobstructed view, from one of its windows, of the trucks being loaded with the plant mix materials. In addition, the facility shall include the minimum:

1. Adequate artificial lighting.
2. Electrical outlets sufficient in number and capacity for operating the required testing equipment and drying samples.
3. A minimum of two (2) Underwriter’s Laboratories approved fire extinguishers of the appropriate types and class.
4. Work benches for testing.
5. Desk with chairs and file cabinet.
6. Sanitary facilities convenient to testing laboratory.
7. Exhaust fan to outside air.
8. Sink with running water.

Failure to provide the specified facilities shall be sufficient cause for disapproving HMA plant operations.
Laboratory facilities shall be kept clean, and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor’s laboratory facility and witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

c. Inspection of plant. The Engineer, or Engineer’s authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

d. Storage bins and surge bins. The HMA stored in storage and surge bins shall meet the same requirements as HMA loaded directly into trucks and may be permitted under the following conditions:

(1) Stored in non-insulated bins for a period of time not to exceed three (3) hours.

(2) Stored in insulated bins for a period of time not to exceed eight (8) hours.

If the Engineer determines that there is an excessive amount of heat loss, segregation, or oxidation of the HMA due to temporary storage, no temporary storage will be allowed.

401-4.3 Hauling equipment. Trucks used for hauling HMA shall have tight, clean, and smooth metal beds. To prevent the HMA from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the Engineer. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

401-4.3.1 Material transfer vehicle (MTV). Material transfer vehicles used to transfer the material from the hauling equipment to the paver, shall use a self-propelled, material transfer vehicle with a swing conveyor that can deliver material to the paver without making contact with the paver. The MTV shall be able to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. The Material Transfer Vehicle will have remixing and storage capability to prevent physical and thermal segregation.

401-4.4 HMA pavers. HMA pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of HMA that will meet the specified
thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the HMA uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

If, during construction, it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and satisfactory equipment shall be provided by the Contractor.

401-4.4.1 Automatic grade controls. The HMA paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within ±0.1%.

The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet (9 m) in length.

b. Taut string-line (wire) set to grade.

c. Short ski or shoe.

d. Laser control.

401-4.5 Rollers. Rollers of the vibratory, steel wheel, and pneumatic-tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the HMA. The number, type, and weight of rollers shall be sufficient to compact the HMA to the required density while it is still in a workable condition.

All rollers shall be specifically designed and suitable for compacting HMA concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used. Depressions in pavement surfaces caused by rollers shall be repaired by the Contractor at their own expense.

The use of equipment that causes crushing of the aggregate will not be permitted.

401-4.6. Density device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern,
type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new HMA. These densities shall be supplied to the Engineer upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

401-4.7 Preparation of asphalt binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F (160°C) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (175°C) when added to the aggregate.

401-4.8 Preparation of mineral aggregate. The aggregate for the HMA shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F (175°C) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

401-4.9 Preparation of HMA. The aggregates and the asphalt binder shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all HMA upon discharge shall not exceed 0.5%.

401-4.10 Preparation of the underlying surface. Immediately before placing the HMA, the underlying course shall be cleaned of all dust and debris. Paint and/or rubber deposits on the existing pavement shall be removed by milling, grinding, or other suitable means prior to the placement of new bituminous material. A prime coat or tack coat shall be applied in accordance with Item P-602 or P-603, if shown on the plans.
401-4.11 Laydown plan, transporting, placing, and finishing. Prior to the placement of the HMA, the Contractor shall prepare a laydown plan for approval by the Engineer. This is to minimize the number of cold joints in the pavement. The laydown plan shall include the sequence of paving laydown by stations, width of lanes, temporary ramp locations, and laydown temperature. The laydown plan shall also include estimated time of completion for each portion of the work (that is, milling, paving, rolling, cooling, etc.). Modifications to the laydown plan shall be approved by the Engineer.

The HMA shall be transported from the mixing plant to the site in vehicles conforming to the requirements of paragraph 401-4.3. Deliveries shall be scheduled so that placing and compacting of HMA is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

The Contractor shall use a material transfer vehicle to deliver HMA to the paver.

The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose for the first lift of all runway and taxiway pavements. Successive lifts of HMA surface course may be placed using a ski, or laser control per paragraph 401-4.4.1, provided grades of the first lift of HMA surface course meet the tolerances of paragraphs 401-5.2b(6) as verified by a survey. Contractor shall survey each lift of HMA surface course and certify to Engineer that every lot of each lift meets the grade tolerances of paragraph 401-5.2b(6) before the next lift can be placed.

The initial placement and compaction of the HMA shall occur at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250°F (121°C).

Edges of existing HMA pavement abutting the new work shall be saw cut and carefully removed as shown on the drawings and coated with asphalt tack coat before new material is placed against it.

Upon arrival, the HMA shall be placed to the full width by a HMA paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the HMA mat. Unless otherwise permitted, placement of the HMA shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The HMA shall be placed in consecutive adjacent strips having a minimum width of 12 feet except where edge lanes require less width to complete the area. Additional screed sections shall not be attached to widen paver to meet the minimum lane width requirements specified above unless additional auger sections are added to match. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot (30 cm); however, the joint in the surface top course shall be at the centerline of
crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course.

Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the HMA may be spread and luted by hand tools.

Areas of segregation in the surface course, as determined by the Engineer, shall be removed and replaced at the Contractor’s expense. The area shall be removed by saw cutting and milling a minimum of 2 inches (50 mm) deep. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

401-4.12 Compaction of HMA. After placing, the HMA shall be thoroughly and uniformly compacted by power rollers. The surface shall be compacted as soon as possible when the HMA has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the HMA to the roller, the wheels shall be equipped with a scraper and kept properly moistened but excessive water will not be permitted.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power driven tampers. Tampers shall weigh not less than 275 pounds (125 kg), have a tamping plate width not less than 15 inches (38 cm), be rated at not less than 4,200 vibrations per minute, and be suitably equipped with a standard tamping plate wetting device.

Any HMA that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor’s expense. Skin patching shall not be allowed.

401-4.13 Joints. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.
The roller shall not pass over the unprotected end of the freshly laid HMA except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh HMA against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F (80°C); or are irregular, damaged, uncompacted or otherwise defective shall be cut back 3 inches (75 mm) to 6 inches (150 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material shall be removed from the project. Asphalt tack coat or other product approved by the Engineer shall be applied to the clean, dry joint, prior to placing any additional fresh HMA against the joint. Any laitance produced from cutting joints shall be removed by vacuuming and washing. The cost of this work shall be considered incidental to the cost of the HMA.

401-4.14 Saw-cut grooving. If shown on the plans, saw cut grooves shall be provided as specified in Item P-621.

401-4.15 Diamond grinding. When required, diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive. The saw blades shall be assembled in a cutting head mounted on a machine designed specifically for diamond grinding that will produce the required texture and smoothness level without damage to the pavement. The saw blades shall be 1/8-inch (3-mm) wide and there shall be a minimum of 55 to 60 blades per 12 inches (300 mm) of cutting head width; the actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Each machine shall be capable of cutting a path at least 3 feet (0.9 m) wide. Equipment that causes raveling, aggregate fractures, spalls or disturbance to the pavement will not be permitted. The depth of grinding shall not exceed 1/2 inch (13mm) and all areas in which diamond grinding has been performed will be subject to the final pavement thickness tolerances specified. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. Areas that have been ground will be sealed with a P-608 surface treatment as directed by the Engineer. It may be necessary to seal a larger area to avoid surface treatment creating any conflict with runway or taxiway markings.

401-4.16 Nighttime paving requirements. Paving during nighttime construction shall require the following:

a. All paving machines, rollers, distribution trucks and other vehicles required by the Contractor for his operations shall be equipped with artificial illumination sufficient to safely complete the work.

b. Minimum illumination level shall be twenty (20) horizontal foot-candles and maintained in the following areas:
(1) An area of 30 feet (9 m) wide by 30 feet (9 m) long immediately behind the paving machines during the operations of the machines.

(2) An area 15 feet (4.5 m) wide by 30 feet (9 m) long immediately in front and back of all rolling equipment, during operation of the equipment.

(3) An area 15 feet (4.5 m) wide by 15 feet (4.5 m) long at any point where an area is being tack coated prior to the placement of pavement.

c. As partial fulfillment of the above requirements, the Contractor shall furnish and use, complete artificial lighting units with a minimum capacity of 3,000 watt electric beam lights, affixed to all equipment in such a way to direct illumination on the area under construction.

d. A lighting plan must be submitted by the Contractor and approved by the Engineer prior to the start of any nighttime work.

If the Contractor places any out of specification mix in the project work area, the Contractor is required to remove it at its own expense, to the satisfaction of the Engineer. If the Contractor has to continue placing non-payment HMA, as directed by the Engineer, to make the surfaces safe for aircraft operations, the Contractor shall do so to the satisfaction of the Engineer. It is the Contractor’s responsibility to leave the facilities to be paved in a safe condition ready for aircraft operations. No consideration for extended closure time of the area being paved will be given. As a first order of work for the next paving shift, the Contractor shall remove all out of specification material and replace with approved material to the satisfaction of the Engineer. When the above situations occur, there will be no consideration given for additional construction time or payment for extra costs.

MATERIAL ACCEPTANCE

401-5.1 Acceptance sampling and testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor except that coring and profilograph testing as required in this section shall be completed and paid for by the Contractor.

Testing organizations performing these tests except profilograph shall be accredited in accordance with ASTM D3666. The laboratory accreditation must be current and listed on the accrediting authority’s website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory’s current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction. All equipment in Contractor furnished laboratories shall be calibrated by an independent testing organization prior to the start of operations at the Contractor’s expense.
a. Hot mixed asphalt. Plant-produced HMA shall be tested for air voids and stability and flow on a lot basis. Sampling shall be from material deposited into trucks at the plant or from trucks at the job site. Samples shall be taken in accordance with ASTM D979.

A standard lot shall be equal to one day’s production or 2000 tons (1814 metric tons) whichever is smaller. If the day’s production is expected to exceed 2000 tons (1814 metric tons), but less than 4000 tons (3628 metric tons), the lot size shall be 1/2 day’s production. If the day’s production exceeds 4000 tons (3628 metric tons), the lot size shall be an equal sized fraction of the day’s production, but shall not exceed 2000 tons (1814 metric tons).

Where more than one plant is simultaneously producing HMA for the job, the lot sizes shall apply separately for each plant.

(1) Sampling. Each lot will consist of four equal sublots. Sufficient HMA for preparation of test specimens for all testing will be sampled by the Engineer on a random basis, in accordance with the procedures contained in ASTM D3665. Samples will be taken in accordance with ASTM D979.

The sample of HMA may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to stabilize to compaction temperature. The compaction temperature of the specimens shall be as specified in the JMF.

(2) Testing. Sample specimens shall be tested for stability and flow in accordance with ASTM D6927. Air voids will be determined by the Engineer in accordance with ASTM D3203. One set of laboratory compacted specimens will be prepared for each subplot in accordance with ASTM D6926 at the number of blows required by paragraph 401-3.2, Table 1. Each set of laboratory compacted specimens will consist of three test specimens prepared from the same sample. The manual hammer in ASTM D6926 shall be used.

Prior to testing, the bulk specific gravity of each test specimen shall be measured by the Engineer in accordance with ASTM D2726 using the procedure for laboratory-prepared thoroughly dry specimens for use in computing air voids and pavement density.

For air voids determination, the theoretical maximum specific gravity of the mixture shall be measured one time for each subplot in accordance with ASTM D2041. The value used in the air voids computation for each subplot shall be based on theoretical maximum specific gravity measurement for the subplot.

The stability and flow for each subplot shall be computed by averaging the results of all test specimens representing that subplot.
(3) Acceptance. Acceptance of plant produced HMA for stability, flow, and air voids shall be determined by the Engineer in accordance with the requirements of paragraph 401-5.2b.

b. In-place HMA. HMA placed in the field shall be tested for mat and joint density on a lot basis. A standard lot shall be equal to one day’s production or 2000 tons (1814 metric tons) whichever is smaller. If the day’s production is expected to exceed 2000 tons (1814 metric tons), but less than 4000 tons (3628 metric tons), the lot size shall be 1/2 day’s production. If the day’s production exceeds 4000 tons (3628 metric tons), the lot size shall be an equal sized fraction of the day’s production, but shall not exceed 2000 tons (1814 metric tons).

(1) Mat density. The lot size shall be the same as that indicated in paragraph 401-5.1a and shall be divided into four equal sublots. One core of finished, compacted HMA shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint.

(2) Joint density. The lot size shall be the total length of longitudinal joints constructed by a lot of HMA as defined in paragraph 401-5.1a. The lot shall be divided into four equal sublots. One core of finished, compacted HMA shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D3665. All cores for joint density shall be taken centered on the joint. The minimum core diameter for joint density determination shall be 5 inches (125 mm).

(3) Sampling. Samples shall be neatly cut with a diamond core drill bit. Samples will be taken in accordance with ASTM D979. The minimum diameter of the sample shall be 5 inches (125 mm). Samples that are clearly defective, as a result of sampling, shall be discarded and another sample taken. The Contractor shall furnish all tools, labor, and materials for cutting samples, cleaning, and filling the cored pavement. Cored pavement shall be cleaned and core holes shall be filled in a manner acceptable to the Engineer and within one day after sampling. Laitance produced by the coring operation shall be removed immediately.

The top most lift of HMA shall be completely bonded to the underlying layer. If any of the cores reveal that the surface is not bonded to the layer immediately below the surface then additional cores shall be taken as directed by the Engineer in accordance with paragraph 401-5.1b to determine the extent of any delamination. All delaminated areas shall be completely removed by milling to the limits and depth and replaced as directed by the Engineer at no additional cost.

(4) Testing. The bulk specific gravity of each cored sample will be measured by the Engineer in accordance with ASTM D2726. Samples will be taken in accordance with ASTM D979. The percent compaction (density) of each sample will be determined by
dividing the bulk specific gravity of each subplot sample by the average bulk specific gravity of all laboratory prepared specimens for the lot, as determined in paragraph 401-5.1a(2). The bulk specific gravity used to determine the joint density at joints formed between different lots shall be the lowest of the bulk specific gravity values from the two different lots.

(5) Acceptance. Acceptance of field placed HMA for mat density will be determined by the Engineer in accordance with the requirements of paragraph 401-5.2b(1). Acceptance for joint density will be determined by the Engineer in accordance with the requirements of paragraph 401-5.2b(3).

c. Partial lots. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or other minor tonnage placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

The last batch produced where production is halted will be sampled, and its properties shall be considered as representative of the particular subplot from which it was taken. In addition, an agreed to minor placement will be sampled, and its properties shall be considered as representative of the particular subplot from which it was taken. Where three sublots are produced, they shall constitute a lot. Where one or two sublots are produced, they shall be incorporated into the next lot, and the total number of sublots shall be used in the acceptance plan calculation, that is, n = 5 or n = 6, for example. Partial lots at the end of asphalt production on the project shall be included with the previous lot. The lot size for field placed material shall correspond to that of the plant material, except that, in no cases, shall less than three (3) cored samples be obtained, that is, n = 3.

401-5.2 Acceptance criteria.

a. General. Acceptance will be based on the following characteristics of the HMA and completed pavement as well as the implementation of the Contractor Quality Control Program and test results:

(1) Air voids

(2) Mat density

(3) Joint density

(4) Thickness

(5) Smoothness

(6) Grade
(7) Stability

(8) Flow

Mat density and air voids will be evaluated for acceptance in accordance with paragraph 401-5.2b(1). Stability and flow will be evaluated for acceptance in accordance with paragraph 401-5.2b(2). Joint density will be evaluated for acceptance in accordance with paragraph 401-5.2b(3).

Thickness will be evaluated by the Engineer for compliance in accordance with paragraph 401-5.2b(4). Acceptance for smoothness will be based on the criteria contained in paragraph 401-5.2b(5). Acceptance for grade will be based on the criteria contained in paragraph 401-5.2b(7).

The Engineer may at any time, reject and require the Contractor to dispose of any batch of HMA which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Acceptance criteria.

(1) Mat density and air voids. Acceptance of each lot of plant produced material for mat density and air voids shall be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot shall be acceptable. Acceptance and payment shall be determined in accordance with paragraph 401-8.1.

(2) Stability and flow. Acceptance of each lot of plant produced HMA for stability and flow shall be based on the PWL. If the PWL of the lot equals or exceeds 90%, the lot shall be acceptable. If the PWL is less than 90%, the Contractor shall determine the reason and take corrective action. If the PWL is below 80%, the Contractor must stop production until the reason for poor stability and/or flow has been determined and adjustments to the HMA are made.

(3) Joint density. Acceptance of each lot of plant produced HMA for joint density shall be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot shall be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint shall be reduced by five (5) percentage points. This lot pay factor reduction shall be incorporated and evaluated in accordance with paragraph 401-8.1.
(4) **Thickness.** Thickness of each lift of surface course shall be evaluated by the Engineer for compliance to the requirements shown on the plans. Measurements of thickness shall be made by the Engineer using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point shall not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, shall not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the Engineer to circumscribe the deficient area.

(5) **Smoothness.** The final surface shall be free from roller marks. After the final rolling, but not later than 24 hours after placement, the surface of each lot shall be tested in both longitudinal and transverse directions for smoothness to reveal all surface irregularities exceeding the tolerances specified. The Contractor shall furnish paving equipment and employ methods that produce a surface for each pavement lot having an average profile index meeting the requirements of paragraph 401-8.1d when evaluated with a profilograph; and the finished surface course of the pavement shall not vary more than 1/4 inch (6mm) when evaluated with a 12-foot (3.7m) straightedge. When the surface course smoothness exceeds specification tolerances which cannot be corrected by diamond grinding of the surface course, full depth removal and replacement of surface course corrections shall be to the limit of the longitudinal placement. Corrections involving diamond grinding will be subject to the final pavement thickness tolerances specified. The Contractor shall apply a surface treatment per Item P-608 or P-609 to all areas that have been subject to grinding as directed by the Engineer.

(a) Transverse measurements. Transverse measurements will be taken for each lot placed. Transverse measurements will be taken perpendicular to the pavement centerline each 50 feet (15m) or more often as determined by the Engineer.

(i) Testing shall be continuous across all joints, starting with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Smoothness readings will not be made across grade changes or cross slope transitions; at these transition areas, the straightedge position shall be adjusted to measure surface smoothness and not design grade or cross slope transitions. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. High spots on final surface course > 1/4 inch (6mm) in transverse direction shall be corrected with diamond grinding per paragraph 401-4.15 or by removing and replacing full depth of surface course. Grinding will be tapered in all directions to provide smooth transitions to areas not
requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

(ii) The joint between lots shall be tested separately to facilitate smoothness between lots. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface, with half the straightedge on one side of the joint and the other half of the straightedge on the other side of the joint. Measure the maximum gap between the straightedge and the pavement surface in the area between these two high points. One measurement shall be taken at the joint every 50 feet (15m) or more often if directed by the Engineer. Deviations on final surface course > 1/4 inch (6mm) in transverse direction shall be corrected with diamond grinding per paragraph 401-4.15 or by removing and replacing full depth of surface course. Each measurement shall be recorded and a copy of the data shall be furnished to the Engineer at the end of each days testing.

(b) Longitudinal measurements. Longitudinal measurements will be taken for each lot placed. Longitudinal tests will be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6m) or greater.

(i) Longitudinal Short Sections. Longitudinal Short Sections are when the longitudinal lot length is less than 200 feet (60m) and areas not requiring a profilograph. When approved by the Engineer, the first and last 15 feet (4.5m) of the lot can also be considered as short sections for smoothness. The finished surface shall not vary more than 1/4 inch (6mm) when evaluated with a 12-foot (3.7m) straightedge. Smoothness readings will not be made across grade changes or cross slope transitions; at these transition areas, the straightedge position shall be adjusted to measure surface smoothness and not design grade or cross slope transitions. Testing shall be continuous across all joints, starting with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. Deviations on final surface course > 1/4 inch (6mm) in longitudinal direction will be corrected with diamond grinding per paragraph 401-4.15 or by removing and replacing full depth of surface course. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

(ii) Profilograph Testing. Profilograph testing shall be performed by the contractor using approved equipment and procedures as described as ASTM E1274. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2 inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an
offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). A copy of the reduced tapes shall be furnished to the Engineer at the end of each days testing.

The pavement must have an average profile index meeting the requirements of paragraph 401-8.1d. High spots, or “must grind” spots, on final surface course in longitudinal direction shall be corrected with diamond grinding per paragraph 401-4.15 or by removing and replacing full depth of surface course. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

Where corrections are necessary, second profilograph runs shall be performed to verify that the corrections produced an average profile index of 15 inches (38 cm) per mile or less. If the initial average profile index was less than 15 inches (38 cm), only those areas representing greater than 0.4 inch (10 mm) deviation will be re-profiled for correction verification.

(iii) Final profilograph of runway. Final profilograph, full length of runway, shall be performed to facilitate testing of smoothness between lots. Profilograph testing shall be performed by the contractor using approved equipment and procedures as described as ASTM E1274. The pavement must have an average profile index meeting the requirements of paragraph 401-8.1d. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2 inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). A copy of the reduced tapes shall be furnished to the Engineer at the end of each days testing. Profilograph of final runway shall be performed one foot right and left of runway centerline and 15 feet (4.5 m) right and left of centerline. Any areas that indicate “must grind” will be corrected as directed by the Engineer.

Smoothness testing indicated in the above paragraphs except paragraph (iii) shall be performed within 24 hours of placement of material. Smoothness testing indicated in paragraph (iii) shall be performed within 48 hours of paving completion. The primary purpose of smoothness testing is to identify areas that may be prone to ponding of water which could lead to hydroplaning of aircraft. If the contractor’s machines and/or methods are producing significant areas that need corrective actions then production should be stopped until corrective measures can be implemented. If corrective measures are not implemented and when directed by the Engineer, production shall be stopped until corrective measures can be implemented.
(6) **Grade.** Grade shall be evaluated on the first day of placement and then as a minimum, every 50 feet to allow adjustments to paving operations if measurements do not meet specification requirements. The Contractor must submit the survey data to the Engineer by the following day after measurements have been taken. The finished surface of the pavement shall not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm). The finished grade of each lot will be determined by running levels at intervals of 50 feet (15 m) or less longitudinally and all breaks in grade transversely (not to exceed 50 feet (15 m)) to determine the elevation of the completed pavement. The Contractor shall pay the cost of surveying of the level runs that shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer. The lot size shall be 200 square yards (m²). When more than 15% of all the measurements within a lot are outside the specified tolerance, or if any one shot within the lot deviates 3/4 inch (19 mm) or more from planned grade, the Contractor shall remove the deficient area to the depth of the final course plus 1/2 inch (12 mm) of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off provided the course thickness complies with the thickness specified on the plans. The surface of the ground pavement shall have a texture consisting of grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide. The peaks and ridges shall be approximately 1/32 inch (1 mm) higher than the bottom of the grooves. The pavement shall be left in a clean condition. The removal of all of the slurry resulting from the grinding operation shall be continuous. The grinding operation should be controlled so the residue from the operation does not flow across other lanes of pavement. High point grinding will be limited to 15 square yards (12.5 m²). Areas in excess of 15 square yards (12.5 m²) will require removal and replacement of the pavement in accordance with the limitations noted above. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

c. **Percentage of material within specification limits (PWL).** The PWL shall be determined in accordance with procedures specified in Section 110 of the General Provisions. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

Table 5. Marshall acceptance limits for stability, flow, air voids, density

<table>
<thead>
<tr>
<th>TEST PROPERTY</th>
<th>75 blows</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Number of Blows</td>
<td></td>
<td><strong>Specification Tolerance</strong></td>
</tr>
<tr>
<td>Stability, minimum (pounds)(N)</td>
<td>1800</td>
<td>--</td>
</tr>
<tr>
<td>Flow, 0.01 inch (25 mm)</td>
<td>8</td>
<td>18 *</td>
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<tr>
<td>Air Voids Total Mix (%)</td>
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<td>5</td>
</tr>
<tr>
<td>Mat Density (%)</td>
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<td>[ 101.3 ]</td>
</tr>
</tbody>
</table>
d. **Outliers.** All individual tests for mat density and air voids shall be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers shall be discarded, and the PWL shall be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 2.1.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 98% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 97.5% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 96% with 2.1% or less variability.

### 401-5.3 Resampling pavement for mat density.

**a. General.** Resampling of a lot of pavement will only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the Engineer. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-5.1b and 401-5.2b(1). Only one resampling per lot will be permitted.

(1) A redefined PWL shall be calculated for the resampled lot. The number of tests used to calculate the redefined PWL shall include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

**b. Payment for resampled lots.** The redefined PWL for a resampled lot shall be used to calculate the payment for that lot in accordance with Table 6.

**c. Outliers.** Check for outliers in accordance with ASTM E178, at a significance level of 5%.

### 401-5.4 Leveling course.

Any course used for trueing and leveling shall meet the aggregate gradation in Table 3, paragraph 401-3.2. The trueing and leveling course
shall meet the requirements of paragraph 401-3.2, 401-5.2b(1) for air voids and 401-5.2b(2) for stability and flow, but shall not be subject to the density requirements of paragraph 401-5.2b(1) for mat density and 401-5.2b(3) for joint density. The leveling course shall be compacted with the same effort used to achieve density of the test section. The trueing and leveling course shall not exceed the maximum lift thickness associated with each gradation in Table 3, paragraph 401-3.2. The leveling course is the first variable thickness lift of an overlay placed prior to subsequent courses.

CONTRACTOR QUALITY CONTROL

401-6.1 General. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provisions. The program shall address all elements that affect the quality of the pavement including, but not limited to:

a. Mix design

b. Aggregate grading

c. Quality of materials

d. Stockpile management

e. Proportioning

f. Mixing and transportation

g. Placing and finishing

h. Joints

i. Compaction

j. Surface smoothness

k. Personnel

l. Laydown plan

The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by paragraph 401-6.3 and Section 100 of the General Provisions. As a part of the process for approving the Contractor’s plan, the Engineer may require the Contractor’s technician to perform testing of samples to demonstrate an acceptable level of performance.
No partial payment will be made for materials that are subject to specific quality control requirements without an approved plan.

401-6.2 Contractor testing laboratory. The lab shall meet the requirements of ASTM D3666 including all necessary equipment, materials, and current reference standards to comply with the specifications.

401-6.3 Quality control testing. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

a. Asphalt content. A minimum of two asphalt content tests shall be performed per lot in accordance with ASTM D6307 or ASTM D2172 if the correction factor in ASTM D6307 is greater than 1.0. The asphalt content for the lot will be determined by averaging the test results.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136, and ASTM C117.

c. Moisture content of aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C566.

d. Moisture content of HMA. The moisture content shall be determined once per lot in accordance with ASTM D1461.

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the HMA at the plant, and the HMA at the job site.

f. In-place density monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

g. Additional testing. Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor’s option.

h. Monitoring. The Engineer reserves the right to monitor any or all of the above testing.

401-6.4 Sampling. When directed by the Engineer, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless
such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

401-6.5 Control charts. The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each sublot will be calculated and monitored by the Quality Control laboratory.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor’s test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor’s projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

a. Individual measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

<table>
<thead>
<tr>
<th>Control Chart Limits For Individual Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>3/4 inch (19 mm)</td>
</tr>
<tr>
<td>1/2 inch (12 mm)</td>
</tr>
<tr>
<td>3/8 inch (9 mm)</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
</tr>
<tr>
<td>No. 50 (0.30 mm)</td>
</tr>
<tr>
<td>No. 200 (0.075 mm)</td>
</tr>
<tr>
<td>Asphalt Content</td>
</tr>
<tr>
<td>VMA</td>
</tr>
</tbody>
</table>

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.
Control Chart Limits Based On Range
(Based On n = 2)

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Suspension Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 inch (12 mm)</td>
<td>11%</td>
</tr>
<tr>
<td>3/8 inch (9 mm)</td>
<td>11%</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>11%</td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
<td>9%</td>
</tr>
<tr>
<td>No. 50 (0.30 mm)</td>
<td>6%</td>
</tr>
<tr>
<td>No. 200 (0.075 mm)</td>
<td>3.5%</td>
</tr>
<tr>
<td>Asphalt Content</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

c. Corrective Action. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

401-6.6 Quality control reports. The Contractor shall maintain records and shall submit reports of quality control activities daily, in accordance with the Contractor Quality Control Program described in General Provisions, Section 100.

METHOD OF MEASUREMENT

401-7.1 Measurement. HMA shall be measured by the number of tons (kg) of HMA used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

Saw-cut grooving of bituminous pavement shall be measured by the number of square yards of saw-cut grooving as specified in-place, completed, and accepted.

Grinding of bituminous pavement shall be measured by the number of square yards of grinding as specified in-place, completed, and accepted.

BASIS OF PAYMENT

401-8.1 Payment. Payment for a lot of HMA meeting all acceptance criteria as specified in paragraph 401-5.2 shall be made based on results of tests for smoothness, mat density and air voids. Payment for acceptable lots shall be adjusted according to paragraph 401-8.1a for mat density and air voids and 401-8.1c for smoothness, subject to the limitation that:
a. The total project payment for plant mix bituminous concrete pavement shall not exceed 106 percent of the product of the contract unit price and the total number of tons (kg) of HMA used in the accepted work (See Note 1 under Table 6).

b. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

c. **Basis of adjusted payment.** The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71 percent then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1. Payment in excess of 100% for accepted lots of HMA shall be used to offset payment for accepted lots of bituminous concrete pavement that achieve a lot pay factor less than 100%.

### Table 6. Price adjustment schedule

<table>
<thead>
<tr>
<th>Percentage of material within specification limits (PWL)</th>
<th>Lot pay factor (percent of contract unit price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 – 100</td>
<td>106</td>
</tr>
<tr>
<td>90 – 95</td>
<td>PWL + 10</td>
</tr>
<tr>
<td>75 – 89</td>
<td>0.5 PWL + 55</td>
</tr>
<tr>
<td>55 – 74</td>
<td>1.4 PWL – 12</td>
</tr>
<tr>
<td>Below 55</td>
<td>Reject 2</td>
</tr>
</tbody>
</table>

1 Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1.

2 The lot shall be removed and replaced. However, the Engineer may decide to allow the rejected lot to remain. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

d. **Profilograph smoothness.** When the final average profile index (subsequent to any required corrective action) does not exceed 7 inches per mile (18 cm per 1.6 km), payment will be made at the contract unit price for the completed pavement. If the final average profile index (subsequent to any required corrective action) exceeds 7 inches per mile (18 cm per 1.6 km), but does not exceed 15 inches per mile (38 cm per 1.6 m),
the Contractor may elect to accept a contract unit price adjustment in lieu of reducing the profile index.

**e. Basis of adjusted payment for smoothness.** Price adjustment for pavement smoothness will be made in accordance with Table 7. The adjustment will apply to the total tonnage of HMA within a lot of pavement and shall be applied with the following equation:

\[(\text{Tons of asphalt concrete in lot}) \times (\text{lot pay factor}) \times (\text{unit price per ton}) \times (\text{smoothness pay factor}) = \text{payment for lot}\]

Table 7. Profilograph Average Profile Index Smoothness Pay Factor

<table>
<thead>
<tr>
<th>Inches/miles per 1/10 mile</th>
<th>Short Sections</th>
<th>Pay Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 7</td>
<td>00.0 - 15.0</td>
<td>100%</td>
</tr>
<tr>
<td>7.1 - 9</td>
<td>15.1 - 16</td>
<td>98%</td>
</tr>
<tr>
<td>9.1 - 11</td>
<td>16.1 - 17</td>
<td>96%</td>
</tr>
<tr>
<td>11.1 - 13</td>
<td>17.1 - 18</td>
<td>94%</td>
</tr>
<tr>
<td>13.1 - 14</td>
<td>18.1 - 20</td>
<td>92%</td>
</tr>
<tr>
<td>14.1 - 15</td>
<td>20.1 - 22</td>
<td>90%</td>
</tr>
<tr>
<td>15.1 and up</td>
<td>22.1 and up</td>
<td>Corrective work required(^1)</td>
</tr>
</tbody>
</table>

\(^1\) The Contractor shall correct pavement areas not meeting these tolerances by removing and replacing the defective work. If the Contractor elects to construct an overlay to correct deficiencies, the minimum thickness of the overlay should be at least three times the maximum aggregate size (approximately four (4) times the nominal maximum aggregate size). The corrective overlay shall not violate grade Criteria and butt joints shall be constructed by sawing and removing the original pavement in compliance with the thickness/maximum aggregate size ratio. Skin patching shall not be permitted.

HMA placed above the specified grade shall not be included in the quantities for payment.

**401-8.1.1. Payment.** Payment will be made under:

- Bid Item No. 69  P-401 Plant Mix Bituminous Pavements (up to 50 TN) - per TN
- Bid Item No. 70  P-401 Plant Mix Bituminous Pavements (51 to 200 TN) - per TN
- Bid Item No. 71  P-401 Plant Mix Bituminous Pavements (201 to 2000 TN) - per TN
- Bid Item No. 72  P-401 Asphalt Pavement Grinding- per SY

**TESTING REQUIREMENTS**
<table>
<thead>
<tr>
<th>ASTM Code</th>
<th>Standard Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C29</td>
<td>Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate</td>
</tr>
<tr>
<td>ASTM C88</td>
<td>Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate</td>
</tr>
<tr>
<td>ASTM C117</td>
<td>Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing</td>
</tr>
<tr>
<td>ASTM C127</td>
<td>Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate</td>
</tr>
<tr>
<td>ASTM C136</td>
<td>Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates</td>
</tr>
<tr>
<td>ASTM C183</td>
<td>Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement</td>
</tr>
<tr>
<td>ASTM C566</td>
<td>Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying</td>
</tr>
<tr>
<td>ASTM D75</td>
<td>Standard Practice for Sampling Aggregates</td>
</tr>
<tr>
<td>ASTM D979</td>
<td>Standard Practice for Sampling Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>ASTM D1073</td>
<td>Standard Specification for Fine Aggregate for Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>ASTM D2172</td>
<td>Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>ASTM D1461</td>
<td>Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>ASTM D2041</td>
<td>Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures</td>
</tr>
<tr>
<td>ASTM D2489</td>
<td>Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures</td>
</tr>
</tbody>
</table>
ASTM D2726  Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures

ASTM D2950  Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

ASTM D3203  Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures

ASTM D3665  Standard Practice for Random Sampling of Construction Materials

ASTM D3666  Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials


ASTM D4791  Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

ASTM D4867  Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures

ASTM D5444  Standard Test Method for Mechanical Size Analysis of Extracted Aggregate


ASTM D6307  Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method


ASTM D6926  Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus


ASTM E11   Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

ASTM E178  Standard Practice for Dealing with Outlying Observations
ASTM E1274 Standard Test Method for Measuring Pavement Roughness Using a Profilograph

AASHTO T030 Standard Method of Test for Mechanical Analysis of Extracted Aggregate

AASHTO T110 Standard Method of Test for Moisture or Volatile Distillates in Hot Mix Asphalt (HMA)

AASHTO T275 Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Paraffin-Coated Specimens


AASHTO T329 Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method

Asphalt Institute Handbook MS-26 Asphalt Binder

Asphalt Institute MS-2 Mix Design Manual, 7th Edition

MATERIAL REQUIREMENTS


ASTM D946 Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction


ASTM D4552 Standard Practice for Classifying Hot-Mix Recycling Agents

ASTM D6373 Standard Specification for Performance Graded Asphalt Binder

END OF ITEM P-401
501 Item P-501 Portland Cement Concrete (PCC) Pavement

DESCRIPTION

501-1.1 This work shall consist of pavement composed of portland cement concrete (PCC), with or without reinforcement constructed on a prepared underlying surface in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross-sections shown on the plans.

MATERIALS

501-2.1 Aggregates.

a. Reactivity. Fine and coarse aggregates to be used in all concrete shall be evaluated and tested by the Contractor for alkali-aggregate reactivity in accordance with both ASTM C1260 and ASTM C1567. Aggregate and mix proportion reactivity tests shall be performed for each project.

(1) Coarse and fine aggregate shall be tested separately in accordance with ASTM C1260. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.10% at 28 days (30 days from casting).

(2) Combined coarse and fine aggregate shall be tested in accordance with ASTM C1567, modified for combined aggregates, using the proposed mixture design proportions of aggregates, cementitious materials, and/or specific reactivity reducing chemicals. If lithium nitrate is proposed for use with or without supplementary cementitious materials, the aggregates shall be tested in accordance with Corps of Engineers (COE) Concrete Research Division (CRD) C662. If lithium nitrate admixture is used, it shall be nominal 30% ±0.5% weight lithium nitrate in water.

(3) If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C1567, modified for combined aggregates, or COE CRD C662, does not exceed 0.10% at 28 days, the proposed combined materials will be accepted. If the expansion of the proposed combined materials test specimens is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10% at 28 days, or new aggregates shall be evaluated and tested.

b. Fine aggregate. Fine aggregate shall conform to the requirements of ASTM C33. Grading of the fine aggregate, as delivered to the mixer, shall conform to the requirements of ASTM C33 and shall have a fineness modulus of not less than 2.50 nor more than 3.40. The soundness loss shall not exceed 10% when sodium sulfate is used or 15% when magnesium sulfate is used, after five cycles, when tested per ASTM C88.
The amount of deleterious material in the fine aggregate shall not exceed the following limits:

**Limits for Deleterious Substances in Fine Aggregate for Concrete**

<table>
<thead>
<tr>
<th>Deleterious material</th>
<th>ASTM</th>
<th>Percentage by Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay Lumps and friable particles</td>
<td>ASTM C142</td>
<td>1.0</td>
</tr>
<tr>
<td>Material finer than 0.075mm (No. 200 sieve)</td>
<td>ASTM C117</td>
<td>3.0</td>
</tr>
<tr>
<td>Lightweight particles</td>
<td>ASTM C123 using a medium with a density of Sp. Gr. of 2.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Total of all deleterious Material</td>
<td></td>
<td>3.0</td>
</tr>
</tbody>
</table>

**c. Coarse aggregate.** Gradation, within the separated size groups, shall meet the coarse aggregate grading requirements of ASTM C33 when tested in accordance with ASTM C136. When the nominal maximum size of the aggregate is greater than one inch (25 mm), the aggregates shall be furnished in two size groups.

Aggregates delivered to the mixer shall consist of crushed stone, crushed or uncrushed gravel, air-cooled iron blast furnace slag, crushed recycled concrete pavement, or a combination. The aggregates should be free of ferrous sulfides, such as pyrite, that would cause “rust” staining that can bleed through pavement markings. Steel blast furnace slag shall not be permitted. The aggregate shall be composed of clean, hard, uncoated particles. Dust and other coating shall be removed from the aggregates by washing.

The percentage of wear shall be no more than 40 when tested in accordance with ASTM C131.

The quantity of flat, elongated, and flat and elongated particles in any size group coarser than 3/8 sieve (9 mm) shall not exceed 8% by weight when tested in accordance with ASTM D4791. A flat particle is defined as one having a ratio of width to thickness greater than 5. An elongated particle is one having a ratio of length to width greater than 5.

The soundness loss shall not exceed 12% when sodium sulfate is used or 18% when magnesium sulfate is used, after five cycles, when tested per ASTM C88.

The amount of deleterious material in the coarse aggregate shall not exceed the following limits:

**Limits for Deleterious Substances in Coarse Aggregate for Concrete**
Deleterious material | ASTM | Percentage by Mass |
--- | --- | --- |
Clay Lumps and friable particles | ASTM C142 | 1.0 |
Material finer than No. 200 sieve (0.075mm) | ASTM C117 | 1.0 |
Lightweight particles | ASTM C123 using a medium with a density of Sp. Gr. of 2.0 | 0.5 |
Chert (less than 2.40 Sp Gr.) | ASTM C123 using a medium with a density of Sp. Gr. of 2.0 | 1.0 |
Total of all deleterious Material | | 3.0 |

Table 1. Gradation For Coarse Aggregate

<table>
<thead>
<tr>
<th>Sieve Designations (square openings)</th>
<th>Percentage by Weight Passing Sieves</th>
<th>From 1-1/2 inch to No. 4 (38 mm - 4.75 mm)</th>
<th>From 1 inch to No. 4 (25.0 mm-4.75 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>mm</td>
<td>#4</td>
<td>#67</td>
</tr>
<tr>
<td>2-1/2</td>
<td>60</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>100</td>
<td>---</td>
</tr>
<tr>
<td>1-1/2</td>
<td>38</td>
<td>90-100</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>20-55</td>
<td>100</td>
</tr>
<tr>
<td>3/4</td>
<td>19</td>
<td>0-15</td>
<td>90-100</td>
</tr>
<tr>
<td>1/2</td>
<td>13</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>3/8</td>
<td>9</td>
<td>0-5</td>
<td>20-55</td>
</tr>
<tr>
<td>No. 4</td>
<td>4.75</td>
<td>---</td>
<td>0-10</td>
</tr>
<tr>
<td>No. 8</td>
<td>2.36</td>
<td>---</td>
<td>0-5</td>
</tr>
</tbody>
</table>

(1) Aggregate susceptibility to durability (D) cracking. Aggregates that have a history of D-cracking shall not be used.

(2) Combined aggregate gradation. If substituted for the grading requirements specified for coarse aggregate and for fine aggregate when approved by the Engineer, the combined aggregate grading shall meet the following requirements:

(a) The materials selected and the proportions used shall be such that when the Coarseness Factor (CF) and the Workability Factor (WF) are plotted on a diagram as described in d. below, the point thus determined shall fall within the parallelogram described therein.

(b) The CF shall be determined from the following equation:
CF = (cumulative percent retained on the 3/8 in. sieve)(100) / (cumulative percent retained on the No. 8 sieve)

(c) The Workability Factor WF is defined as the percent passing the No. 8 (2.36 mm) sieve based on the combined gradation. However, WF shall be adjusted, upwards only, by 2.5 percentage points for each 94 pounds (42 kg) of cementitious material per cubic meter yard greater than 564 pounds per cubic yard (335 kg per cubic meter).

(d) A diagram shall be plotted using a rectangular scale with WF on the Y-axis with units from 20 (bottom) to 45 (top), and with CF on the X-axis with units from 80 (left side) to 30 (right side). On this diagram a parallelogram shall be plotted with corners at the following coordinates (CF-75, WF-28), (CF-75, WF-40), (CF-45, WF-32.5), and (CF-45, WF-44.5). If the point determined by the intersection of the computed CF and WF does not fall within the above parallelogram, the grading of each size of aggregate used and the proportions selected shall be changed as necessary.

501-2.2 Cement. Cement shall conform to the requirements of ASTM C150 Type II or V.

If aggregates are deemed innocuous when tested in accordance with paragraph 501-2.1.a.1 and accepted in accordance with paragraph 501-2.1.a.2, higher equivalent alkali content in the cement may be allowed if approved by the Engineer and FAA. If cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

Rapid Setting Concrete Cement. Cement shall conform to the requirements of CTS Cement Manufacturing Corp., 11065 Knott Avenue, Suite A, Cypress, CA, 90630, Phone: 800-929-3030, Website: www.ctscement.com; or JWA approved equal.

501-2.3 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash for use in mitigating alkali-silica reactivity shall have a Calcium Oxide (CaO) content of less than 13% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the mix design, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the Engineer.

b. Slag cement (ground granulated blast furnace(GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.
c. **Raw or calcined natural pozzolan.** Natural pozzolan shall be raw or calcined and conform to ASTM C618, Class N, including the optional requirements for uniformity and effectiveness in controlling Alkali-Silica reaction and shall have a loss on ignition not exceeding 6%. Class N pozzolan for use in mitigating Alkali-Silica Reactivity shall have a total available alkali content less than 3%.

d. **Ultrafine fly ash and ultrafine pozzolan.** UltraFine Fly Ash (UFFA) and UltraFine Pozzolan (UFP) shall conform to ASTM C618, Class F or N, and the following additional requirements:

1. The strength activity index at 28 days of age shall be at least 95% of the control specimens.

2. The average particle size shall not exceed 6 microns.

501-2.4 **Joint seal.** The joint seal for the joints in the concrete pavement shall meet the requirements of Item P-605 and shall be of the type specified in the plans.

501-2.5 **Isolation joint filler.** Premolded joint filler for isolation joints shall conform to the requirements of ASTM D1752, Type II or III and shall be where shown on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Engineer. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the Engineer.

501-2.6 **Steel reinforcement.** Reinforcing shall consist of bar mats conforming to the requirements of ASTM ASTM A615 or ASTM A706.

501-2.7 **Dowel and tie bars.** Dowel bars shall be plain steel bars conforming to ASTM A615 and shall be free from burring or other deformation restricting slippage in the concrete. High strength dowel bars shall conform to ASTM A714, Class 2, Type S, Grade I, II or III, Bare Finish. Before delivery to the construction site each dowel bar shall be epoxy coated per ASTM A1078. The dowels shall be coated with a bond-breaker recommended by the manufacturer. Grout retention rings shall be fully circular metal or plastic devices capable of supporting the dowel until the grout hardens. Tie bars shall be deformed steel bars and conform to the requirements of ASTM A615. Tie bars designated as Grade 60 in ASTM A615 or ASTM A706 shall be used for construction requiring bent bars.

501-2.8 **Water.** Water used in mixing or curing shall be potable, clean, free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product, except that non-potable water, or water from concrete production operations, may be used if it meets the requirements of ASTM C1602.
501-2.9 Material for curing concrete. Curing materials shall conform to one of the following specifications:

a. Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C309, Type 2, Class B, or Class A if wax base only.

b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C171.

c. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C171.

d. Waterproof paper for curing concrete shall conform to the requirements of ASTM C171.

501-2.10 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the Engineer. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

d. Lithium Nitrate. The lithium admixture shall be a nominal 30% aqueous solution of Lithium Nitrate, with a density of 10 pounds/gallon (1.2 kg/L), and shall have the approximate chemical form as shown below:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Limit (Percent by Mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiNO3 (Lithium Nitrate)</td>
<td>30 ±0.5</td>
</tr>
<tr>
<td>SO4 (Sulfate Ion)</td>
<td>0.1 (max)</td>
</tr>
</tbody>
</table>
Provide a trained manufacturer’s representative to supervise the lithium nitrate admixture dispensing and mixing operations.

501-2.11 Epoxy-resin. All epoxy-resin materials shall be two-component materials conforming to the requirements of ASTM C881, Class as appropriate for each application temperature to be encountered, except that in addition, the materials shall meet the following requirements:

a. Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.

b. Material for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for use for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed Portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete shall be Type V, Grade as approved.

501-2.12 Material acceptance. Prior to use of materials, the Contractor shall submit certified test reports to the Engineer for those materials proposed for use during construction. The certification shall show the appropriate ASTM test for each material, the test results, and a statement that the material passed or failed.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

MIX DESIGN

501-3.1. General. No concrete shall be placed until the mix design has been submitted to the Engineer for review and the Engineer has taken appropriate action. The Engineer’s review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

501-3.2 Proportions. The laboratory preparing the mix design shall be accredited in accordance with ASTM C1077. The mix design for all Portland cement concrete placed under P-501 shall be stamped or sealed by the responsible professional Engineer of the laboratory. All Concrete shall be proportioned to achieve a 28-day flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-5.2 for a flexural strength of 650 psi per ASTM C78. High Early Strength Concrete shall be
proportioned to achieve a 12-hour flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-5.2 for a flexural strength of 500 psi per ASTM C78. **Rapid Setting Concrete** shall be proportioned to achieve a 4-hour flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-5.2 for a flexural strength of 500 psi per ASTM C78. The mix shall be developed using the procedures contained in the Portland Cement Association’s (PCA) publication, “Design and Control of Concrete Mixtures”.

The minimum cementitious material shall be adequate to ensure a workable, durable mix. The minimum cementitious material (cement plus fly ash, or slag cement) shall be 564 pounds per cubic yard. The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall not be more than 0.45 by weight.

Flexural strength test specimens shall be prepared in accordance with ASTM C192 and tested in accordance with ASTM C78. The mix determined shall be workable concrete having a maximum allowable slump between one and two inches (25 mm and 50 mm) as determined by ASTM C143. For slip-form concrete, the slump shall be between 1/2 inch (12 mm) and 1-1/2 inch (38 mm). At the start of the project, the Contractor shall determine a maximum allowable slump for slip-form pavement which will produce in-place pavement to control the edge slump. The selected slump shall be applicable to both pilot and fill-in lanes.

Before the start of paving operations and after approval of all material to be used in the concrete, the Contractor shall submit a mix design showing the proportions and flexural strength obtained from the concrete at seven (7) and 28 days. The mix design shall include copies of test reports, including test dates, and a complete list of materials including type, brand, source, and amount of cement, fly ash, ground slag, coarse aggregate, fine aggregate, water, and admixtures. The mix design shall be submitted to the Engineer at least 30 days prior to the start of operations. The submitted mix design shall not be more than 90 days old. Production shall not begin until the mix design is approved in writing by the Engineer.

If a change in sources is made, or admixtures added or deleted from the mix, a new mix design must be submitted to the Engineer for approval.

The results of the mix design shall include a statement giving the maximum nominal coarse aggregate size and the weights and volumes of each ingredient proportioned on a one cubic yard (meter) basis. Aggregate quantities shall be based on the mass in a saturated surface dry condition. The recommended mixture proportions shall be accomplished by test results demonstrating that the proportions selected will produce concrete of the qualities indicated. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in PCA’s publication, Design and Control of Concrete Mixtures, modified as necessary to accommodate flexural strength.
The submitted mix design shall be stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

a. Coarse, fine, and combined aggregate gradations and plots including fineness modulus of the fine aggregate.

b. Reactivity Test Results.

c. Coarse aggregate quality test results, including deleterious materials.

d. Fine aggregate quality test results, including deleterious materials.

e. Mill certificates for cement and supplemental cementitious materials.

f. Certified test results for all admixtures, including Lithium Nitrate if applicable.

g. Specified flexural strength, slump, and air content.

h. Recommended proportions/volumes for proposed mixture and trial water-cementitious materials ratio, including actual slump and air content.

i. Flexural and compressive strength summaries and plots, including all individual beam and cylinder breaks.

j. Correlation ratios for acceptance testing and Contractor Quality Control testing, when applicable.

k. Historical record of test results documenting production standard deviation, when applicable.

501-3.3 Cementitious materials.

a. Fly ash. When fly ash is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20 and 30% by weight of the total cementitious material. If fly ash is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement may be used. The slag cement, or slag cement plus fly ash if both are used, may constitute between 25 to 55% of the total cementitious material by weight. If the concrete is to be used for slipforming operations and the air temperature is expected to be lower than 55°F (13°C) the percent slag cement shall not exceed 30% by weight.

c. Raw or calcined natural Pozzolan. Natural Pozzolan may be used in the mix design. When Pozzolan is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between 20 and 30%
by weight of the total cementitious material. If pozzolan is used in conjunction with slag cement the maximum replacement rate shall not exceed 10% by weight of total cementitious material.

d. **Ultrafine fly ash (UUFFA) and ultrafine pozzolan (UFP).** UFFA and UFP may be used in the mix design with the Engineer’s approval. When UFFA and UFP is used as a partial replacement for cement, the replacement rate shall be determined from laboratory trial mixes, and shall be between seven (7) and 16% by weight of the total cementitious material.

**501-3.4 Admixtures.**

a. **Air-entraining admixtures.** Air-entraining admixture are to be added in such a manner that will ensure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be 2.5%. Air content shall be determined by testing in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag and other highly porous coarse aggregate.

b. **Water-reducing admixtures.** Water-reducing admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, in accordance with ASTM C494.

c. **Other admixtures.** Set controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, in accordance with ASTM C 494.

d. **Lithium nitrate.** Lithium nitrate shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements in accordance with paragraph 501-2.10d.

**501-3.5 Concrete mix design laboratory.** The Contractor’s laboratory used to develop the concrete mix design shall be accredited in accordance with ASTM C1077. The laboratory accreditation must be current and listed on the accrediting authority’s website. All test methods required for developing the concrete mix design must be listed on the lab accreditation. A copy of the laboratory’s current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

**CONSTRUCTION METHODS**

**501-4.1 Equipment.** Equipment necessary for handling materials and performing all parts of the work shall be approved by the Engineer, but does not relieve the Contractor of the responsibility for the proper operation of equipment and maintaining the
equipment in good working condition. The equipment shall be at the jobsite sufficiently ahead of the start of paving operations to be examined thoroughly and approved.

a. **Batch plant and equipment.** The batch plant and equipment shall conform to the requirements of ASTM C94.

b. **Mixers and transportation equipment.**

(1) **General.** Concrete may be mixed at a central plant, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer’s nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

(2) **Central plant mixer.** Central plant mixers shall conform to the requirements of ASTM C94. The mixer shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 inch (19 mm) or more. The Contractor shall have a copy of the manufacturer’s design on hand showing dimensions and arrangement of blades in reference to original height and depth.

(3) **Truck mixers and truck agitators.** Truck mixers used for mixing and hauling concrete and truck agitators used for hauling central-mixed concrete shall conform to the requirements of ASTM C94.

(4) **Nonagitator trucks.** Nonagitating hauling equipment shall conform to the requirements of ASTM C94.

(5) **Transfer and spreading equipment.** Equipment for transferring concrete from the transporting equipment to the paving lane in front of the paver shall be specially manufactured, self-propelled transfer equipment which will accept the concrete outside the paving lane and will transfer and spread it evenly across the paving lane in front of the paver and strike off the surface evenly to a depth which permits the paver to operate efficiently.

c. **Finishing equipment.** The standard method of constructing concrete pavements shall be with an approved slip-form paving equipment designed and operated to spread, consolidate, screed, and float-finish the freshly placed concrete in one complete pass of the machine so that the end result is a dense and homogeneous pavement which is achieved with a minimum of hand finishing. The paver-finisher shall be a heavy duty, self-propelled machine designed specifically for paving and finishing high quality concrete pavements. It shall weigh at least 2,200 lbs per foot (3274 kg/m) of paving lane width and powered by an engine having at least 6.0 horsepower per foot of lane width.

On projects requiring less than 500 square yard (418 sq m) of cement concrete pavement or requiring individual placement areas of less than 500 square yard (418 sq
m), or irregular areas at locations inaccessible to slip-form paving equipment, concrete pavement may be placed with approved placement and finishing equipment using stationary side forms. Hand screeding and float finishing may only be used on small irregular areas as allowed by the Engineer.

d. Vibrators. Vibrator shall be the internal type. Operating frequency for internal vibrators shall be between 8,000 and 12,000 vibrations per minute. Average amplitude for internal vibrators shall be 0.025-0.05 inch (0.06 - 0.13 cm).

The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement and meet the recommendations of American Concrete Institute (ACI) 309, Guide for Consolidation of Concrete. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases. The Contractor shall provide an electronic or mechanical means to monitor vibrator status. The checks on vibrator status shall occur a minimum of two times per day or when requested by the Engineer.

Hand held vibrators may be used in irregular areas only, but shall meet the recommendations of ACI 309R, Guide for Consolidation of Concrete.

e. Concrete saws. The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations. Early-entry saws may be used, subject to demonstration and approval of the Engineer.

f. Side forms. Straight side forms shall be made of steel and shall be furnished in sections not less than 10 feet (3 m) in length. Forms shall have a depth equal to the pavement thickness at the edge, and a base width equal to or greater than the depth. Flexible or curved forms of proper radius shall be used for curves of 100-foot (31 m) radius or less. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8 inch (3 mm) in 10 feet (3 m), and the upstanding leg shall not vary more than 1/4 inch (6 mm). The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the Engineer.

g. Pavers. The paver shall be fully energized, self-propelled, and designed for the specific purpose of placing, consolidating, and finishing the concrete pavement, true to grade, tolerances, and cross-section. It shall be of sufficient weight and power to construct the maximum specified concrete paving lane width as shown in the plans, at adequate forward speed, without transverse, longitudinal or vertical instability or
without displacement. The paver shall be equipped with electronic or hydraulic horizontal and vertical control devices.

501-4.2 Form setting. Forms shall be set sufficiently in advance of the concrete placement to ensure continuous paving operation. After the forms have been set to correct grade, the underlying surface shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place sufficiently to maintain the form in position for the method of placement.

Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/8 inch (3 mm) at any joint. Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the placing of concrete.

The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete.

501-4.3 Conditioning of underlying surface. The compacted underlying surface on which the pavement will be placed shall be widened approximately 3 feet (1 m) to extend beyond the paving machine track to support the paver without any noticeable displacement. After the underlying surface has been placed and compacted to the required density, the areas that will support the paving machine and the area to be paved shall be trimmed or graded to the plan grade elevation and profile by means of a properly designed machine. The grade of the underlying surface shall be controlled by a positive grade control system using lasers, stringlines, or guide wires. If the density of the underlying surface is disturbed by the trimming operations, it shall be corrected by additional compaction and retested at the option of the Engineer before the concrete is placed except when stabilized subbases are being constructed. If damage occurs on a stabilized subbase, it shall be corrected full depth by the Contractor. If traffic is allowed to use the prepared grade, the grade shall be checked and corrected immediately before the placement of concrete. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete. The underlying surface shall be protected so that it will be entirely free of frost when concrete is placed.

501-4.4 Conditioning of underlying surface, side-form and fill-in lane construction. The prepared underlying surface shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from the concrete. Damage caused by hauling or usage of other equipment shall be corrected and retested at the option of the Engineers. If damage occurs to a stabilized subbase, it shall be corrected full depth by the Contractor. A template shall be provided and operated on the forms immediately in advance of the placing of all concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they may be set and maintained at the correct
contour of the underlying surface. The adjustment and operation of the templates shall be such as will provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed and wasted. Low areas shall be filled and compacted to a condition similar to that of the surrounding grade. The underlying surface shall be protected so that it will be entirely free from frost when the concrete is placed. The use of chemicals to eliminate frost in the underlying surface shall not be permitted.

The template shall be maintained in accurate adjustment, at all times by the Contractor, and shall be checked daily.

501-4.5 Handling, measuring, and batching material. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant.

Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit free drainage.

Batching plants shall be equipped to proportion aggregates and bulk cement, by weight, automatically using interlocked proportioning devices of an approved type. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper to transporting container or into the batch itself for transportation to the mixer, such as a chute, boot, or other approved device, to prevent loss of cement. The device shall be arranged to provide positive assurance that the cement content specified is present in each batch.

501-4.6 Mixing concrete. The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials, except water, are emptied into the drum. All concrete shall be mixed and delivered to the site in accordance with the requirements of ASTM C94.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or non-agitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is deposited in place at the work site shall not exceed 30 minutes when the concrete is hauled in non-agitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. Retempering concrete by adding water or by other means will not be permitted. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the
water/cementitious ratio specified in the approved mix design is not exceeded, and approved by the Engineer.

501-4.7 Limitations on mixing and placing. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

a. Cold weather. Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F (4°C) and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F (2°C).

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50°F (10°C) at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150°F (66°C). The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

b. Hot weather. During periods of hot weather when the maximum daily air temperature exceeds 85°F (30°C), the following precautions shall be taken.

The forms and/or the underlying surface shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed at the coolest temperature practicable, and in no case shall the temperature of the concrete when placed exceed 90°F (32°C). The aggregates and/or mixing water shall be cooled as necessary to maintain the concrete temperature at or not more than the specified maximum.

The finished surfaces of the newly laid pavement shall be kept damp by applying a water-fog or mist with approved spraying equipment until the pavement is covered by the curing medium. When necessary, wind screens shall be provided to protect the concrete from an evaporation rate in excess of 0.2 psf (0.98 kg/m² per hour) per hour. When conditions are such that problems with plastic cracking can be expected, and particularly if any plastic cracking begins to occur, the Contractor shall immediately take such additional measures as necessary to protect the concrete surface. Such measures shall consist of wind screens, more effective fog sprays, and similar measures commencing immediately behind the paver. If these measures are not effective in preventing plastic cracking, paving operations shall be immediately stopped.

c. Temperature management program. Prior to the start of paving operation for each day of paving, the Contractor shall provide the Engineer with a Temperature
Management Program for the concrete to be placed to assure that uncontrolled cracking is avoided. As a minimum the program shall address the following items:

(1) Anticipated tensile strains in the fresh concrete as related to heating and cooling of the concrete material.

(2) Anticipated weather conditions such as ambient temperatures, wind velocity, and relative humidity; and anticipated evaporation rate using Figure 11-8, PCA, Design and Control of Concrete Mixtures.

(3) Anticipated timing of initial sawing of joint.

(4) Anticipated number and type of saws to be used.

501-4.8 Placing concrete. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3 feet (1 m). The finished concrete product must be dense and homogeneous, without segregation and conforming to the standards in this specification. Backhoes and grading equipment shall not be used to distribute the concrete in front of the paver. Front end loaders will not be used. All concrete shall be consolidated without voids or segregation, including under and around all load-transfer devices, joint assembly units, and other features embedded in the pavement. Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed pavement when the concrete strength reaches a flexural strength of 550 psi based on the average of four field cured specimens per 2,000 cubic yards (1,530 cubic meters) of concrete placed. Also, subgrade and subbase planers, concrete pavers, and concrete finishing equipment may be permitted to ride upon the edges of previously constructed pavement when the concrete has attained a minimum flexural strength of 400 psi (2757 kPa).

The Contractor shall have available materials for the protection of the concrete during inclement weather. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils (0.1 mm) thick of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

a. Slip-form construction. The concrete shall be distributed uniformly into final position by a self-propelled slip-form paver without delay. The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose. The paver shall vibrate the concrete for the full width and depth of the strip of pavement being placed and the vibration shall be adequate to provide a consistency of concrete that will stand normal to the surface with sharp well defined edges. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms. The plastic
concrete shall be effectively consolidated by internal vibration with transverse vibrating units for the full width of the pavement and/or a series of equally placed longitudinal vibrating units. The space from the outer edge of the pavement to longitudinal unit shall not exceed 9 inches (23 cm) for slipform and at the end of the dowels for the fill-in lanes. The spacing of internal units shall be uniform and shall not exceed 18 inches (0.5 m).

The term internal vibration means vibrating units located within the specified thickness of pavement section.

The rate of vibration of each vibrating unit shall be within 8000 to 12000 cycles per minute and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least one foot (30 cm). The frequency of vibration or amplitude shall vary proportionately with the rate of travel to result in a uniform density and air content. The paving machine shall be equipped with a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

The concrete shall be held at a uniform consistency. The slip-form paver shall be operated with as nearly a continuous forward movement as possible and all operations of mixing, delivering, and spreading concrete shall be coordinated to provide uniform progress with stopping and starting of the paver held to a minimum. If for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

Not more than 15% of the total free edge of each 500 foot (150 m) segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4 inch (6 mm), and none of the free edge of the pavement shall have an edge slump exceeding 3/8 inch (9 mm). (The total free edge of 500 feet (150 m) of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; that is, 500 feet (150 m) of paving lane originally constructed as a separate lane will have 1,000 feet (300 m) of free edge, 500 feet (150 m) of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 inches (0.5 m) from the edge. When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor as directed by the Engineer.
b. **Side-form construction.** Side form sections shall be straight, free from warps, bends, indentations, or other defects. Defective forms shall be removed from the work. Metal side forms shall be used except at end closures and transverse construction joints where straight forms of other suitable material may be used.

Side forms may be built up by rigidly attaching a section to either top or bottom of forms. If such build-up is attached to the top of metal forms, the build-up shall also be metal.

Width of the base of all forms shall be equal to or greater than the specified pavement thickness.

Side forms shall be of sufficient rigidity, both in the form and in the interlocking connection with adjoining forms, that springing will not occur under the weight of subgrading and paving equipment or from the pressure of the concrete. The Contractor shall provide sufficient forms so that there will be no delay in placing concrete due to lack of forms.

Before placing side forms, the underlying material shall be at the proper grade. Side forms shall have full bearing upon the foundation throughout their length and width of base and shall be placed to the required grade and alignment of the finished pavement. They shall be firmly supported during the entire operation of placing, compacting, and finishing the pavement.

Forms shall be drilled in advance of being placed to line and grade to accommodate tie bars where these are specified.

Immediately in advance of placing concrete and after all subbase operations are completed, side forms shall be trued and maintained to the required line and grade for a distance sufficient to prevent delay in placing.

Side forms shall remain in place at least 12 hours after the concrete has been placed, and in all cases until the edge of the pavement no longer requires the protection of the forms. Curing compound shall be applied to the concrete immediately after the forms have been removed.

Side forms shall be thoroughly cleaned and oiled each time they are used and before concrete is placed against them.

Concrete shall be spread, screeded, shaped and consolidated by one or more self-propelled machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to the required cross-section with a minimum of handwork.

The number and capacity of machines furnished shall be adequate to perform the work required at a rate equal to that of concrete delivery.
Concrete for the full paving width shall be effectively consolidated by internal vibrators without causing segregation. Internal type vibrators’ rate of vibration shall be not less than 7,000 cycles per minute. Amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete more than one foot (30 cm) from the vibrating element. The Contractor shall furnish a tachometer or other suitable device for measuring and indicating frequency of vibration.

Power to vibrators shall be connected so that vibration ceases when forward or backward motion of the machine is stopped.

The provisions relating to the frequency and amplitude of internal vibration shall be considered the minimum requirements and are intended to ensure adequate density in the hardened concrete.

c. Consolidation. Concrete shall be consolidated with the specified type of lane-spanning, gang-mounted, mechanical, immersion type vibrating equipment mounted in front of the paver, supplemented, in rare instances as specified, by hand-operated vibrators. The vibrators shall be inserted into the concrete to a depth that will provide the best full-depth consolidation but not closer to the underlying material than inches (50 mm). Excessive vibration shall not be permitted. If the vibrators cause visible tracking in the paving lane, the paving operation shall be stopped and equipment and operations modified to prevent it. Concrete in small, odd-shaped slabs or in isolated locations inaccessible to the gang-mounted vibration equipment shall be vibrated with an approved hand-operated immersion vibrator operated from a bridge spanning the area. Vibrators shall not be used to transport or spread the concrete. Hand-operated vibrators shall not be operated in the concrete at one location for more than 20 seconds. Insertion locations for hand-operated vibrators shall be between 6 to 15 inches (150 to 400 mm) on centers. For each paving train, at least one additional vibrator spud, or sufficient parts for rapid replacement and repair of vibrators shall be maintained at the paving site at all times. Any evidence of inadequate consolidation (honeycomb along the edges, large air pockets, or any other evidence) shall require the immediate stopping of the paving operation and adjustment of the equipment or procedures as approved by the Engineer.

If a lack of consolidation of the concrete is suspected by the Engineer, referee testing may be required. Referee testing of hardened concrete will be performed by the Engineer by cutting cores from the finished pavement after a minimum of 24 hours curing. Density determinations will be made by the Engineer based on the water content of the core as taken. ASTM C642 shall be used for the determination of core density in the saturated-surface dry condition. When required, referee cores will be taken at the minimum rate of one for each 500 cubic yards (382 m³) of pavement, or fraction. The Contractor shall be responsible for all referee testing cost if they fail to meet the required density.

The average density of the cores shall be at least 97% of the original mix design density, with no cores having a density of less than 96% of the original mix design density.
Failure to meet the referee tests will be considered evidence that the minimum requirements for vibration are inadequate for the job conditions. Additional vibrating units or other means of increasing the effect of vibration shall be employed so that the density of the hardened concrete conforms to the above requirements.

501-4.9 Strike-off of concrete and placement of reinforcement. Following the placing of the concrete, it shall be struck off to conform to the cross-section shown on the plans and to an elevation that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor’s expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable ASTM specification requirements.

501-4.10 Joints. Joints shall be constructed as shown on the plans and in accordance with these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2 inch (12 mm) from their designated position and shall be true to line with not more than 1/4 inch (6 mm) variation in 10 feet (3 m). The surface across the joints shall be tested with a 12 feet (3 m) straightedge as the joints are finished and any irregularities in excess of 1/4 inch (6 mm) shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the plans.

a. Construction. Longitudinal construction joints shall be slip-formed or formed against side forms as shown in the plans.

Transverse construction joints shall be installed at the end of each day’s placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.
b. **Contraction.** Contraction joints shall be installed at the locations and spacing as shown on the plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer’s instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 inch (3 mm) wide and to the depth shown on the plans.

c. **Isolation (expansion).** Isolation joints shall be installed as shown on the plans. The premolded filler of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint, except for space for sealant at the top of the slab. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface. A cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete has been placed and struck off, the cap shall be carefully withdrawn leaving the space over the premolded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic. Any concrete bridging the joint space shall be removed for the full width and depth of the joint.

d. **Tie bars.** Tie bars shall consist of deformed bars installed in joints as shown on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the plans. They shall be held in position parallel to the pavement surface and in the middle of the slab depth. When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. Tie bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed.

e. **Dowel bars.** Dowel bars or other load-transfer units of an approved type shall be placed across joints as shown on the plans. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. The dowels shall be coated with a bond-breaker or other lubricant recommended by the manufacturer and approved by the Engineer.

f. Dowels bars at longitudinal construction joints shall be bonded in drilled holes.

g. **Placing dowels and tie bars.** The method used in installing and holding dowels in position shall ensure that the error in alignment of any dowel from its required horizontal and vertical alignment after the pavement has been completed will not be greater than 1/8 inch per feet (3 mm per 0.3 m). Except as otherwise specified below,
The horizontal spacing of dowels shall be within a tolerance of ±5/8 inch (16 mm). The vertical location on the face of the slab shall be within a tolerance of ±1/2 inch (12 mm). The vertical alignment of the dowels shall be measured parallel to the designated top surface of the pavement, except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge. The horizontal alignment shall be checked with a framing square. Dowels and tie bars shall not be placed closer than 0.6 times the dowel bar length to the planned joint line. If the last regularly spaced longitudinal dowel is closer than that dimension, it shall be moved away from the joint to a location 0.6 times the dowel bar length, but not closer than 6 inches (150 mm) to its nearest neighbor. The portion of each dowel intended to move within the concrete or expansion cap shall be wiped clean and coated with a thin, even film of lubricating oil or light grease before the concrete is placed. Dowels shall be installed as specified in the following subparagraphs.

(1) **Contraction joints.** Dowels and tie bars in longitudinal and transverse contraction joints within the paving lane shall be held securely in place, as indicated, by means of rigid metal frames or basket assemblies of an approved type. The basket assemblies shall be held securely in the proper location by means of suitable pins or anchors. Do not cut or crimp the dowel basket tie wires. At the Contractor’s option, in lieu of the above, dowels and tie bars in contraction joints shall be installed near the front of the paver by insertion into the plastic concrete using approved equipment and procedures. Approval will be based on the results of a preconstruction demonstration, showing that the dowels and tie bars are installed within specified tolerances.

(2) **Construction joints.** Install dowels and tie bars by the cast-in-place or the drill-and-dowel method. Installation by removing and replacing in preformed holes will not be permitted. Dowels and tie bars shall be prepared and placed across joints where indicated, correctly aligned, and securely held in the proper horizontal and vertical position during placing and finishing operations, by means of devices fastened to the forms. The spacing of dowels and tie bars in construction joints shall be as indicated.

(3) **Dowels installed in isolation joints and other hardened concrete.** Install dowels for isolation joints and in other hardened concrete by bonding the dowels into holes drilled into the hardened concrete. The concrete shall have cured for seven (7) days or reached a minimum compressive strength of 2500 psi before drilling commences. Holes 1/8 inch (3 mm) greater in diameter than the dowels shall be drilled into the hardened concrete using rotary-core drills. Rotary-percussion drills may be used, provided that excessive spalling does not occur to the concrete joint face. Modification of the equipment and operation shall be required if, in the Engineer’s opinion, the equipment and/or operation is causing excessive damage. Depth of dowel hole shall be within a tolerance of ±1/2 inch (12 mm) of the dimension shown on the drawings. On completion of the drilling operation, the dowel hole shall be blown out with oil-free, compressed air. Dowels shall be bonded in the drilled holes using epoxy
Epoxy resin shall be injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel will not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic grout retention ring fitted around the dowel. Dowels required to be installed in any joints between new and existing concrete shall be grouted in holes drilled in the existing concrete, all as specified above.

**h. Sawing of joints.** Joints shall be cut as shown on the plans. Equipment shall be as described in paragraph 501-4.1. The circular cutter shall be capable of cutting a groove in a straight line and shall produce a slot at least 1/8 inch (3 mm) wide and to the depth shown on the plans. The top of the slot shall be widened by sawing to provide adequate space for joint sealers as shown on the plans. Sawing shall commence, without regard to day or night, as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs and shall continue without interruption until all joints have been sawn. The joints shall be sawn at the required spacing. All slurry and debris produced in the sawing of joints shall be removed by vacuuming and washing. Curing compound or system shall be reapplied in the initial sawcut and maintained for the remaining cure period.

**501-4.11 Finishing.** Finishing operations shall be a continuing part of placing operations starting immediately behind the strike-off of the paver. Initial finishing shall be provided by the transverse screed or extrusion plate. The sequence of operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, texturing, and then edging of joints. Finishing shall be by the machine method. The hand method shall be used only on isolated areas of odd slab widths or shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Any machine finishing operation which requires appreciable hand finishing, other than a moderate amount of straightedge finishing, shall be immediately stopped and proper adjustments made or the equipment replaced. Any operations which produce more than 1/8 inch (3 mm) of mortar-rich surface (defined as deficient in plus U.S. No. 4 (4.75 mm) sieve size aggregate) shall be halted immediately and the equipment, mixture, or procedures modified as necessary. Compensation shall be made for surging behind the screds or extrusion plate and settlement during hardening and care shall be taken to ensure that paving and finishing machines are properly adjusted so that the finished surface of the concrete (not just the cutting edges of the screds) will be at the required line and grade. Finishing equipment and tools shall be maintained clean and in an approved condition. At no time shall water be added to the surface of the slab with the finishing equipment or tools, or in any other way, except for fog (mist) sprays specified to prevent plastic shrinkage cracking.

**a. Machine finishing with slipform pavers.** The slipform paver shall be operated so that only a very minimum of additional finishing work is required to produce pavement
surfaces and edges meeting the specified tolerances. Any equipment or procedure that
fails to meet these specified requirements shall immediately be replaced or modified as
necessary. A self-propelled non-rotating pipe float may be used while the concrete is
still plastic, to remove minor irregularities and score marks. Only one pass of the pipe
float shall be allowed. If there is concrete slurry or fluid paste on the surface that runs
over the edge of the pavement, the paving operation shall be immediately stopped and
the equipment, mixture, or operation modified to prevent formation of such slurry. Any
slurry which does run down the vertical edges shall be immediately removed by hand,
using stiff brushes or scrapers. No slurry, concrete or concrete mortar shall be used to
build up along the edges of the pavement to compensate for excessive edge slump,
either while the concrete is plastic or after it hardens.

b. Machine finishing with fixed forms. The machine shall be designed to straddle the
forms and shall be operated to screed and consolidate the concrete. Machines that cause
displacement of the forms shall be replaced. The machine shall make only one pass
over each area of pavement. If the equipment and procedures do not produce a surface
of uniform texture, true to grade, in one pass, the operation shall be immediately
stopped and the equipment, mixture, and procedures adjusted as necessary.

c. Other types of finishing equipment. Clary screeds, other rotating tube floats, or
bridge deck finishers are not allowed on mainline paving, but may be allowed on
irregular or odd-shaped slabs, and near buildings or trench drains, subject to the
Engineer’s approval.

Bridge deck finishers shall have a minimum operating weight of 7500 pounds (3400
kg) and shall have a transversely operating carriage containing a knock-down auger
and a minimum of two immersion vibrators. Vibrating screeds or pans shall be used
only for isolated slabs where hand finishing is permitted as specified, and only where
specifically approved.

d. Hand finishing. Hand finishing methods will not be permitted, except under the
following conditions: (1) in the event of breakdown of the mechanical equipment, hand
methods may be used to finish the concrete already deposited on the grade and (2) in
areas of narrow widths or of irregular dimensions where operation of the mechanical
equipment is impractical. Use hand finishing operations only as specified below.

(1) Equipment and screed. In addition to approved mechanical internal vibrators for
consolidating the concrete, provide a strike-off and tamping screed and a longitudinal
float for hand finishing. The screed shall be at least one foot (30 cm) longer than the
width of pavement being finished, of an approved design, and sufficiently rigid to retain
its shape, and shall be constructed of metal or other suitable material shod with metal.
The longitudinal float shall be at least 10 feet (3 m) long, of approved design, and rigid
and substantially braced, and shall maintain a plane surface on the bottom. Grate
tampers (jitterbugs) shall not be used.
(2) Finishing and floating. As soon as placed and vibrated, the concrete shall be struck off and screeded to the crown and cross-section and to such elevation above grade that when consolidated and finished, the surface of the pavement will be at the required elevation. In addition to previously specified complete coverage with handheld immersion vibrators, the entire surface shall be tamped with the strike-off and tamping template, and the tamping operation continued until the required compaction and reduction of internal and surface voids are accomplished. Immediately following the final tamping of the surface, the pavement shall be floated longitudinally from bridges resting on the side forms and spanning but not touching the concrete. If necessary, additional concrete shall be placed, consolidated and screeded, and the float operated until a satisfactory surface has been produced. The floating operation shall be advanced not more than half the length of the float and then continued over the new and previously floated surfaces.

e. Straightedge testing and surface correction. After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a Contractor furnished 12-foot (3.7-m) straightedge swung from handles 3 feet (1 m) longer than one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8 inch (3 mm) thick shall be removed from the surface of the pavement and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the smoothness requirements of paragraph 501-5.2e(3). Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross-section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment. This straight-edging is not a replacement for the straightedge testing of paragraph 501-5.2e(3), Smoothness.

501-4.12 Surface texture. The surface of the pavement shall be finished with either a brush or broom, burlap drag, or artificial turf finish for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. Any imperfections resulting from the texturing operation shall be corrected to the satisfaction of the Engineer.

a. Brush or broom finish. If the pavement surface texture is to be a type of brush or broom finish, it shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface, providing corrugations that are uniform in appearance and approximately 1/16 inch (2 mm) in depth.
b. Burlap drag finish. If a burlap drag is used to texture the pavement surface, it shall be at least 15 ounces per square yard (555 grams per square meter). To obtain a textured surface, the transverse threads of the burlap shall be removed approximately one foot (30 cm) from the trailing edge. A heavy buildup of grout on the burlap threads produces the desired wide sweeping longitudinal striations on the pavement surface. The corrugations shall be uniform in appearance and approximately 1/16 inch (2 mm) in depth.

c. Artificial turf finish. If artificial turf is used to texture the surface, it shall be applied by dragging the surface of the pavement in the direction of concrete placement with an approved full-width drag made with artificial turf. The leading transverse edge of the artificial turf drag will be securely fastened to a lightweight pole on a traveling bridge. At least 2 feet (60 cm) of the artificial turf shall be in contact with the concrete surface during dragging operations. A variety of different types of artificial turf are available and approval of any one type will be done only after it has been demonstrated by the Contractor to provide a satisfactory texture. One type that has provided satisfactory texture consists of 7,200 approximately 0.85 inch-long polyethylene turf blades per square foot. The corrugations shall be uniform in appearance and approximately 1/16 inch (2 mm) in depth.

501-4.13 Curing. Immediately after finishing operations are completed and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured for a 7-day cure period in accordance with one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour during the curing period.

When a two-sawcut method is used to construct the contraction joint, the curing compound shall be applied to the sawcut immediately after the initial cut has been made. The sealant reservoir shall not be sawed until after the curing period has been completed. When the one cut method is used to construct the contraction joint, the joint shall be cured with wet rope, wet rags, or wet blankets. The rags, ropes, or blankets shall be kept moist for the duration of the curing period.

a. Impervious membrane method. The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of one gallon (4 liters) to not more than 150 sq ft (14 sq m). The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. When hand spraying is approved by the Engineer, a double
application rate shall be used to ensure coverage. The curing compound shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause, including sawing operations, within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface. Curing shall be applied immediately after the bleed water is gone from the surface.

b. **White burlap-polyethylene sheets.** The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully saturated and in position for seven (7) days after the concrete has been placed.

c. **Water method.** The entire area shall be covered with burlap or other water absorbing material. The material shall be of sufficient thickness to retain water for adequate curing without excessive runoff. The material shall be kept wet at all times and maintained for seven (7) days. When the forms are stripped, the vertical walls shall also be kept moist. It shall be the responsibility of the Contractor to prevent ponding of the curing water on the subbase.

d. **Concrete protection for cold weather.** The concrete shall be maintained at an ambient temperature of at least 50°F (10°C) for a period of 72 hours after placing and at a temperature above freezing for the remainder of the curing time. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather; and any concrete damaged shall be removed and replaced at the Contractor’s expense.

e. **Concrete protection for hot weather.** Concrete should be continuous moisture cured for the entire curing period and shall commence as soon as the surfaces are finished and continue for at least 24 hours. However, if moisture curing is not practical beyond 24 hours, the concrete surface shall be protected from drying with application of a liquid membrane-forming curing compound while the surfaces are still damp. Other curing methods may be approved by the Engineer.

501-4.14 Removing forms. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing. After the forms have been removed, the sides of the slab shall be cured as per the methods indicated in paragraph 501-4.13. Major honeycombed areas shall be considered as defective work and shall be removed and replaced in accordance with paragraph 501-5.2(f).
501-4.15 Saw-cut grooving. If shown on the plans, grooved surfaces shall be provided in accordance with the requirements of Item P-621.

501-4.16 Sealing joints. The joints in the pavement shall be sealed in accordance with Item P-605.

501-4.17 Protection of pavement. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor’s employees and agents until accepted by the Engineer. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor’s expense.

Aggregates, rubble, or other similar construction materials shall not be placed on airfield pavements. Traffic shall be excluded from the new pavement by erecting and maintaining barricades and signs until the concrete is at least seven (7) days old, or for a longer period if directed by the Engineer.

In paving intermediate lanes between newly paved pilot lanes, operation of the hauling and paving equipment will be permitted on the new pavement after the pavement has been cured for seven (7) days and the joints have been sealed or otherwise protected, and the concrete has attained a minimum field cured flexural strength of 550 psi (37928 kPa) and approved means are furnished to prevent damage to the slab edge.

All new and existing pavement carrying construction traffic or equipment shall be continuously kept completely clean, and spillage of concrete or other materials shall be cleaned up immediately upon occurrence.

Damaged pavements shall be removed and replaced at the Contractor’s expense. Slabs shall be removed to the full depth, width, and length of the slab.

501-4.18 Opening to construction traffic. The pavement shall not be opened to traffic until test specimens molded and cured in accordance with ASTM C31 have attained a flexural strength of 550 lb / square inch (3.8 kPa) when tested in accordance with ASTM C78. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Prior to opening the pavement to construction traffic, all joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from foreign matter intrusion.

501-4.19 Repair, removal, or replacement of slabs.

a. General. New pavement slabs that are broken or contain cracks or are otherwise defective or unacceptable shall be removed and replaced or repaired, as directed by the Engineer and as specified hereinafter at no cost to the Owner. Spalls along joints shall
be repaired as specified. Removal of partial slabs is not permitted. Removal and replacement shall be full depth, shall be full width of the slab, and the limit of removal shall be normal to the paving lane and to each original transverse joint. The Engineer will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be 4 inch (100 mm) diameter, shall be drilled by the Contractor and shall be filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin, using approved procedures. Drilling of cores and refilling holes shall be at no expense to the Owner. All epoxy resin used in this work shall conform to ASTM C881, Type V. Repair of cracks as described in this section shall not be allowed if in the opinion of the Engineer the overall condition of the pavement indicates that such repair is unlikely to achieve an acceptable and durable finished pavement. No repair of cracks shall be allowed in any panel that demonstrates segregated aggregate with an absence of coarse aggregate in the upper 1/8 inch (3 mm) of the pavement surface.

b. Shrinkage cracks. Shrinkage cracks, which do not exceed 4 inches (100 mm) in depth, shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1, using procedures as approved by the Engineer. Care shall be taken to assure that the crack is not widened during epoxy resin injection. All epoxy resin injection shall take place in the presence of the Engineer. Shrinkage cracks, which exceed 4 inches (100 mm) in depth, shall be treated as full depth cracks in accordance with paragraphs 4.19b and 4.19c.

c. Slabs with cracks through interior areas. Interior area is defined as that area more than 6 inches (150 mm) from either adjacent original transverse joint. The full slab shall be removed and replaced at no cost to the Owner, when there are any full depth cracks, or cracks greater than 4 inches (100 mm) in depth, that extend into the interior area.

d. Cracks close to and parallel to joints. All cracks essentially parallel to original joints, extending full depth of the slab, and lying wholly within 6 inches (150 mm) either side of the joint shall be treated as specified here. Any crack extending more than 6 inches (150 mm) from the joint shall be treated as specified above in subparagraph c.

(1) Full depth cracks present, original joint not opened. When the original un-cracked joint has not opened, the crack shall be sawed and sealed, and the original joint filled with epoxy resin as specified below. The crack shall be sawed with equipment specially designed to follow random cracks. The reservoir for joint sealant in the crack shall be formed by sawing to a depth of 3/4 inches (19 mm), ±1/16 inch (2 mm), and to a width of 5/8 inch (16 mm), ±1/8 inch (3 mm). Any equipment or procedure which causes raveling or spalling along the crack shall be modified or replaced to prevent such raveling or spalling. The joint sealant shall be a liquid sealant as specified. Installation of joint seal shall be as specified for sealing joints or as directed. If the joint sealant reservoir has been sawed out, the reservoir and as much of the lower saw cut as possible shall be filled with epoxy resin, Type IV, Grade 2, thoroughly tooled into the void using approved procedures.
If only the original narrow saw cut has been made, it shall be cleaned and pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. If filler type material has been used to form a weakened plane in the transverse joint, it shall be completely sawed out and the saw cut pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. Where a parallel crack goes part way across paving lane and then intersects and follows the original joint which is cracked only for the remained of the width, it shall be treated as specified above for a parallel crack, and the cracked original joint shall be prepared and sealed as originally designed.

(2) **Full depth cracks present, original joint also cracked.** At a joint, if there is any place in the lane width where a parallel crack and a cracked portion of the original joint overlap, the entire slab containing the crack shall be removed and replaced for the full lane width and length.

**e. Removal and replacement of full slabs.** Where it is necessary to remove full slabs, unless there are dowels present, all edges of the slab shall be cut full depth with a concrete saw. All saw cuts shall be perpendicular to the slab surface. If dowels, or tie bars are present along any edges, these edges shall be sawed full depth just beyond the end of the dowels or tie bars. These joints shall then be carefully sawed on the joint line to within one inch (25 mm) of the depth of the dowel or tie bar.

The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. Suitable equipment shall be used to provide a truly vertical lift, and approved safe lifting devices used for attachment to the slabs. The narrow strips along doweled edges shall be carefully broken up and removed using light, hand-held jackhammers, 30 lb (14 kg) or less, or other approved similar equipment.

Care shall be taken to prevent damage to the dowels, tie bars, or to concrete to remain in place. The joint face below dowels shall be suitably trimmed so that there is not abrupt offset in any direction greater than 1/2 inch (12 mm) and no gradual offset greater than one inch (25 mm) when tested in a horizontal direction with a 12-foot (3.7-m) straightedge.

No mechanical impact breakers, other than the above hand-held equipment shall be used for any removal of slabs. If underbreak between 1-1/2 and 4 inches (38 and 100 mm) deep occurs at any point along any edge, the area shall be repaired as directed before replacing the removed slab. Procedures directed will be similar to those specified for surface spalls, modified as necessary.

If underbreak over 4 inches (100 mm) deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels or tie bars, or where they have been damaged, dowels or tie bars of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified. Original damaged dowels or tie bars shall be cut off flush with the joint face. Protruding portions of
dowels shall be painted and lightly oiled. All four (4) edges of the new slab shall contain dowels or original tie bars.

Placement of concrete shall be as specified for original construction. Prior to placement of new concrete, the underlying material (unless it is stabilized) shall be re-compacted and shaped as specified in the appropriate section of these specifications. The surfaces of all four joint faces shall be cleaned of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels or tie bars. The resulting joints around the new slab shall be prepared and sealed as specified for original construction.

f. Repairing spalls along joints. Where directed, spalls along joints of new slabs, and along parallel cracks used as replacement joints, shall be repaired by first making a vertical saw cut at least one inch (25 mm) outside the spalled area and to a depth of at least 2 inch (50 mm). Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete and at least 1/2 inch (12 mm) of visually sound concrete. The cavity thus formed shall be thoroughly cleaned with high-pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat of epoxy resin, Type III, Grade I, shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Pooling of epoxy resin shall be avoided. The cavity shall be filled with low slump Portland cement concrete or mortar or with epoxy resin concrete or mortar. Concrete shall be used for larger spalls, generally those more than 1/2 cu. ft. (0.014 m³) in size, and mortar shall be used for the smaller ones. Any spall less than 0.1 cu. ft. (0.003 m³) shall be repaired only with epoxy resin mortar or a Grade III epoxy resin. Portland cement concrete and mortar mixtures shall be proportioned as directed and shall be mixed, placed, consolidated, and cured as directed. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions and mixing and placing procedures as recommended by the manufacturer and approved by the Engineer. The epoxy resin materials shall be placed in the cavity in layers not over 2 inches (50 mm) thick. The time interval between placement of additional layers shall be such that the temperature of the epoxy resin material does not exceed 140°F (60°C) at any time during hardening. Mechanical vibrators and hand tampers shall be used to consolidate the concrete or mortar. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints, or as required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints. If any spall penetrates half the depth of the slab or more, the entire slab shall be removed and replaced as previously specified. If any spall would require over 25% of the length of any single joint to be repaired, the entire slab shall be removed and replaced. Repair of spalls as described in this section shall
not be allowed if in the opinion of the Engineer the overall condition of the pavement indicates that such repair is unlikely to achieve an acceptable and durable finished pavement. No repair of spalls shall be allowed in any panel that demonstrates segregated aggregate with a significant absence of coarse aggregate in the upper one-eighth (1/8th) inch of the pavement surface.

g. Diamond grinding of PCC surfaces. Diamond grinding of the hardened concrete with an approved diamond grinding machine should not be performed until the concrete is 14 days or more old and concrete has reached full minimum strength. When required, diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive. The saw blades shall be assembled in a cutting head mounted on a machine designed specifically for diamond grinding that will produce the required texture and smoothness level without damage to the pavement. The saw blades shall be 1/8-inch (3-mm) wide and there shall be a minimum of 55 to 60 blades per 12 inches (300 mm) of cutting head width; the actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Each machine shall be capable of cutting a path at least 3 feet (0.9 m) wide. Equipment that causes ravels, aggregate fractures, spalls or disturbance to the joints will not be permitted. The area corrected by diamond grinding the surface of the hardened concrete should not exceed 10% of the total area of any sublot. The depth of diamond grinding shall not exceed 1/2 inch (13 mm) and all areas in which diamond grinding has been performed will be subject to the final pavement thickness tolerances specified. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. All pavement areas requiring plan grade or surface smoothness corrections in excess of the limits specified above, may require removing and replacing in conformance with paragraph 501-4.19.

501-4.20 Existing concrete pavement removal and repair.

All operations shall be carefully controlled to prevent damage to the concrete pavement and to the underlying material to remain in place. All saw cuts shall be made perpendicular to the slab surface.

a. Removal of existing pavement slab.

When it is necessary to remove existing concrete pavement and leave adjacent concrete in place, unless there are dowels present, the joint between the removal area and adjoining pavement to stay in place, including dowels or tie bars, shall first be cut full depth with a standard diamond-type concrete saw. If dowels are present at this joint, the saw cut shall be made full depth just beyond the end of dowels. The edge shall then be carefully sawed on the joint line to within one inch (25 mm) of the top of the dowel. Next, a full depth saw cut shall be made parallel to the joint at least 24 inches (600 mm) from the joint and at least 12 inches (300 mm) from the end of any dowels. All pavement between this last saw cut and the joint line shall be carefully broken up and removed using hand-held jackhammers, 30 lb (14 kg) or less, or the
approved light-duty equipment which will not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place. Where dowels are present, care shall be taken to produce an even, vertical joint face below the dowels. If the Contractor is unable to produce such a joint face, or if underbreak or other distress occurs, the Contractor shall saw the dowels flush with the joint. The Contractor shall then install new dowels, of the size and spacing used for other similar joints, by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph 501-4.10g. All this shall be at no additional cost to the Owner. Dowels of the size and spacing indicated shall be installed as shown on the drawings by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph 501-4.10g. The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any direction greater than 1/2 inches (12 mm) and no gradual offset greater than one inch (25 mm) when tested in a horizontal direction with a 12-foot (3.7-m) straightedge.

b. Edge repair.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Areas that are damaged during construction shall be repaired at no cost to the Owner.

(1) Spall repair. Spalls shall be repaired where indicated and where directed by the Engineer. Repair materials and procedures shall be as previously specified in subparagraph 501-4.19f.

(2) Underbreak repair. All underbreak shall be repaired. First, all delaminated and loose material shall be carefully removed. Next, the underlying material shall be recompacted, without addition of any new material. Finally, the void shall be completely filled with paving concrete, thoroughly consolidated. Care shall be taken to produce an even joint face from top to bottom. Prior to placing concrete, the underlying material shall be thoroughly moistened. After placement, the exposed surface shall be heavily coated with curing compound.

(3) Underlying material. The underlying material adjacent to the edge and under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new concrete, and shall be shaped as shown on the drawings or as directed. Sufficient material shall be kept in place outside the joint line to prevent disturbance (or sloughing) of material under the pavement that is to remain in place. Any material under the portion of the concrete pavement to remain in place, which is disturbed or loses its compaction shall be carefully removed and replaced with concrete as specified in paragraph 501-4.20b(2). The underlying material outside the joint line shall be thoroughly compacted and moist when new concrete is placed.
**501-5.1 Acceptance sampling and testing.** All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section, with the exception of coring for thickness determination, will be performed by the Engineer at no cost to the Contractor. The Contractor shall bear the cost of providing curing facilities for the strength specimens, per paragraph 501-5.1a(3), and coring and filling operations, per paragraph 501-5.1b(1). Testing organizations performing these tests shall be accredited in accordance with ASTM C1077. The laboratory accreditation must be current and listed on the accrediting authority’s website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory’s current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

Concrete shall be accepted for strength and thickness on a lot basis.

A lot shall consist of a day’s production.

**a. Flexural strength.**

(1) **Sampling.** Each lot shall be divided into four equal sublots. One sample shall be taken for each sublot from the plastic concrete delivered to the job site. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D3665. The concrete shall be sampled in accordance with ASTM C172.

(2) **Testing.** Two (2) specimens shall be made from each sample. Specimens shall be made in accordance with ASTM C31 and the flexural strength of each specimen shall be determined in accordance with ASTM C78. The flexural strength for each sublot shall be computed by averaging the results of the two test specimens representing that sublot.

Immediately prior to testing for flexural strength, the beam shall be weighed and measured for determination of a sample unit weight. Measurements shall be made for each dimension; height, depth, and length, at the mid-point of the specimen and reported to the nearest 1/10 inch (3 mm). The weight of the specimen shall be reported to the nearest 0.1 pound (45 gm). The sample unit weight shall be calculated by dividing the sample weight by the calculated volume of the sample. This information shall be reported as companion information to the measured flexural strength for each specimen.

The samples will be transported while in the molds. The curing, except for the initial cure period, will be accomplished using the immersion in saturated lime water method.

Slump, air content, and temperature tests will also be conducted by the quality assurance laboratory for each set of strength test samples, per ASTM C31.
(3) **Curing.** The Contractor shall provide adequate facilities for the initial curing of beams. During the 24 hours after molding, the temperature immediately adjacent to the specimens must be maintained in the range of 60° to 80°F (16° to 27°C), and loss of moisture from the specimens must be prevented. The specimens may be stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or using other suitable methods, provided the temperature and moisture loss requirements are met.

(4) **Acceptance.** Acceptance of pavement for flexural strength will be determined by the Engineer in accordance with paragraph 501-5.2b.

**b. Pavement thickness.**

(1) **Sampling.** Each lot shall be divided into four equal sublots and one core shall be taken by the Contractor for each sublot. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D3665. Areas, such as thickened edges, with planned variable thickness, shall be excluded from sample locations.

Cores shall be neatly cut with a core drill. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored hole. Core holes shall be filled by the Contractor with a non-shrink grout approved by the Engineer within one day after sampling.

(2) **Testing.** The thickness of the cores shall be determined by the Engineer by the average caliper measurement in accordance with ASTM C174.

(3) **Acceptance.** Acceptance of pavement for thickness shall be determined by the Engineer in accordance with paragraph 501-5.2c.

**c. Partial lots.** When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or minor placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

Where three sublots have been produced, they shall constitute a lot. Where one or two sublots have been produced, they shall be incorporated into the next lot or the previous lot and the total number of sublots shall be used in the acceptance criteria calculation, that is, n=5 or n=6.

**d. Outliers.** All individual flexural strength tests within a lot shall be checked for an outlier (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers shall be discarded, and the percentage of material within specification limits (PWL) shall be determined using the remaining test values.
501-5.2 Acceptance criteria.

a. General. Acceptance will be based on the following characteristics of the completed pavement discussed in paragraph 501-5.2e:

(1) Flexural strength

(2) Thickness

(3) Smoothness

(4) Grade

(5) Edge slump

Flexural strength and thickness shall be evaluated for acceptance on a lot basis using the method of estimating PWL. Acceptance using PWL considers the variability (standard deviation) of the material and the testing procedures, as well as the average (mean) value of the test results to calculate the percentage of material that is above the lower specification tolerance limit (L).

Acceptance for flexural strength will be based on the criteria contained in accordance with paragraph 501-5.2e(1). Acceptance for thickness will be based on the criteria contained in paragraph 501-5.2e(2). Acceptance for smoothness will be based on the criteria contained in paragraph 501-5.2e(3). Acceptance for grade will be based on the criteria contained in paragraph 501-5.2e(4).

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Flexural strength. Acceptance of each lot of in-place pavement for flexural strength shall be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.

c. Pavement thickness. Acceptance of each lot of in-place pavement shall be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.

d. Percentage of material within limits (PWL). The PWL shall be determined in accordance with procedures specified in Section 110 of the General Provisions.

The lower specification tolerance limit (L) for flexural strength and thickness shall be:
Lower Specification Tolerance Limit (L)

<table>
<thead>
<tr>
<th>Flexural Strength</th>
<th>0.93 × strength specified in paragraph 501-3.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>Lot Plan Thickness in inches, - 0.50 in</td>
</tr>
</tbody>
</table>

**e. Acceptance criteria.**

(1) **Flexural Strength.** If the PWL of the lot equals or exceeds 90%, the lot shall be acceptable. Acceptance and payment for the lot shall be determined in accordance with paragraph 501-8.1.

(2) **Thickness.** If the PWL of the lot equals or exceeds 90%, the lot shall be acceptable. Acceptance and payment for the lot shall be determined in accordance with paragraph 501-8.1.

(3) **Smoothness.** As soon as the concrete has hardened sufficiently, but not later than 48 hours after placement, the surface of each lot shall be tested in both longitudinal and transverse directions for smoothness to reveal all surface irregularities exceeding the tolerances specified. The Contractor shall furnish paving equipment and employ methods that produce a surface for each section of pavement having an average profile index meeting the requirements of paragraph 501-8.1c when evaluated with a profilograph; and the finished surface of the pavement shall not vary more than 1/4 inch (6mm) when evaluated with a 12-foot (3.7m) straightedge. When the surface smoothness exceeds specification tolerances which cannot be corrected by diamond grinding of the pavement, full depth removal and replacement of pavement shall be to the limit of the longitudinal placement. Corrections involving diamond grinding will be subject to the final pavement thickness tolerances specified.

(a) Transverse measurements. Transverse measurements will be taken for each lot placed. Transverse measurements will be taken perpendicular to the pavement centerline each 50 feet (15m) or more often as determined by the Engineer.

(i) Testing shall be continuous across all joints, starting with one-half the length of the straight edge at the edge of pavement section being tested and then moved ahead one-half the length of the straight edge for each successive measurement. Smoothness readings will not be made across grade changes or cross slope transitions; at these transition areas, the straightedge position shall be adjusted to measure surface smoothness and not design grade or cross slope transitions. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. Deviations on final pavement > 1/4 inch (6mm) in transverse direction shall be corrected with diamond grinding per paragraph 501-4.19g or by removing and replacing full depth of pavement. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring
grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

(ii) The joint between lots shall be tested separately to facilitate smoothness between lots. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface, with half the straightedge on one side of the joint and the other half of the straightedge on the other side of the joint. Measure the maximum gap between the straightedge and the pavement surface in the area between these two high points. One measurement shall be taken at the joint every 50 feet (15m) or more often if directed by the Engineer. Maximum gap on final pavement surface > 1/4 inch (6mm) in transverse direction shall be corrected with diamond grinding per paragraph 501-4.19g or by removing and replacing full depth of surface. Each measurement shall be recorded and a copy of the data shall be furnished to the Engineer at the end of each days testing.

(b) Longitudinal measurements. Longitudinal measurements will be taken for each lot placed. Longitudinal tests will be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6m); and at the one third points of paving lanes when widths of paving lanes are 20 ft (6m) or greater.

(i) Longitudinal Short Sections. Longitudinal Short Sections are when the longitudinal lot length is less than 200 feet (60m) and areas not requiring a profilograph. When approved by the Engineer, the first and last 15 feet (4.5m) of the lot can also be considered as short sections for smoothness. The finished surface shall not vary more than 1/4 inch (6mm) when evaluated with a 12-foot (3.7m) straightedge. Smoothness readings will not be made across grade changes or cross slope transitions, at these transition areas, the straightedge position shall be adjusted to measure surface smoothness and not design grade or cross slope transitions. Testing shall be continuous across all joints, starting with one-half the length of the straight edge at the edge of pavement section being tested and then moved ahead one-half the length of the straight edge for each successive measurement. The amount of surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points. Deviations on final pavement surface > 1/4 inch (6mm) in longitudinal direction will be corrected with diamond grinding per paragraph 501-4.19g or by removing and replacing full depth of surface. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

(ii) Profilograph Testing. Profilograph testing shall be performed by the contractor using approved equipment and procedures as described as ASTM E1274. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2 inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an
The profilograph must be calibrated prior to use and operated by a factory or State DOT approved operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). A copy of the reduced tapes shall be furnished to the Engineer at the end of each days testing.

The pavement must have an average profile index meeting the requirements of paragraph 501-8.1c. Deviations on final surface in longitudinal direction shall be corrected with diamond grinding per paragraph 501-4.19g or by removing and replacing full depth of pavement. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The area corrected by grinding should not exceed 10% of the total area and these areas shall be retested after grinding.

Where corrections are necessary, second profilograph runs shall be performed to verify that the corrections produced an average profile index of 15 inches (38 cm) per mile or less. If the initial average profile index was less than 15 inches (38 cm), only those areas representing greater than 0.4 inch (10 mm) deviation will be re-profiled for correction verification.

(iii) Final profilograph of [runway]. Final profilograph, full length of runway, shall be performed to facilitate testing of smoothness between lots. Profilograph testing shall be performed by the contractor using approved equipment and procedures as described as ASTM E1274. The pavement must have an average profile index meeting the requirements of paragraph 501-8.1c. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2 inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). A copy of the reduced tapes shall be furnished to the Engineer at the end of each days testing. Profilograph of final runway shall be performed one foot right and left of runway center line and 15 feet right and left of centerline. Any areas that indicate “must grind” will be corrected as directed by the Engineer.

Smoothness testing indicated in the above paragraphs except paragraph (iii) shall be performed within 48 hours of placement of material. Smoothness testing indicated in paragraph (iii) shall be performed within 48 hours final paving completion. The primary purpose of smoothness testing is to identify areas that may be prone to ponding of water which could lead to hydroplaning of aircraft. If the contractor’s machines and/or methods are producing significant areas that need corrective actions then production should be stopped until corrective measures can be implemented. If corrective measures are not implemented and when directed by the Engineer, production shall be stopped until corrective measures can be implemented.
(4) **Grade.** An evaluation of the surface grade shall be made by the Engineer for compliance to the tolerances contained below. The finish grade will be determined by running levels at intervals of 50 feet (15 m) or less longitudinally and all breaks in grade transversely (not to exceed 50 feet (15 m)) to determine the elevation of the completed pavement. The Contractor shall pay the costs of surveying the level runs, and this work shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer.

(a) **Lateral deviation.** Lateral deviation from established alignment of the pavement edge shall not exceed ±0.10 feet (3 mm) in any lane.

(b) **Vertical deviation.** Vertical deviation from established grade shall not exceed ±0.04 feet (12 mm) at any point.

(5) **Edge slump.** When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor as directed by the Engineer in accordance with paragraph 501-4.8a.

f. **Removal and replacement of concrete.** Any area or section of concrete that is removed and replaced shall be removed and replaced back to planned joints. The Contractor shall replace damaged dowels and the requirements for doweled longitudinal construction joints in paragraph 501-4.10 shall apply to all contraction joints exposed by concrete removal. Removal and replacement shall be in accordance with paragraph 501-4.20.

**CONTRACTOR QUALITY CONTROL**

501-6.1 **Quality control program.** The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provisions. The program shall address all elements that affect the quality of the pavement including but not limited to:

a. Mix Design

b. Aggregate Gradation

c. Quality of Materials

d. Stockpile Management

e. Proportioning

f. Mixing and Transportation

g. Placing and Consolidation
h. Joints

i. Dowel Placement and Alignment

j. Flexural or Compressive Strength

k. Finishing and Curing

l. Surface Smoothness

501-6.2 Quality control testing. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content.

A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

a. Fine aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C70 or ASTM C566.

b. Coarse Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily for each size of aggregate. Tests shall be made in accordance with ASTM C136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C566.

c. Slump. Four slump tests shall be performed for each lot of material produced in accordance with the lot size defined in paragraph 501-5.1. One test shall be made for each subplot. Slump tests shall be performed in accordance with ASTM C143 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.
d. **Air content.** Four air content tests, shall be performed for each lot of material produced in accordance with the lot size defined in paragraph 501-5.1. One test shall be made for each sublot. Air content tests shall be performed in accordance with ASTM C231 for gravel and stone coarse aggregate and ASTM C173 for slag or other porous coarse aggregate, from material randomly sampled from trucks at the paving site. Material samples shall be taken in accordance with ASTM C172.

e. Four unit weight and yield tests shall be made in accordance with ASTM C138. The samples shall be taken in accordance with ASTM C172 and at the same time as the air content tests.

**501-6.3 Control charts.** The Contractor shall maintain linear control charts for fine and coarse aggregate gradation, slump, moisture content and air content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept up to date at all times. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and suspension Limits, or Specification limits, applicable to each test parameter, and the Contractor’s test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor’s projected data during production indicates a potential problem and the Contractor is not taking satisfactory corrective action, the Engineer may halt production or acceptance of the material.

a. **Fine and coarse aggregate gradation.** The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. Specification limits contained in the Lower Specification Tolerance Limit (L) table above and the Control Chart Limits table below shall be superimposed on the Control Chart for job control.

b. **Slump and air content.** The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for slump and air content in accordance with the following Action and Suspension Limits.

<table>
<thead>
<tr>
<th>Control Chart Limits</th>
<th>Individual Measurements</th>
<th>Range Suspension Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Action Limit</td>
<td>Suspension Limit</td>
</tr>
<tr>
<td>Slip Form:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slump</td>
<td>+0 to -1 inch (0-25 mm)</td>
<td>+0.5 to -1.5 inch (13-38 mm)</td>
</tr>
<tr>
<td>Air Content</td>
<td>±1.2%</td>
<td>±1.8%</td>
</tr>
</tbody>
</table>

| Side Form:           |                         |                        |
| Slump                | +0.5 to -1 inch (13-25 mm) | +1 to -1.5 inch (25-38 mm) | ±1.5 inch (38 mm) |
The individual measurement control charts shall use the mix design target values as indicators of central tendency.

501-6.4 Corrective action. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of control. The Contractor Quality Control Program shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

a. Fine and coarse aggregate gradation. When two consecutive averages of five tests are outside of the specification limits in paragraph 501-2.1, immediate steps, including a halt to production, shall be taken to correct the grading.

b. Fine and coarse aggregate moisture content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5%, the scale settings for the aggregate batcher and water batcher shall be adjusted.

c. Slump. The Contractor shall halt production and make appropriate adjustments whenever:

(1) one point falls outside the Suspension Limit line for individual measurements or range

OR

(2) two points in a row fall outside the Action Limit line for individual measurements.

d. Air content. The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:

(1) one point falls outside the Suspension Limit line for individual measurements or range

OR

(2) two points in a row fall outside the Action Limit line for individual measurements.

Whenever a point falls outside the Action Limits line, the air-entraining admixture dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility.

METHOD OF MEASUREMENT

<table>
<thead>
<tr>
<th>Control Parameter</th>
<th>Individual Measurements</th>
<th>Range Suspension Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Action Limit</td>
<td>Suspension Limit</td>
</tr>
<tr>
<td>Air Content</td>
<td>±1.2%</td>
<td>±1.8%</td>
</tr>
</tbody>
</table>
501-7.1 Portland cement concrete pavement shall be measured by the number of cubic yards of either plain or reinforced pavement as specified in-place, completed and accepted. Reinforcing steel shall be measured by the pound as specified in place and accepted.

BASIS OF PAYMENT

501-8.1 Payment. Payment for concrete pavement meeting all acceptance criteria as specified in paragraph 501-5.2 Acceptance Criteria shall be based on results of smoothness, strength and thickness tests. Payment for acceptable lots of concrete pavement shall be adjusted in accordance with paragraph 501-8.1a for strength and thickness and 501-8.1c for smoothness, subject to the limitation that:

The total project payment for concrete pavement shall not exceed 100 percent of the product of the contract unit price and the total number of cubic yards of concrete pavement used in the accepted work (See Note 1 under the Price Adjustment Schedule table below).

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings.

a. Basis of adjusted payment. The pay factor for each individual lot shall be calculated in accordance with the Price Adjustment Schedule table below. A pay factor shall be calculated for both flexural strength and thickness. The lot pay factor shall be the higher of the two values when calculations for both flexural strength and thickness are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either flexural strength or thickness is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both flexural strength and thickness are less than 100%.

Price Adjustment Schedule1

<table>
<thead>
<tr>
<th>Percentage of Materials Within Specification Limits (PWL)</th>
<th>Lot Pay Factor (Percent of Contract Unit Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 – 100</td>
<td>106</td>
</tr>
<tr>
<td>90 – 95</td>
<td>PWL + 10</td>
</tr>
<tr>
<td>75 – 90</td>
<td>0.5 PWL + 55</td>
</tr>
<tr>
<td>55 – 74</td>
<td>1.4 PWL – 12</td>
</tr>
<tr>
<td>Below 55</td>
<td>Reject2</td>
</tr>
</tbody>
</table>

1 Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment in excess of 100% shall be subject to the total project payment limitation specified in paragraph 501-8.1.

2 The lot shall be removed and replaced. However, the Engineer may decide to allow the rejected lot to remain. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50%
of the contract unit price and the total project payment limitation shall be reduced by the amount withheld for the rejected lot.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 501-8.1. Payment in excess of 100% for accepted lots of concrete pavement shall be used to offset payment for accepted lots of concrete pavement that achieve a lot pay factor less than 100%.

b. Payment. Payment shall be made under:

Bid Item No. 85  PCC Pavements, P501 Airfield Pavements- per CY

Bid Item No. 86  High Early Strength PCC, P501 Airfield Pavements- per CY

Bid Item No. 99  Smooth Dowels- per LB

Bid Item No. 100  Reinforcing Steel- per LB

Bid Item No. 81  Rapid Setting Concrete, P501 Airfield Pavements- per CY

c. Basis of adjusted payment for smoothness. Price adjustment for pavement smoothness will apply to the total area of concrete within a section of pavement and shall be applied in accordance the following equation and schedule:

(Square yard in section) × (original unit price per square yard) × PFm = reduction in payment for area within section

<table>
<thead>
<tr>
<th>Average Profile Index (Inches Per Mile)</th>
<th>Contract Unit Price Adjustment (PFm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement Strength Rating</td>
<td>Over 30,000 lb</td>
</tr>
<tr>
<td>0 - 7</td>
<td>0 - 10</td>
</tr>
<tr>
<td>7.1 - 9</td>
<td>10.1 - 11</td>
</tr>
<tr>
<td>9.1 - 11</td>
<td>11.1 - 12</td>
</tr>
<tr>
<td>11.1 - 13</td>
<td>12.1 - 13</td>
</tr>
<tr>
<td>13.1 - 14</td>
<td>13.1 - 14</td>
</tr>
<tr>
<td>15.1 and up</td>
<td>15.1 and up</td>
</tr>
</tbody>
</table>

TESTING REQUIREMENTS

ASTM C31  Standard Practice for Making and Curing Concrete Test Specimens in the Field
<table>
<thead>
<tr>
<th>Standard Test Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C39</td>
<td>Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens</td>
</tr>
<tr>
<td>ASTM C70</td>
<td>Standard Test Method for Surface Moisture in Fine Aggregate</td>
</tr>
<tr>
<td>ASTM C78</td>
<td>Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)</td>
</tr>
<tr>
<td>ASTM C88</td>
<td>Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate</td>
</tr>
<tr>
<td>ASTM C136</td>
<td>Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates</td>
</tr>
<tr>
<td>ASTM C138</td>
<td>Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete</td>
</tr>
<tr>
<td>ASTM C142</td>
<td>Standard Test Method for Clay Lumps and Friable Particles in Aggregates</td>
</tr>
<tr>
<td>ASTM C143</td>
<td>Standard Test Method for Slump of Hydraulic-Cement Concrete</td>
</tr>
<tr>
<td>ASTM C172</td>
<td>Standard Practice for Sampling Freshly Mixed Concrete</td>
</tr>
<tr>
<td>ASTM C173</td>
<td>Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method</td>
</tr>
<tr>
<td>ASTM C174</td>
<td>Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores</td>
</tr>
<tr>
<td>ASTM C231</td>
<td>Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method</td>
</tr>
<tr>
<td>ASTM C289</td>
<td>Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)</td>
</tr>
<tr>
<td>Standard Number</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>ASTM C295</td>
<td>Standard Guide for Petrographic Examination of Aggregates for Concrete</td>
</tr>
<tr>
<td>ASTM C114</td>
<td>Standard Test Methods for Chemical Analysis of Hydraulic Cement</td>
</tr>
<tr>
<td>ASTM C311</td>
<td>Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland Cement Concrete</td>
</tr>
<tr>
<td>ASTM C566</td>
<td>Standard Test Method for Total Evaporable Moisture Content of Aggregates by Drying</td>
</tr>
<tr>
<td>ASTM C642</td>
<td>Standard Test Method for Density, Absorption, and Voids in Hardened Concrete</td>
</tr>
<tr>
<td>ASTM C666</td>
<td>Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing</td>
</tr>
<tr>
<td>ASTM C1077</td>
<td>Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation</td>
</tr>
<tr>
<td>ASTM C1602</td>
<td>Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete</td>
</tr>
<tr>
<td>ASTM D3665</td>
<td>Standard Practice for Random Sampling of Construction Materials</td>
</tr>
<tr>
<td>ASTM D4791</td>
<td>Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate</td>
</tr>
<tr>
<td>ASTM E178</td>
<td>Standard Practice for Dealing With Outlying Observations</td>
</tr>
<tr>
<td>ASTM E1274</td>
<td>Standard Test Method for Measuring Pavement Roughness Using a Profilograph</td>
</tr>
</tbody>
</table>

U.S. Army Corps of Engineers (USACE) Concrete Research Division (CRD) C662 Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)
MATERIAL REQUIREMENTS

ASTM A184 Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A704 Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement

ASTM A706 Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

ASTM A714 Standard Specification for High-Strength Low-Alloy Welded and Seamless Steel Pipe

ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars

ASTM A934 Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars

ASTM A996 Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

ASTM A1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

ASTM A1078 Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement

ASTM C33 Standard Specification for Concrete Aggregates

ASTM C94 Standard Specification for Ready-Mixed Concrete

ASTM C150 Standard Specification for Portland Cement

ASTM C171 Standard Specification for Sheet Materials for Curing Concrete

ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete

ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C494 Standard Specification for Chemical Admixtures for Concrete

ASTM C595 Standard Specification for Blended Hydraulic Cements
ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C881 Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C989 Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752 Standard Specification for Preformed Sponge Rubber and Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving And Structural Construction
ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 305R Guide to Hot Weather Concreting
ACI 306R Guide to Cold Weather Concreting
ACI 309R Guide for Consolidation of Concrete
AC 150/5320-6 Airport Pavement Design and Evaluation
PCA Design and Control of Concrete Mixtures
END ITEM P-501
602. ITEM P-602 BITUMINOUS PRIME COAT

602.1. DESCRIPTION

602.1.1. This item shall consist of an application of bituminous material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

602.2. MATERIALS

602.2.1. BITUMINOUS MATERIAL: The types, grades, controlling specifications, and application temperatures for the bituminous materials are given in Table 1. The Owner’s Representative shall designate the specific material to be used.

### TABLE 1. BITUMINOUS MATERIAL

<table>
<thead>
<tr>
<th>Type and Grade</th>
<th>Specification</th>
<th>Application Temperature ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(°F)</td>
</tr>
<tr>
<td>Emulsified Asphalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS-1, SS-1h</td>
<td>ASTM D 977</td>
<td>70-160</td>
</tr>
<tr>
<td>MS-2, HFMS-1</td>
<td>ASTM D 977</td>
<td>70-160</td>
</tr>
<tr>
<td>CSS-1, CSS-1h</td>
<td>ASTM D 2397</td>
<td>70-160</td>
</tr>
<tr>
<td>CMS-2</td>
<td>ASTM D 2397</td>
<td>70-160</td>
</tr>
<tr>
<td>Cutback Asphalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-30</td>
<td>ASTM D 2028</td>
<td>80+</td>
</tr>
<tr>
<td>RC-70</td>
<td>ASTM D 2028</td>
<td>120+</td>
</tr>
<tr>
<td>RC-250</td>
<td>ASTM D 2028</td>
<td>165+</td>
</tr>
</tbody>
</table>

¹ The maximum temperature for cutback asphalt shall be that at which fogging occurs.

602.3. CONSTRUCTION METHODS

602.3.1. WEATHER LIMITATIONS: The prime coat shall be applied only when the existing surface is dry or contains sufficient moisture to get uniform distribution of the bituminous material, when the atmospheric temperature is above 60°F, and when the weather is not foggy or rainy. The temperature requirements may be waived, but only when so directed by the Owner’s Representative.

602.3.2. EQUIPMENT: The equipment used by the Contractor shall include a self-powered pressure bituminous material distributor and equipment for heating bituminous material.

The distributor shall be designed, equipped, maintained, and operated so that bituminous material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not
exceed 10 percent. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

If the distributor is not equipped with an operable quick shut off valve, the prime operations shall be started and stopped on building power. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the owner.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

602.3.3. APPLICATION OF BITUMINOUS MATERIAL: Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The bituminous material including solvent shall be uniformly applied with a bituminous distributor at the rate of 0.25 to 0.50 gallons per square yard depending on the base course surface texture. The type of bituminous material and application rate shall be approved by the Owner’s Representative prior to application.

Following the application, the primed surface shall be allowed to dry not less than 48 hours without being disturbed or for such additional time as may be necessary to permit the drying out of the prime coat until it will not be picked up by traffic or equipment. This period shall be determined by the Owner’s Representative. The surface shall then be maintained by the Contractor until the surfacing has been placed. Suitable precautions shall be taken by the Contractor to protect the primed surface against damage during this interval, including supplying and spreading any sand necessary to blot up excess bituminous material.

602.3.4. BITUMINOUS MATERIAL CONTRACTOR'S RESPONSIBILITY: Samples of the bituminous materials that the Contractor proposes to use, together with a statement as to their source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the bituminous materials to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials, so demonstrated by service tests, shall be acceptable.

The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The test reports shall contain all the data required by the applicable specification. If the Contractor applies the prime material prior to receipt of the tests reports, payment for the material shall be withheld until they are received. If the material does not pass the specifications it shall be replaced at the contractor's expense. The report shall be delivered to the Owner’s
Representative before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as basis for final acceptance. All such test reports shall be subject to verification by testing samples of materials received for use on the project.

602.3.5. FREIGHT AND WEIGH BILLS: Before the final estimate is allowed, the Contractor shall file with the Owner's Representative receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the bituminous materials actually used in the construction covered by the contract. The Contractor shall not remove bituminous material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Owner’s Representative, nor shall the car or tank be released until the final outage has been taken by the Owner’s Representative.

Copies of freight bills and weigh bills shall be furnished to the Owner's Representative during the progress of the work.

602.4. METHOD OF MEASUREMENT

602.4.1. The bituminous material for prime coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F in accordance with ASTM D 1250 for cutback asphalt, and Table IV-3 of The Asphalt Institute's Manual MS-6 for emulsified asphalt.

602.5. BASIS OF PAYMENT

602.5.1. Payment shall be made at the contract unit price per gallon for bituminous prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Bid Item no 66 P-602 Bituminous Prime Coat - Per GAL

602.6. MATERIAL AND TESTING REQUIREMENTS

602.6.1. MATERIAL REQUIREMENTS

- ASTM D 977 Emulsified Asphalt
- ASTM D 2028 Cutback Asphalt (Rapid Curing Type)
- ASTM D 2397 Cationic Emulsified Asphalt

602.6.2. TESTING REQUIREMENTS

- ASTM D 1250 Petroleum Measurement Tables
Asphalt Institute Asphalt Pocketbook of Useful Information, Manual MS-6 (Temperature-Volume Corrections for Emulsified Asphalts) Table IV-3

END OF ITEM P-602
603. **ITEM P-603 BITUMINOUS TACK COAT**

603.1. **DESCRIPTION**

603.1.1. This item shall consist of preparing and treating a bituminous or concrete surface with bituminous material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

603.2. **MATERIALS**

603.2.1. **BITUMINOUS MATERIALS:** The bituminous material shall be either cutback asphalt, emulsified asphalt, or tar and shall conform to the requirements of Table 1. The type, grade, controlling specification, and application temperature of bituminous material to be used shall be specified by the Owner’s Representative.

**TABLE 1. BITUMINOUS MATERIAL**

<table>
<thead>
<tr>
<th>Type and Grade</th>
<th>Specification</th>
<th>Application Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(°F)</td>
</tr>
<tr>
<td>Emulsified Asphalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS-1, SS-1h</td>
<td>ASTM D 977</td>
<td>75-130</td>
</tr>
<tr>
<td>CSS-1, CSS-1h</td>
<td>ASTM D 2397</td>
<td>75-130</td>
</tr>
<tr>
<td>Cutback Asphalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC-70</td>
<td>ASTM D 2028</td>
<td>120+</td>
</tr>
<tr>
<td>Tar</td>
<td>AASHTO M 52</td>
<td>60-120</td>
</tr>
</tbody>
</table>

603.3. **CONSTRUCTION METHODS**

603.3.1. **WEATHER LIMITATIONS:** The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is above 60°F. The temperature requirements may be waived, but only when so directed by the Owner’s Representative.

603.3.2. **EQUIPMENT:** The Contractor shall provide equipment for heating and applying the bituminous material.

The distributor shall be designed, equipped, maintained, and operated so that bituminous material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10 percent. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.
If the distributor is not equipped with an operable quick shut off valve, the tack operations shall be started and stopped on building paper. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the owner.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

603.3.3. APPLICATION OF BITUMINOUS MATERIAL: Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or airblast to remove all loose dirt and other objectionable material.

Emulsified asphalt shall be diluted by the addition of water when directed by the Owner’s Representative and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlying mixture is placed on the tacked surface.

The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of 0.05 to 0.15 gallons per square yard depending on the condition of the existing surface. The type of bituminous material and application rate shall be approved by the Owner’s Representative prior to application.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Owner’s Representative. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

603.3.4. BITUMINOUS MATERIAL CONTRACTOR’S RESPONSIBILITY: Samples of the bituminous material that the Contractor proposes to use, together with a statement as to its source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the bituminous material to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials so demonstrated by service tests, shall be acceptable.

The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The tests reports shall contain all the data required by the applicable specification. If the Contractor applies the material prior to receipt of the tests reports, payment for the material shall be withheld until they are received. If the material does not pass the specifications it shall be replaced at the contractor's expense. The report shall be delivered to the Owner’s Representative before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as
a basis for final acceptance. All such test reports shall be subject to verification by testing samples of material received for use on the project.

603.3.5. FREIGHT AND WEIGH BILLS: Before the final estimate is allowed, the Contractor shall file with the Owner’s Representative receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the bituminous materials actually used in the construction covered by the contract. The Contractor shall not remove bituminous material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Owner’s Representative, nor shall the car or tank be released until the final outage has been taken by the Owner’s Representative. Copies of freight bills and weigh bills shall be furnished to the Owner’s Representative during the progress of the work.

603.4. METHOD OF MEASUREMENT

603.4.1. The bituminous material for tack coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F in accordance with ASTM D 1250 for cutback asphalt, ASTM D 633 for tar, and Table IV-3 of The Asphalt Institute's Manual MS-6 for emulsified asphalt. Water added to emulsified asphalt will not be measured for payment.

603.5. BASIS OF PAYMENT

603.5.1. Payment shall be made at the contract unit price per gallon of bituminous material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item no 67  P-603 Bituminous Tack Coat - Per GAL

603.6. MATERIAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D 633</td>
<td>Volume Correction Table for Road Tar</td>
</tr>
<tr>
<td>ASTM D 977</td>
<td>Emulsified Asphalt</td>
</tr>
<tr>
<td>ASTM D 1250</td>
<td>Petroleum Measurement Tables</td>
</tr>
<tr>
<td>ASTM D 2028</td>
<td>Cutback Asphalt (Rapid-Curing Type)</td>
</tr>
<tr>
<td>ASTM D 2397</td>
<td>Cationic Emulsified Asphalt</td>
</tr>
</tbody>
</table>

Asphalt Institute Asphalt Pocketbook of Useful Information, Manual MS-6 (Temperature-Volume Corrections for Emulsified Asphalts) Table IV-3

END ITEM P-603
605. **ITEM P-605 JOINT SEALING FILLER AND JOINT ADHESIVES**

605.1. **DESCRIPTION**

605.1.1. This item shall consist of providing and installing a waterproof pavement joint adhesive to the asphalt pavement cold joints (including those cold joints related to the asphalt test sections from Item P-401) to reduce crack formation and raveling of cold joints.

605.2. **MATERIALS**

605.2.1. **ASPHALT COLD JOINT ADHESIVE**: Joint adhesive materials shall consist of a hot applied modified asphalt composition used as an adhesive and tacking material for cold construction joints in asphalt concrete pavement. Joint adhesive materials shall meet or exceed the requirements shown in Table 1.

<table>
<thead>
<tr>
<th>Test</th>
<th>Standard</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brookfield Viscosity, 400° F</td>
<td>ASTM D 2669</td>
<td>4,000 to 10,000 cp</td>
</tr>
<tr>
<td>Cone Penetration, 77° F</td>
<td>ASTM D 5329</td>
<td>60 to 100</td>
</tr>
<tr>
<td>Flow, 140° F</td>
<td>ASTM D 5329</td>
<td>5 mm Maximum</td>
</tr>
<tr>
<td>Resilience, 77° F</td>
<td>ASTM D 5329</td>
<td>30% Maximum</td>
</tr>
<tr>
<td>Ductility, 77° F</td>
<td>ASTM D 113</td>
<td>30 cm Minimum</td>
</tr>
<tr>
<td>Ductility, 39.2° F</td>
<td>ASTM D 113</td>
<td>30 cm Maximum</td>
</tr>
<tr>
<td>Tensile Adhesion, 77° F</td>
<td>ASTM D 5329</td>
<td>500% Minimum</td>
</tr>
<tr>
<td>Flexibility, 0° F</td>
<td>Manufacture Procedure</td>
<td>Pass</td>
</tr>
<tr>
<td>Softening Point</td>
<td>ASTM D 36</td>
<td>170 Degrees F Minimum</td>
</tr>
<tr>
<td>Asphalt Compatibility</td>
<td>ASTM D 5329</td>
<td>Pass</td>
</tr>
<tr>
<td>Recommended Pour Temperature</td>
<td>-</td>
<td>380° F</td>
</tr>
<tr>
<td>Safe Heating Temperature</td>
<td>-</td>
<td>410° F</td>
</tr>
</tbody>
</table>

The asphalt cold joint adhesive shall be Pavement Joint Adhesive, Part No. 34524, as manufactured by Crafco™ Inc., 420 North Roosevelt Avenue, Chandler, Arizona 85226, or an approved equal. Phone number for Crafco, Inc. is (800) 528-8242, or www.crafco.com

The pavement joint adhesive material shall be a hot applied modified asphalt composition effectively bonding the paving passes together creating a watertight seal during thermal movement.

Each lot or batch of sealing compound shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the
manufacturer's certification stating that the compound meets the requirements of this specification.

605.3. EQUIPMENT

605.3.1. GENERAL: Equipment for hot-applied joint sealing and adhesive materials shall be an oil-jacketed, double boiler, melter kettle equipped with both agitation and re-circulating systems that is approved by the joint sealing manufacturer and the joint adhesive manufacturer. The kettle shall contain a feed wand applicator system with an applicator shoe attached.

605.4. CONSTRUCTION METHODS

605.4.1. ASPHALT COLD JOINT ADHESIVE: Joint adhesive material shall be applied to the vertical face of the joint prior to placing the adjacent paving lane.

   a. Surface Preparation. Prior to the application of the asphalt joint adhesive, the Contractor shall ensure that the face of the longitudinal joint of the first paving lane paved is thoroughly dry and free from any loose material, dust, or any other debris that would inhibit adhesion. When the joint is not clean, the Contractor shall clean the joint face by the use of compressed air. If moisture is present, the Contractor shall use a hot compressed air lance. The Contractor shall ensure the preparation process occurs shortly before application to prevent the return of debris on the joint face prior to applying the asphalt joint adhesive.

   b. Asphalt Joint Adhesive Temperature Control. The Contractor shall ensure the temperature of the asphalt joint adhesive is between 380 degrees Fahrenheit and 410 degrees Fahrenheit when applied to the longitudinal joint.

   c. Asphalt Joint Adhesive Application. The Contractor shall ensure the pavement temperature is a minimum 40 degrees Fahrenheit during the application of the asphalt joint adhesive. Prior to applying the adhesive, the Contractor shall demonstrate competence in applying the adhesive to the satisfaction of the Engineer. The joint adhesive shall be heated in a melter kettle to the specified temperature range. The joint adhesive shall be pumped from the melter kettle, through the wand onto the vertical face of the joint. The adhesive shall be applied in a continuous, 1/8-inch thick band over the entire face of the longitudinal joint. The Contractor shall not use excessive material in either thickness or location. Application excesses should not exceed an overlap of more than 2 inches at the bottom of the joint, or more than ½-inch at the top of the joint. Upon completion of the joint adhesive material, the Contractor will place and compact the adjacent lane against the face of the joint coated with the asphalt joint adhesive.
d. Asphalt Joint Adhesive Certification. The Contractor shall furnish an original asphalt joint adhesive manufacturer’s certification to the Engineer stating the material conforms to all requirements herein prior to use.

605.5. METHOD OF MEASUREMENT

605.5.1. Asphalt Cold Joint Adhesive shall be measured by the linear foot of adhesive applied in place, completed, and accepted.

605.6. BASIS OF PAYMENT

605.6.1. Payment for Asphalt Cold Joint Adhesive shall be made at the contract unit price per square foot. The price shall be full compensation for furnishing all materials, for all preparation, delivering, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

605.6.2. Payment will be made under:

Bid Item no. 68 P-605 Asphalt Cold Joint Adhesive - per SF

605.7. TESTING REQUIREMENTS

ASTM D 412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension

ASTM D 1644 Test Methods for Nonvolatile Content of Varnishes

605.8. MATERIAL REQUIREMENTS

ASTM D 1854 Jet-Fuel-Resistant Concrete Joint Sealer, Hot-Applied Elastic Type

ASTM D 3406 Joint Sealants, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements

ASTM D 3569 Joint Sealant, Hot-Applied, Elastometric, Jet-Fuel-Resistant Type, for Portland Cement Concrete Pavements

ASTM D 3581 Joint Sealant, Hot-Applied, Jet-Fuel-Resistant Type, for Portland Cement Concrete and Tar-Concrete Pavements

ASTM D 5893 Standard Specifications for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

ASTM D 6690 Joint and Crack Sealants, Hot-Applied, for Concrete and Asphalt Pavements
FED SPEC

Sealants, Joint, Two-Component, Jet-Blast Resistant, Cold
SS-S-200E(2) Applied

END ITEM P-605
608. Item P-608 Emulsified Asphalt Seal Coat

DESCRIPTION

608-1.1 This item shall consist of the application of an emulsified asphalt surface treatment composed of an emulsion of natural and refined asphalt materials, water and, if specified, a polymer additive, for taxiways and runways with the application of a suitable aggregate to maintain adequate surface friction; and airfield secondary and tertiary pavements including low-speed taxiways, shoulders, overruns, roads, parking areas, and other general applications with or without aggregate applied. Emulsified Asphalt Seal Coat products assist in pavement preservation through reducing the rate of pavement oxidation. The emulsified asphalt surface treatment shall be applied in accordance with these specifications, and as shown on the plans or as directed by the Engineer.

608-1.2 Quantities of materials per square yard (square meter). The approximate amounts of materials per square yard (square meter) for the asphalt surface treatment shall be as provided in the table for the treatment area(s) at the specified dilution rate(s) as noted on the plans. The actual application rates will vary within the range specified to suit field conditions and will be recommended by the manufacturer’s representative and approved by the Engineer from the test area/sections evaluation.

<table>
<thead>
<tr>
<th>Dilution Rate</th>
<th>Quantity of Emulsion gal/yd² (l/m²)</th>
<th>Quantity of Aggregate lb/yd² (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>0.10-0.15 (0.45-0.68)</td>
<td>0.20-0.50 (0.11-0.27)</td>
</tr>
<tr>
<td>2:1</td>
<td>0.08-0.15 (0.36-0.54)</td>
<td>0.20-0.50 (0.11-0.27)</td>
</tr>
</tbody>
</table>

MATERIALS

608-2.1 Aggregate. The aggregate material shall be a dry, clean, dust and dirt free, sound, durable, angular shaped manufactured specialty sand, such as that used as an abrasive, with a Mohs hardness of 6 to 8. The Contractor shall submit manufacturer’s technical data and a manufacturer’s certification indicating that the specialty sand meets the requirements of the specification to the Engineer prior to start of construction. The sand must be approved for use by the Engineer and shall meet the following gradation limits when tested in accordance with ASTM C136 and ASTM C117:
The terms seal coat and sealer binder and asphalt material are interchangeable throughout this specification. The term emulsified asphalt means an emulsion of natural and refined asphalt materials.

### Aggregate Material Gradation Requirements

<table>
<thead>
<tr>
<th>Sieve Designation (square openings)</th>
<th>Percentage by Weight Retained Sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 8 (2.38 mm)</td>
<td>0</td>
</tr>
<tr>
<td>No. 16 (1.19 mm)</td>
<td>0-8</td>
</tr>
<tr>
<td>No. 20 (0.84 mm)</td>
<td>0-28</td>
</tr>
<tr>
<td>No. 30 (0.60 mm)</td>
<td>20-50</td>
</tr>
<tr>
<td>No. 40 (0.42 mm)</td>
<td>10-55</td>
</tr>
<tr>
<td>No. 50 (0.30 mm)</td>
<td>0-30</td>
</tr>
<tr>
<td>No. 70 (0.21 mm)</td>
<td>0-5</td>
</tr>
<tr>
<td>No. 100 (0.15 mm)</td>
<td>0-2</td>
</tr>
<tr>
<td>No. 200 (0.07 mm)</td>
<td>0-2</td>
</tr>
</tbody>
</table>

The Contractor shall provide a certification showing particle size analysis and properties of the material delivered for use on the project. The Contractor’s certification may be subject to verification by testing the material delivered for use on the project.

### 608-2.2 Asphalt material

The Contractor shall furnish the vendor’s certified test reports for the emulsified asphalt, in its concentrated form, to the Engineer, showing that the material meets the following properties:

<table>
<thead>
<tr>
<th>Concentrated Asphalt Material Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Saybolt Furol Viscosity at 77°F (25°C)</td>
</tr>
<tr>
<td>Residue by Distillation or Evaporation</td>
</tr>
<tr>
<td>Sieve Test</td>
</tr>
<tr>
<td>24-hour Stability</td>
</tr>
<tr>
<td>5-day Settlement Test</td>
</tr>
<tr>
<td>Particle Charge</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

1 pH may be used in lieu of the particle charge test which is sometimes inconclusive in slow setting, asphalt emulsions.

The asphalt material concentrate must be diluted with heated water prior to application. The asphalt material, when diluted in the volumetric proportion of one part concentrated asphalt material to one part hot water shall have the following properties:
### One-to-One Dilution Emulsion Properties

<table>
<thead>
<tr>
<th>Properties</th>
<th>Specification</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In Ready-to-Apply Form, one part concentrate to one part water, by volume</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saybolt Furol Viscosity at 77°F (25°C)</td>
<td>ASTM D244</td>
<td>10 – 50 seconds</td>
</tr>
<tr>
<td>Residue by Distillation or Evaporation</td>
<td>ASTM D244</td>
<td>28.5% minimum</td>
</tr>
<tr>
<td>Pumping Stability ¹</td>
<td></td>
<td>Pass</td>
</tr>
</tbody>
</table>

¹ Pumping stability is tested by pumping one pint (475 ml) of seal coat diluted one (1) part concentrate to one (1) part water, at 77°F (25°C), through a 1/4-inch (6 mm) gear pump operating 1750 rpm for 10 minutes with no significant separation or coagulation.

The asphalt material, when diluted in the volumetric proportion of two parts concentrated asphalt material to one part hot water shall have the following properties:

### Two-to-One Dilution Emulsion Properties

<table>
<thead>
<tr>
<th>Properties</th>
<th>Specification</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In Ready-to-Apply Form, two parts concentrate to one part water, by volume</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saybolt Furol Viscosity at 77°F (25°C)</td>
<td>ASTM D244</td>
<td>10 – 50 seconds</td>
</tr>
<tr>
<td>Residue by Distillation or Evaporation</td>
<td>ASTM D244</td>
<td>38% minimum</td>
</tr>
<tr>
<td>Pumping Stability ¹</td>
<td></td>
<td>Pass</td>
</tr>
</tbody>
</table>

¹ Pumping stability is tested by pumping one pint (475 ml) of seal coat diluted one (1) part concentrate to one (1) part water, at 77°F (25°C), through a 1/4-inch (6 mm) gear pump operating 1750 rpm for 10 minutes with no significant separation or coagulation.

The asphalt material base residue shall contain not less than 20% gilsonite, or uintaite and shall not contain any tall oil pitch or coal tar material. The material shall be compatible with asphaltic concrete, and have a 5-year minimum proven performance record at airports with similar climatic conditions. Curing time, under recommended application conditions, shall not exceed eight (8) hours.
Emulsion Residue by Distillation or Evaporation Tests

<table>
<thead>
<tr>
<th>Properties</th>
<th>Specification</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity at 275°F (135°C)</td>
<td>ASTM D4402</td>
<td>1750 cts maximum</td>
</tr>
<tr>
<td>Solubility in 1, 1, 1 trichloroethylene</td>
<td>ASTM D2042</td>
<td>97.5% minimum</td>
</tr>
<tr>
<td>Penetration</td>
<td>ASTM D5</td>
<td>50 dmm minimum</td>
</tr>
<tr>
<td>Asphaltenes</td>
<td>ASTM D2007</td>
<td>15% minimum</td>
</tr>
<tr>
<td>Saturates</td>
<td>ASTM D2007</td>
<td>15% maximum</td>
</tr>
<tr>
<td>Polar Compounds</td>
<td>ASTM D2007</td>
<td>25% minimum</td>
</tr>
<tr>
<td>Aromatics</td>
<td>ASTM D2007</td>
<td>15% minimum</td>
</tr>
</tbody>
</table>

The Contractor shall furnish vendor’s certified test reports showing that the material is the type, grade and quality specified for each load of asphalt material delivered to the project. The certification shall also show the shipment number, refinery, consignee, destination, contract number and date of shipment. The test reports and certification shall be delivered to the Engineer before permission is granted to use the material. The furnishing of the vendor’s certified test report for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer’s material test report certification may be subject to verification by testing the material delivered for use on the project.

The asphalt material storage and handling temperature shall be between 50°F - 160°F (10°C - 70°C) and the material shall be protected from freezing, or whenever outside temperature drops below 40°F (4°C) for prolonged time periods.

**608-2.3 Water.** Water used in making the emulsion shall be potable, free from harmful soluble salts and chemicals, and at least 100°F (38°C).

**608-2.4 Polymer.** The polymer shall be a vinyl acrylic polymer approved for use by the asphalt material manufacturer. The Contractor shall submit manufacturer’s technical data, the manufacturer’s certification indicating that the polymer meets the requirements of the specification, and the asphalt material manufacturer’s approval of its use to the Engineer. The polymer must be approved for use by the Engineer and shall meet the following properties:
Polymer Properties

<table>
<thead>
<tr>
<th>Properties</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solids Content</td>
<td>54 to 57%, Percent by Weight</td>
</tr>
<tr>
<td>Weight</td>
<td>8.9 to 9.8 pounds/gallon (1.07 to 1.17 kg/L)</td>
</tr>
<tr>
<td>pH</td>
<td>4.0 to 6.0</td>
</tr>
<tr>
<td>Particle Charge</td>
<td>Nonionic/Anionic</td>
</tr>
<tr>
<td>Mechanical Stability</td>
<td>Excellent</td>
</tr>
<tr>
<td>Film Forming Temperature, °C</td>
<td>+5°C, minimum</td>
</tr>
<tr>
<td>Tg, °C</td>
<td>22°C, maximum</td>
</tr>
</tbody>
</table>

APPLICATION RATE

608-3.1 Material performance for runway and high-speed taxiway projects. The Contractor shall submit to the Engineer friction tests, from previous airport projects which used the seal coat materials in a similar environment, in accordance with AC 150/5320-12, at 40 or 60 mph (65 or 95 km/h) wet, showing, as a minimum; friction value of pavement surface prior to sealant application; two values, tested between 24 and 96 hours after application, with a minimum of 24 hours between tests; and one value tested at no less than 180 days or greater than 360 days after the application. The results of the two tests between 24 and 96 hours shall indicate friction is increasing at a rate to obtain similar friction value of the pavement surface prior to application, and the long term test shall indicate no apparent adverse effect with time relative to friction values and existing pavement surface. The Contractor shall submit to the Engineer a list of airports which meet the above requirements, as well as technical details on application rates, aggregate rates, and point of contact at these airports to confirm use and success of sealer with aggregate. Friction tests shall be submitted from no less than one of the airports on the list and each set of tests described above, must be from one project.

Seal coat material submittal without required friction performance will not be approved. Friction tests performed on this project cannot be used as a substitute of this requirement.

608-3.2 Test areas and test sections. A qualified manufacturer’s representative shall be present in the field to assist the Contractor in applying test areas and/or test sections to determine the optimum application rate of both emulsion and sand.

A test area and/or section shall be applied for each differing HMA pavement surface identified in the project. The test area(s) and/or test section(s) shall be used to
determine the material application rate(s) of both emulsion and sand prior to full production. The same equipment and method of operation shall be utilized on the test area(s) and/or test section(s) as will be utilized on the remainder of the work.

**a. For taxiway, taxilane and apron surfaces.** Prior to full application, the Contractor shall place test areas at varying application rates as specified by the manufacturer’s representative and Engineer to determine appropriate application rate(s). The test areas will be located on representative section(s) of the pavement to receive the asphalt surface treatment designated by the Engineer.

**b. For runway and high speed exit taxiway surfaces.** Prior to full application, the Contractor shall place a series of test sections a minimum of 300 feet (90 m) long by 12 feet (3.6 m) wide, or width of anticipated application, whichever is greater, at varying application rates as stipulated by the manufacturer’s representative and Engineer to determine appropriate application rate(s). The area to be tested will be located on a representative section of the pavement to receive the asphalt surface treatment designated by the Engineer. Before beginning the test section(s), the skid resistance of the existing pavement shall be determined for each test section with a continuous friction measuring equipment (CFME). The skid resistance test after application shall be at approximately the same location as the test done on the existing pavement. The Contractor may begin testing the skid resistance of runway and high speed exit taxiway test sections after application of the asphalt surface treatment has fully cured. Aircraft shall not be permitted on the runway or high speed exit taxiway test sections for a minimum of 24 hours and until such time as the Contractor validates that its surface friction meets AC 150/5320-12. The results of the friction evaluation must meet or exceed the Maintenance Planning levels provided in Table 3-2, “Friction Level Classification for Runway Pavement Surfaces,” in AC 150/5320-12, Measurement, Construction, and Maintenance of Skid-resistant Airport Pavement Surfaces, when tested at speeds of 40 and 60 mph (65 and 95 km/h) wet with approved CFME.

If the test section should prove to be unsatisfactory, necessary adjustments to the application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and additional skid resistance tests performed and evaluated. Full production shall not begin without the Engineer’s approval of an appropriate application rate(s). Acceptable test sections shall be paid for in accordance with paragraph 608-8.1.

**CONSTRUCTION METHODS**

**608-4.1 Worker safety.** The seal coat product shall be handled with caution. The Contractor shall obtain a Material Safety Data Sheet (MSDS) for both the asphalt emulsion product and sand and require workmen to follow the manufacturer’s recommended safety precautions.

**608-4.2 Weather limitations.** The asphalt emulsion shall be applied only when the existing pavement surface is dry and when the weather is not foggy, rainy, or when the
wind velocity will prevent the uniform application of the material. No material shall be applied when dust or sand is blowing or when rain is anticipated within eight (8) hours of application completion. The atmospheric temperature and the pavement surface temperature shall both be above 60°F (16°C) and rising. During application, account for wind drift. Cover existing buildings, structures, runway edge lights, taxiway edge lights, informational signs, retro-reflective marking and in-pavement duct markers as necessary to protect against overspray before applying the emulsion. Should emulsion get on any light or marker fixture, promptly clean the fixture. If cleaning is not satisfactory to the Engineer, the Contractor shall replace any light, sign or marker with equivalent equipment at no cost to the Owner.

608-4.3 Equipment and tools. The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

a. Pressure distributor. The emulsion shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spreader bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute). Test the equipment under pressure for leaks and to ensure it is in good working order before use.

The distributor truck shall be equipped with a 12-foot (3.7-m), minimum, spreader bar with individual nozzle control. The distributor truck shall be capable of specific application rates in the range of 0.05 to 0.25 gallons per square yard (0.15 to 0.80 liters per square meter). These rates shall be computer-controlled rather than mechanical. The distributor truck shall have an easily accessible thermometer that constantly monitors the temperature of the emulsion, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy.

A distributor truck shall be provided, if necessary, equipped to effectively heat and mix the material to the required temperature prior to application. Heating and mixing shall be done in accordance with the manufacturer’s recommendations. Care shall be taken not to overheat or over mix the material.

The distributor shall be equipped to hand spray the emulsion in areas identified either on the plans or by the Engineer.

b. Aggregate spreader. The asphalt distributor truck will be equipped with an aggregate spreader mounted to the distributor truck that can apply sand to the emulsion in a single pass operation without driving through wet emulsion. The aggregate spreader shall be equipped with a variable control system capable of uniformly distributing the sand at the specified rate at varying application widths and speeds. The sander shall have a minimum hopper capacity of at least 3,000 pounds (1361 kg) of
sand. Push-type hand sanders will be allowed for use around lights, signs and other obstructions.

c. **Power broom/blower.** A power broom and/or blower shall be provided for removing loose material from the surface to be treated.

d. **Equipment calibration.** The Contractor shall calibrate the equipment using either of the following procedures:

(1) **First procedure.** The Contractor shall furnish a State Calibration Certification for the emulsified asphalt distributor, from any state providing that service, or other acceptable agency certification approved by the Engineer, and the calibration date shall have been within six (6) months of the contract award, or up to 12 months if supporting documents substantiate continuous work using the same distributor.

(2) **Second procedure.** The Contractor shall furnish all equipment, materials and labor necessary to calibrate the emulsified asphalt distributor and the aggregate spreader. Perform all calibrations with the approved job materials and prior to applying the specified coatings to the prepared surface. Perform calibration of the emulsified asphalt distributor in accordance with ASTM D2995. Perform work to calibrate the tank and measuring devices of the distributor. Perform inspection and calibration at the beginning of the work and at least once a day during construction.

608-4.4 **Preparation of asphalt pavement surfaces.** Clean pavement surface immediately prior to placing the seal coat by sweeping, flushing well with water leaving no standing water, or a combination of both, so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film. Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with the oil spot primer. Any additional surface preparation, such as crack repair, shall be in accordance with paragraph 101-3.6.

a. **New asphalt pavement surfaces.** Allow new asphalt pavement surfaces to cure so that there is no concentration of oils on the surface. A period of at least 30 days at 70°F (21°C) daytime temperatures shall elapse between the placement of a hot mixed asphalt concrete surface course and the application of the surface treatment.

Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. (Cast approximately one gallon (4 liters) of clean water out over the surface. The water should sheet out and wet the surface uniformly without crawling or showing oil rings.) If signs of crawling or oil rings are apparent on the pavement surface, additional time must be allowed for additional curing and retesting of the pavement surface prior to treatment.

608-4.5 **Emulsion mixing.** The application emulsion shall be obtained by blending asphalt material concentrate, water and polymer, if specified. Always add heated water
to the asphalt material concentrate, never add asphalt material concentrate to heated water. Mix one part heated water to one part or two parts asphalt material concentrate, by volume, as indicated on the plans.

If polymer is required, add 1% polymer, by volume, to the emulsion mix. If the polymer is added to the emulsion mix at the plant, submit weigh scale tickets to the Engineer. As an option, the polymer may be added to the emulsion mix at the job site provided the polymer is added slowly while the circulating pump is running. The mix must be agitated for a minimum of 15 minutes or until the polymer is mixed to the satisfaction of the Engineer.

**608-4.6 Application of asphalt emulsion.** The asphalt emulsion shall be applied using a pressure distributor upon the properly prepared, clean and dry surface at the application rate recommended by the manufacturer’s representative and approved by the Engineer from the test area/sections evaluation for each designated treatment area. The asphalt emulsion should be applied at a temperature between 130°F (54°C) and 160°F (70°C) or in accordance with the manufacturer’s recommendation.

Pavement surfaces which have excessive runoff of seal coat due to excessive amount of material being applied or excessive surface grade shall be treated in two or more applications to the specified application rate at no additional cost to the Owner. Each additional application shall be performed after the prior application of material has penetrated into the pavement.

If low spots and depressions greater than 1/2 inch (12 mm) in depth in the pavement surface cause ponding or puddling of the applied materials, the pavement surface shall be broomed with a broom drag. Brooming shall continue until the pavement surface is free of any pools of excess material. Ponding and/or puddling shall not cause excessive pavement softening and/or additional distress. The Engineer shall inspect and approve areas after brooming.

During all applications, the surfaces of adjacent structures shall be protected to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or on the airport area.

**608-4.7 Application of aggregate material.** Immediately following the application of the asphalt emulsion or as directed by the Engineer, sand at the rate recommended by the manufacturer’s representative and approved by the Engineer from the test area/sections evaluation for each designated application area, shall be spread uniformly over the asphalt emulsion. The aggregate shall be spread to the same width of application as the asphalt material and shall not be applied in such thickness as to cause blanketing.

Sprinkling of additional aggregate material, and spraying additional asphalt material over areas that show up having insufficient cover or bitumen, shall be done by hand
whenever necessary. In areas where hand work is necessitated, the sand shall be applied before the sealant begins to break.

Sanding shall be performed to prevent excessive amounts of sand from accumulating on the pavement prior to the emulsion being applied. The Contractor shall clean areas with excess or loose sand and dispose of off airport property.

QUALITY CONTROL

608-5.1 Manufacturer’s representation. The manufacturer’s representative shall have knowledge of the material, procedures, and equipment described in the specification and shall be responsible for determining the application rates and shall oversee the preparation and application of the seal coat product. Documentation of the manufacturer representative’s experience and knowledge for applying the seal coat product shall be furnished to the Engineer a minimum of 10 work days prior to placement of the test sections. The cost of the manufacturer’s representative shall be included in the bid price.

608-5.2 Contractor qualifications. The Contractor shall provide the Engineer Contractor qualifications for applicators, personnel and equipment. The Contractor shall also provide, from the seal coat Manufacturer, documentation that the Contractor is certified to apply the seal coat and to have made at least three (3) applications similar to this project in the past two (2) years.

MATERIAL ACCEPTANCE

608-6.1 Friction tests. Friction testing will be provided by JWA.

METHOD OF MEASUREMENT

608-7.1 Asphalt surface treatment. The quantity of asphalt surface treatment shall be measured by the square yards of material applied in accordance with the plans and specifications and accepted by the Engineer.

The Contractor must furnish the Engineer with the certified weigh bills when materials are received for the asphalt material used under this contract. The Contractor must not remove material from the tank car or storage tank until initial amounts and temperature measurements have been verified.

BASIS OF PAYMENT

608-8.1 Payment shall be made at the contract unit price per square yard for the asphalt surface treatment applied and accepted by the Engineer. This price shall be full compensation for all surface preparation, furnishing all materials, delivery and
application of these materials, for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item no. 75 P-608 Asphalt Surface Treatment- per SY (dilution rate 1:1)

MATERIAL REQUIREMENTS

ASTM C117 Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM D5 Standard Test Method for Penetration of Bituminous Materials
ASTM D244 Standard Test Methods and Practices for Emulsified Asphalts
ASTM D2995 Standard Practice for Estimating Application Rate of Bituminous Distributors
ASTM D5340 Standard Test Method for Airport Pavement Condition Index Surveys
AC 150/5320-12 Measurement, Construction, and Maintenance of Skid-Resistant Airport Pavement Surfaces
AC 150/5320-17 Airfield Pavement Surface Evaluation and Rating (PASER) Manuals
AC 150/5380-6 Guidelines and Procedures for Maintenance of Airport Pavements

END OF ITEM P-608
610. ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

610.1. DESCRIPTION

610.1.1. This item shall consist of structural Portland cement concrete, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

610.2. MATERIALS

610.2.1. GENERAL: Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

Aggregates shall be tested for deleterious reactivity with alkalis in the cement that may cause excessive expansion of the concrete. Acceptance of aggregates shall be based upon satisfactory evidence furnished by the Contractor that the aggregates, combined with other mixture constituents, do not produce excessive expansion in the concrete. This evidence shall include service records of concrete of comparable properties under similar conditions or exposure and certified records of tests by a testing laboratory that meets the requirements of ASTM C 1077. Tests shall be made in accordance with ASTM C 1260. Test specimens shall be produced using all components (e.g. coarse aggregate, fine aggregate, cement and fly ash...) to be included in the produced concrete. If the mean expansion of the test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 16 days from casting the aggregates shall be accepted. If the mean expansion at 16 days is greater than 0.10% but less than 0.15%, the aggregate may be accepted based upon satisfactory service records and acceptance of the aggregate by a State Highway Department specifically addressing Alkali-Silica Reactivity. If the expansion is greater than 0.15%, the aggregate shall not be accepted for use.

610.2.2. COARSE AGGREGATE: The coarse aggregate for concrete shall meet the requirements of ASTM C 33. Crushed stone aggregate shall have a durability factor,
as determined by ASTM C 666, greater than or equal to 95. The Engineer may consider and reserve final approval of other State classification procedures addressing aggregate durability.

Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

610.2.3. FINE AGGREGATE: The fine aggregate for concrete shall meet the requirements of ASTM C 33.

The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2 when tested in accordance with ASTM C 136:

<table>
<thead>
<tr>
<th>TABLE 1. GRADATION FOR COARSE AGGREGATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Designation (square openings)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>No. 4 to 3/4 in. (4.75-19.0 mm)</td>
</tr>
<tr>
<td>No. 4 to 1 in. (4.75-25.0 mm)</td>
</tr>
<tr>
<td>No. 4 to 1-1/2 in. (4.75-38.1 mm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2. GRADATION FOR FINE AGGREGATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Designation (square openings)</td>
</tr>
<tr>
<td>3/8 inch (9.5 mm)</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
</tr>
<tr>
<td>No. 30 (0.60 mm)</td>
</tr>
<tr>
<td>No. 50 (0.30 mm)</td>
</tr>
<tr>
<td>No. 100 (0.15 mm)</td>
</tr>
</tbody>
</table>

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5%
and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610.2.4. CEMENT: Cement shall conform to the requirements of ASTM C 150 - Type I or Type II. The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610.2.5. WATER: The water used in concrete shall be free from sewage, oil, acid, strong alkali, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

610.2.6. ADMIXTURES: The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

610.2.6.1. Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolons meeting the requirements of ASTM C 618.

610.2.6.2. Air-entraining admixtures shall meet the requirements of ASTM C 260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

610.2.6.3. Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.

610.2.7. PREMOLDED JOINT MATERIAL: Premolded joint material for expansion joints shall meet the requirements of ASTM D 1751.

610.2.8. JOINT FILLER: The filler for joints shall meet the requirements of Item P-605, unless otherwise specified in the proposal.

610.2.9. STEEL REINFORCEMENT: Reinforcing shall consist of welded steel wire fabric conforming to the requirements of ASTM A 497.

610.2.10. COVER MATERIALS FOR CURING: Curing materials shall conform to one of the following specifications:
610.3. CONSTRUCTION METHODS

610.3.1. GENERAL: The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified herein. All machinery and equipment owned or controlled by the Contractor, which he proposes to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610.3.2. CONCRETE COMPOSITION: The concrete shall develop a compressive strength of 3500 psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The concrete shall contain not less than 470 pounds of cement per cubic yard. The concrete shall contain 5 percent of entrained air, plus or minus 1 percent, as determined by ASTM C 231 and shall have a slump of not more than 4 inches (10 cm) as determined by ASTM C 143.

610.3.3. ACCEPTANCE SAMPLING AND TESTING: Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Compressive strength specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The Contractor shall cure and store the test specimens under such conditions as directed. The Engineer will make the actual tests on the specimens at no expense to the Contractor.

610.3.4. PROPORTIONING AND MEASURING DEVICES: When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610.3.5. CONSISTENCY: The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

610.3.6. MIXING: Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94.
610.3.7. **MIXING CONDITIONS:** The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his/her expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610.3.8. **FORMS:** Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.

610.3.9. **PLACING REINFORCEMENT:** All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610.3.10. **EMBEDDED ITEMS:** Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610.3.11. **PLACING CONCRETE:** All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of
foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610.3.12. CONSTRUCTION JOINTS: When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete that has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610.3.13. EXPANSION JOINTS: Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610.3.14. DEFECTIVE WORK: Any defective work discovered after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610.3.15. SURFACE FINISH: All exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be
permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610.3.16. CURING AND PROTECTION: All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorbive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610.3.17. DRAINS OR DUCTS: Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610.3.18. COLD WEATHER PROTECTION: When concrete is placed at temperatures below 40°F (4°C), the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50°F and 100°F (10°C and 38°C).

610.3.19. FILLING JOINTS: All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

610.4. METHOD OF MEASUREMENT

610.4.1. No separate measurement of concrete and other materials used in catch basin construction shall be determined.

610.5. BASIS OF PAYMENT

610.5.1. No payment shall be made for component materials used in catch basin construction.
610.6. TESTING REQUIREMENTS

ASTM C 31  Making and Curing Test Specimens in the Field
ASTM C 39  Compressive Strength of Cylindrical Concrete Specimens
ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
ASTM C 138 Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143 Slump of Hydraulic Cement Concrete
ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 666 Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 1077 Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1260 Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

610.7. MATERIAL REQUIREMENTS

ASTM A 184 Specification for Fabricated Deformed Steel Bar or Rod Mats for Concrete Reinforcement
ASTM A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497 Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 704 Welded Steel Plain Bars or Rod Mats for Concrete Reinforcement
ASTM C 33 Concrete Aggregates
ASTM C 94 Ready-Mixed Concrete
ASTM C 150 Portland Cement
ASTM C 171 Sheet Materials for Curing Concrete
ASTM C 172 Sampling Freshly Mixed Concrete
ASTM C 260 Air-Entraining Admixtures for Concrete
ASTM C 309 Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494  Chemical Admixtures for Concrete
ASTM C 595  Blended Hydraulic Cements
ASTM C 618  Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO T 26  Quality of Water to be used in Concrete
END OF ITEM P-610
ITEM P-620 RUNWAY AND TAXIWAY PAINTING

DESCRIPTION

This item shall consist of the preparation for and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Owner’s Representative.

This item shall also consist of the installation and removal of raised pavement marker and temporary flexible pavement markers.

MATERIALS

MATERIALS ACCEPTANCE: The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Owner’s Representative may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Owner’s Representative upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

PAINT: Paint shall be Waterborne in accordance with the requirements of paragraph 620-2.2a. Paint shall be furnished in White – 37925, Yellow - 33538 or 33655, Black – 37038, Red - 31136, and Green - 34193 in accordance with Federal Standard No 595.

a. WATERBORNE. Paint shall meet the requirements of Federal Specification TT-P-1952 E, Type II.

b. EPOXY. Not applicable.

c. METHACRYLATE. Not applicable.

d. SOLVENT BASE. Not applicable.

REFLECTIVE MEDIA: Glass beads shall meet the requirements for TT-B-1325D, Type III, gradation A. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

RAISED PAVEMENT MARKERS: Raised pavement markers shall be directional, retroreflective and of the color as indicated on the plans and shall conform to highway standards capable of being attached to pavement and standing up to traffic loading
without becoming dislodged or disfigured and without causing damage to vehicular or aircraft tires.

620.2.5. TEMPORARY FLEXIBLE PAVEMENT MARKERS: Temporary flexible raised pavement markers shall be retroreflective and of the color as indicated on the plans and shall conform to highway standards capable of being attached to pavement and standing up to traffic loading without becoming dislodged or disfigured and without causing damage to vehicular or aircraft tires.

620.3. CONSTRUCTION METHODS

620.3.1. WEATHER LIMITATIONS: The painting shall be performed only when the surface is dry and when the surface temperature is at least 50°F and rising and the pavement surface temperature is at least 5°F above the dew point. Markings shall not be applied when the pavement temperature is greater than 110°F. Markings shall not be applied when the wind speed exceeds 10 knots unless windscreens are used to shroud the material guns.

620.3.2. EQUIPMENT: All equipment for the work shall be approved by the Owner’s Representative and shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type-marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall be designed so as to apply markings of uniform cross sections and clear-cut edges without running or spattering and without over spray.

620.3.3. PREPARATION OF SURFACE: Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials without damage to the pavement surface. Paint shall not be applied to Portland cement concrete pavement until the areas to be painted are clean of curing material. Sandblasting or high-pressure water shall be used to remove curing materials. If sandblasting is used, the Contractor shall use vacuum equipment to adequately prevent fugitive dust and debris.

620.3.4. LAYOUT OF MARKINGS: The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall include permanent taxiway centerline marking, permanent taxiway edge markings, hold short lines, permanent non-movement area boundary markings, and other marking as directed by the Owner’s Representative.

620.3.5. APPLICATION: Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of
the surface has been approved by the Owner’s Representative. The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet and marking dimensions and spacings shall be within the following tolerances:

<table>
<thead>
<tr>
<th>Dimension and Spacing</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 inches or less</td>
<td>±1/2 inch</td>
</tr>
<tr>
<td>greater than 36 inches to 6 feet</td>
<td>± 1 inch</td>
</tr>
<tr>
<td>greater than 6 feet to 60 feet</td>
<td>± 2 inches</td>
</tr>
<tr>
<td>greater than 60 feet</td>
<td>± 3 inches</td>
</tr>
</tbody>
</table>

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate(s) shown in Table 1. The addition of thinner will not be permitted.

<table>
<thead>
<tr>
<th>Paint Type</th>
<th>Paint Square feet per gallon, ft²/gal</th>
<th>Glass Beads, Type III Pounds per gallon of paint—lb./gal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent</td>
<td>115 maximum</td>
<td>12 minimum</td>
</tr>
<tr>
<td>Temporary</td>
<td>250 - 300</td>
<td>--</td>
</tr>
</tbody>
</table>

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the second coat of paint. A dispenser shall be furnished which is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate(s) shown in Table 1. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Regular monitoring of glass bead embedment should be performed.

All emptied containers shall be returned to the paint storage area for checking by the Owner’s Representative. The containers shall not be removed from the airport or destroyed until authorized by the Owner’s Representative.

620.3.6. **PROTECTION:** After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings of paint.

620.3.7. **REMOVAL OF PAVEMENT MARKINGS:** Pavement markings to be removed as shown on the plans shall be removed by a fully self-contained surface preparation unit equipped with a dust collector that does not generate debris and airborne dust. The unit shall be a Goff 26-D-13 blast machine equipped with an 816 dust collector shot blaster.
by George Fisher Disa Goffs, Inc. or approved equal. The surface of asphalt concrete pavements subject to the pavement markings removal shall be sealed with a quick-set grade of emulsion – QS-1h or CQS-1h.

Where the plans indicate removal of pavement markings by painting over, the paint used shall be selected to match the color of the existing pavement to the maximum extent possible. The Contractor shall mix the paint on site and shall add white paint to black paint to produce the right shade of black or gray until the correct color is obtained to the satisfaction of the Owner’s Representative. The paint color shall vary as the pavement color varies. Paint shall be matte and non reflective or glossy. Any paint that in the opinion of the Owner’s Representative is found not to match the color of the pavement adequately shall be painted over at no additional cost to the Owner.

620.4. CLEANUP

620.4.1. The contractor shall remove from the work area all debris, waste, loose or unadhered reflective media and by-products generated by the surface preparation and application operations to the satisfaction of the Owner’s representative.

620.5. METHOD OF MEASUREMENT

620.5.1. The quantity of runway and taxiway markings to be paid in accordance with field measurement of area performed in accordance with the specifications and accepted by the Owner’s Representative.

620.6. BASIS OF PAYMENT

620.6.1. Payment shall be made at the contract price per unit in accordance with the Schedule of Prices for Airfield Pavement painting. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item nos. 106-110  Repaint Airfield Pavement – per LF
Bid Item no. 111      Repaint Airfield Pavement Symbols and Markings – per SF
Bid Item nos. 118-122 New Paint Airfield Pavement – per LF
Bid Item no. 123      New Paint Airfield Pavement Symbols and Markings – per SF
Bid Item nos. 112-116 Repaint Airfield Pavement with Reflective Glass Beads – per LF
<table>
<thead>
<tr>
<th>Bid Item no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>Repaint Airfield Pavement with Reflective Glass Beads Symbols and Markings – per SF</td>
</tr>
<tr>
<td>124-128</td>
<td>New Paint Airfield Pavement with Reflective Glass Beads – per LF</td>
</tr>
<tr>
<td>129</td>
<td>New Paint Airfield Pavement with Reflective Glass Beads Symbols and Markings – per SF</td>
</tr>
</tbody>
</table>

END OF ITEM P-620
621. Item P-621 Saw-Cut Grooves

DESCRIPTION

621-1.1 This item consists of providing a skid resistant surface that prevents hydroplaning during wet weather in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

CONSTRUCTION METHODS

621-2.1 Procedures. The Contractor shall submit to the Engineer the grooving sequence and method of placing guide lines to control grooving operation. Transverse grooves saw-cut in the pavement must form a 1/4 inch (+1/16 inch, -0 inch) wide by 1/4 inch (±1/16 inch) deep by 1-1/2 inch (-1/8 inch, +0 inch) center-to-center configuration. The grooves must be continuous for the entire runway length. They must be saw-cut transversely (perpendicular to centerline) in the runway and high-speed taxiway pavement to not less than 5 feet (1.5 m) from the runway pavement edge to allow adequate space for equipment operation.

The saw-cut grooves must meet the following tolerances. The tolerances apply to each day’s production and to each piece of grooving equipment used for production. The Contractor is responsible for all controls and process adjustments necessary to meet these tolerances. The Contractor shall routinely spot check for compliance each time the equipment aligns for a grooving pass.

a. Alignment tolerance. The grooves shall not vary more than ±1-1/2 inch (38 mm) in alignment for 75 feet (23 m) along the runway length, allowing for realignment every 500 feet (150 m) along the runway length.

b. Groove tolerance. Depth. The standard depth is 1/4 inch (6 mm). At least 90% of the grooves must be at least 3/16 inch (5 mm), at least 60% of the grooves must be at least 1/4 inch (6 mm), and not more than 10% of the grooves may exceed 5/16 inch (8 mm).

c. Width. The standard width is 1/4 inch (6 mm). At least 90% of the grooves must be at least 3/16 inch (5 mm), at least 60% of the grooves must be at least 1/4 inch (6 mm), and not more than 10% of the grooves may exceed 5/16 inch (8 mm).

d. Center-to-center spacing. The standard spacing is 1-1/2 inch (38 mm). Minimum spacing 1-3/8 inch (34 mm). Maximum spacing 1-1/2 inch (38 mm).

Saw-cut grooves must not be closer than 3 inches (8 cm) or more than 9 inches (23 cm) from transverse joints in concrete pavements. Grooves must not be closer than 6 inches (150 mm) and no more than 18 inches (0.5 m) from in-pavement light fixtures. Grooves may be continued through longitudinal construction joints. Where neoprene compression seals have been installed and the compression seals are recessed
sufficiently to prevent damage from the grooving operation, grooves may be continued through the longitudinal joints. Where neoprene compression seals have been installed and the compression seals are not recessed sufficiently to prevent damage from the grooving operation, grooves must not be closer than 3 inches (8 cm) or more than 5 inches (125 mm) from the longitudinal joints. Where lighting cables are installed, grooving through longitudinal or diagonal saw kerfs shall not be allowed.

621-2.2 Environmental requirements. Grooving operations will not be permitted when freezing conditions prevent the immediate removal of debris and/or drainage of water from the grooved area. Discharge and disposal of waste slurry shall be the Contractor’s responsibility.

621-2.3 Test section. Groove a test section in an area of the pavement outside of the trafficked area, as approved by the Engineer. The area shall be 50 feet long by two lanes wide. Demonstrate the setup and alignment process, the grooving operation, and the waste slurry disposal.

621-2.4 Existing pavements. Bumps, depressed areas, bad or faulted joints, and badly cracked and/or spalled areas in the pavement shall not be grooved until such areas are adequately repaired or replaced.

621-2.5 New pavements. New asphalt concrete pavements shall be allowed to cure for a minimum of 30 days before grooving, to allow the material to become stable enough to prevent closing of the grooves under normal use. Permit new Portland cement concrete pavements to cure for a minimum of 28 days before grooving. Spalling along or tearing or raveling of the groove edges shall not be allowed.

621-2.6 Grooving machine. Provide a grooving machine that is power driven, self-propelled, specifically designed and manufactured for pavement grooving, and has a self-contained and integrated continuous slurry vacuum system as the primary method for removing waste slurry. The grooving machine shall be equipped with diamond-saw cutting blades, and capable of making at least 18 inches (0.5 m) in width of multiple parallel grooves in one pass of the machine. Thickness of the cutting blades shall be capable of making the required width and depth of grooves in one pass of the machine. The cutting head shall not contain a mixture of new and worn blades or blades of unequal wear or diameter. Match the blade type and configuration with the hardness of the existing airfield pavement. The wheels on the grooving machine shall be of a design that will not scar or spall the pavement. Provide the machine with devices to control depth of groove and alignment.

621-2.7 Water supply. Water for the grooving operation shall be provided by the Contractor.

621-2.8 Clean-up. During and after installation of saw-cut grooves, the Contractor must remove from the pavement all debris, waste, and by-products generated by the operations to the satisfaction of the Engineer. Cleanup of waste material must be
continuous during the grooving operation. Flush debris produced by the machine to the edge of the grooved area or pick it up as it forms. The dust coating remaining shall be picked up or flushed to the edge of the area if the resultant accumulation is not detrimental to the vegetation or storm drainage system. Accomplish all flushing operations in a manner to prevent erosion on the shoulders or damage to vegetation. Waste material must be disposed of in an approved manner. Waste material must not be allowed to enter the airport storm sewer system. The Contractor must dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

621-2.9 Repair of damaged pavement. Grooving must be stopped and damaged pavement repaired at the Contractor’s expense when, in the opinion of the Engineer, the result of the grooving operation will be detrimental to aircraft tires.

ACCEPTANCE

621-3.1 Acceptance testing. Grooves will be accepted based on results of zone testing. All acceptance testing necessary to determine conformance with the groove tolerances specified will be performed by the Engineer.

Instruments for measuring groove width and depth must have a range of at least 0.5 inch (12 mm) and a resolution of at least 0.005 inch (0.13 mm). Gauge blocks or gauges machined to standard grooves width, depth, and spacing may be used.

Instruments for measuring center-to-center spacing must have a range of at least 3 inches (8 cm) and a resolution of at least 0.02 inch (0.5 mm).

The Engineer will measure grooves in five zones across the pavement width. Measurements will be made at least three times during each day’s production. Measurements in all zones will be made for each cutting head on each piece of grooving equipment used for each day’s production.

The five zones are as follows:

Zone 1 Centerline to 5 feet (1.5 m) left or right of the centerline.
Zone 2 5 feet (1.5 m) to 25 feet (7.5 m) left of the centerline.
Zone 3 5 feet (1.5 m) 25 feet (7.5 m) right of the centerline.
Zone 4 25 feet (7.5 m) to edge of grooving left of the centerline.
Zone 5 25 feet (7.5 m) to edge of grooving right of the centerline.

At a random location within each zone, five consecutive grooves sawed by each cutting head on each piece of grooving equipment will be measured for width, depth, and spacing. The five consecutive measurements must be located about the middle blade of
each cutting head ±4 inches (100 mm). Measurements will be made along a line perpendicular to the grooves.

Width or depth measurements less than 0.170 inch (4 mm) shall be considered less than 3/16 inch (5 mm).

Width or depth measurements more than 0.330 inch (8 mm) shall be considered more than 5/16 inch (8 mm).

Width or depth measurements more than 0.235 inch (6 mm) shall be considered more than 1/4 inch (6 mm).

Production must be adjusted when more than one groove on a cutting head fails to meet the standard depth, width, or spacing in more than one zone.

METHOD OF MEASUREMENT

621-4.1 The quantity of grooving to be paid for shall be the number of square yards of grooving performed in accordance with the specifications and accepted by the Engineer per paragraph 621-3.1.

BASIS OF PAYMENT

621-5.1 Payment for saw-cut grooving. Payment for saw-cut grooving will be made at the contract unit price per square yard for saw-cut grooving. This price shall be full compensation for furnishing all materials, and for all preparation, delivering, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item No. 73 Saw-Cut Grooving- per SY

END OF ITEM P-621
626. ITEM P-626 EMULSIFIED ASPHALT SLURRY SEAL SURFACE TREATMENT

626.1 DESCRIPTION

626.1.1. This item shall consist of a mixture of emulsified asphalt, mineral aggregate, and water properly proportioned, mixed, and spread on an asphalt prepared underlying course or existing wearing course in accordance with these specifications and shall conform to the dimensions shown on the plans or as directed by the Owner’s Representative.

626.2 MATERIALS

626.2.1. AGGREGATE: The aggregate shall consist of sound and durable manufactured sand, slag, crusher fines, crushed stone, or a combination thereof. The aggregate shall be clean and free from vegetable matter, dirt, and other deleterious substances. The aggregate shall have a sand equivalent of not less than 45 percent when tested in accordance with ASTM D 2419. The aggregate shall show a loss of not more than 35 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, or the magnesium soundness loss shall not exceed 20 percent after 5 cycles when tested in accordance with ASTM C 88. Aggregate shall be 100 percent crushed.

The combined aggregate shall conform to the gradation shown in Table 1 when tested in accordance with ASTM C 136 and ASTM C 117.

TABLE 1. GRADATION OF AGGREGATES

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent by Weight Passing Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type I</td>
</tr>
<tr>
<td>3/8 in.</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>100</td>
</tr>
<tr>
<td>No. 8</td>
<td>90 - 100</td>
</tr>
<tr>
<td>No. 16</td>
<td>65 - 90</td>
</tr>
<tr>
<td>No. 30</td>
<td>40 - 65</td>
</tr>
<tr>
<td>No. 50</td>
<td>25 - 42</td>
</tr>
<tr>
<td>No. 100</td>
<td>15 - 30</td>
</tr>
<tr>
<td>No. 200</td>
<td>10 - 20</td>
</tr>
<tr>
<td>Residual asphalt content percent dry weight of aggregate</td>
<td>10% - 16%</td>
</tr>
</tbody>
</table>

The job mix formula (mix design) shall be run using aggregate within the gradation band for the desired type shown in Table 1. Once the mix design has been submitted and approved, the aggregate used on the project shall not vary by more than the tolerances shown in Table 2. At no time shall the aggregate used go out of the gradation bands in Table 1.
The aggregate will be accepted at the job location or stockpile. The stockpile will be accepted based on five gradation tests samples in accordance with ASTM D 75. If the average of the five tests is within the gradation tolerances, then the materials will be accepted. If the tests show the material to be out of tolerance, the Contractor will be given the choice either to remove the material or blend other aggregates with the stockpile material to bring it into specification. Materials used in blending shall meet the quality tests before blending and shall be blended in a manner to produce a consistent gradation. This blending may require a new mix design.

Screening shall be required at the project stockpile site if there are any problems created by having oversize materials in the mix.

Precautions shall be taken to prevent segregation of the aggregate in storing and handling. The stockpile shall be kept in areas that drain readily.

626.2.1.1. AGGREGATE TOLERANCE: Once the mix design has been accepted, the aggregate gradation used on the project may vary from the aggregate gradation used in the mix design on each sieve by the percentages shown in Table 2. If the project aggregate fails to remain within this tolerance, a new mix design will be required by the Owner’s Representative at the expense of the Contractor.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Tolerance, percent by weight passing sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 in.</td>
<td>+ or – 0%</td>
</tr>
<tr>
<td>No. 4</td>
<td>+ or - 2%</td>
</tr>
<tr>
<td>No. 8</td>
<td>+ or - 5%</td>
</tr>
<tr>
<td>No. 16</td>
<td>+ or - 5%</td>
</tr>
<tr>
<td>No. 30</td>
<td>+ or - 5%</td>
</tr>
<tr>
<td>No. 50</td>
<td>+ or - 4%</td>
</tr>
<tr>
<td>No. 100</td>
<td>+ or - 3%</td>
</tr>
<tr>
<td>No. 200</td>
<td>+ or - 2%</td>
</tr>
<tr>
<td>Residual Asphalt, percent dry weight of aggregate</td>
<td>+ or - 1%</td>
</tr>
</tbody>
</table>

626.2.2. MINERAL FILLER: If mineral filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242 and shall be used in the amounts required by the mix design. The mineral filler shall be considered as part of the aggregate.

626.2.3. EMULSIFIED ASPHALT: The emulsified asphalt shall conform to the requirements of ASTM D 977 and/or 2397 and shall be SS, CSS, CQS, or QS type emulsions.

626.2.4. WATER: All water used in making the slurry shall be potable and free from harmful soluble salts and chemicals.
626.3 COMPOSITION AND APPLICATION

626.3.1. COMPOSITION: The slurry seal shall consist of a mixture of emulsified asphalt, mineral aggregate, and water.

626.3.2. JOB MIX FORMULA: No slurry seal for payment shall be placed until a mix design has been approved by the Owner’s Representative. The mix design shall be developed by a laboratory with experience in designing slurry seal mixes and a signed copy shall be submitted in writing by the Contractor to the Owner’s Representative at least 10 days prior to the start of operations.

The laboratory report (mix design) shall indicate the proportions of aggregates, mineral filler (min. and max.), water (min. and max.) and asphalt emulsion based on the dry aggregate weight. It shall also report the quantitative effects of moisture content on the unit weight of the aggregate (bulking effects). The mix design shall be in effect until modified in writing by the Owner’s Representative. Should a change in sources of materials be made, a new mix design shall be established before the new material is used.

The Contractor shall submit to the Owner’s Representative for approval a complete mix design on the materials proposed for use, prepared and certified by an approved laboratory. Compatibility of the aggregate, emulsion, mineral filler, and other additives shall be verified by the mix design. The mix design shall be made with the same aggregate and grade of emulsified asphalt that the Contractor will provide on the project. At a minimum the required tests and values needed are as follows:

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISSA TB-100 Wet Track Abrasion Loss</td>
<td>50 g/ft² max</td>
</tr>
<tr>
<td>One Hour Soak</td>
<td></td>
</tr>
<tr>
<td>ISSA TB-115 Determination of Slurry Seal</td>
<td>Pass</td>
</tr>
<tr>
<td>Seal Compatibility</td>
<td></td>
</tr>
</tbody>
</table>

626.3.3. APPLICATION RATE: Unless otherwise specified, the slurry seal shall be applied to at the application rates shown in Table 3 for that gradation of material used.

626.3.4. TEST SECTIONS: Test sections shall be placed prior to the start of the slurry seal work in the presence of the Owner’s Representative. The test area will be designated by the Owner’s Representative and will be located on the existing pavement. Test strips shall be made by each machine after calibration. Samples of the slurry seal may be taken and the mix consistency verified by using ISSA TB-106 Slurry Seal Consistency test. In addition, the proportions of the individual materials may be verified by the Owner’s Representative by using the calibration information provided after machine calibration. If any test does not meet specification requirements, additional tests shall be made at the expense of the Contractor, until an acceptable test strip is placed.
626.4 CONSTRUCTION METHODS

626.4.1. WEATHER LIMITATIONS: The slurry seal shall not be applied if either the pavement or air temperature is below 50° F and falling but may be applied when both pavement and air temperature are above 45° F and rising. No slurry seal shall be applied when there is danger that the finished product will freeze before 24 hours. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

626.4.2. EQUIPMENT AND TOOLS: The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of this work.

626.4.2.1. SLURRY MIXING EQUIPMENT: The machine shall be specifically designed and manufactured to lay slurry seal. The material shall be mixed by a self-propelled slurry seal mixing machine of either truck mounted or continuous run design. Either type machine shall be able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, and water to a revolving mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for materials to maintain an adequate supply to the proportioning controls.

If continuous run equipment is used, the machine shall be equipped to allow the operator to have full control of the forward and reverse speed of the machine during application of the slurry seal, with a self-loading device, with opposite side driver stations, all part of original equipment manufacturer design.

The aggregate shall be pre-wetted immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients. No excessive mixing shall be permitted. The mixing machine shall be equipped with a fines feeder that provides an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer at the same time and location that the aggregate is fed into the mixer.

The mixing machine shall be equipped with a water pressure system and fog-type spray bar adequate for complete fogging of the surface with an application of 0.05 to 0.10 gallon per square yard preceding the spreading equipment.

Sufficient machine storage capacity to mix properly and apply a minimum of 5 tons of the slurry shall be provided. Proportioning devices shall be calibrated prior to placing the slurry seal.

626.4.2.2. SLURRY SPREADING EQUIPMENT: The mixture shall be spread uniformly by means of a conventional surfacing spreader box attached to the mixer and equipped to agitate and spread the material evenly throughout the box. A front seal shall be provided to insure no loss of the mixture at the surface contact point. The rear seal shall act as the final strike-off and shall be adjustable. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow
of material to the rear strike-off. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform mat.

626.4.2.3. AUXILIARY EQUIPMENT: Other tools or equipment such as brushes, hand squeegees, hose equipment, tank trucks, water distributors and flushers, power blowers, barricades, etc., shall be provided as required.

626.4.2.4. ROLLER: The roller, if required, shall be a self-propelled pneumatic-tired roller capable of exerting a contact pressure during rolling of 50 pounds per square inch. It shall be equipped with a water spray system, to be used if the slurry is picking up on the tires during rolling.

626.4.2.5. TACK COAT AND DISTRIBUTOR: Normally a tack coat is not required unless the surface to be covered is extremely dry and raveled or is concrete or brick. If required, the tack coat should consist of one part emulsified asphalt and three parts water. The emulsified asphalt may be the same as that used in the mix. Pressure distributors used for application of the diluted asphalt emulsion tack coat shall be self-propelled, equipped with pneumatic tires, and capable of uniformly applying 0.05 to 0.15 gallon per square yard of the diluted emulsion over the required width of application. Distributors shall be equipped with tachometers, pressure gages, and volume-measuring devices. The tack coat shall be applied at least 2 hours before the slurry seal but within the same day.

626.4.3. EQUIPMENT CALIBRATION: Each slurry mixing unit to be used on the project shall be calibrated in the presence of the Owner’s Representative prior to construction. Previous calibration documentation covering the exact materials to be used may be accepted by the Owner’s Representative provided they were made during the calendar year. The documentation shall include an individual calibration of each material at various settings, which can be related to the machine's metering devices. No machine will be allowed to work on the project until the calibration has been completed and/or accepted.

626.4.4. PREPARATION OF EXISTING SURFACE: Prior to placing the tack coat and slurry seal coat, unsatisfactory areas shall be repaired and the surface shall be cleaned of dust, dirt, or other loose foreign matter, grease, oil, excessive rubber accumulation, or any type of objectionable surface film. Any standard cleaning method will be acceptable except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface.

Any painted stripes or markings on the surface of the runways or taxiways to be treated, shall be removed.

Cracks wider than 1/4 inch shall be cleaned with compressed air, and sealed with a compatible crack sealer prior to applying the slurry seal. Cracks wider than 3/4 inch
should be pre-filled and sealed with the slurry mixture prior to surfacing. Cracks that show evidence of vegetation shall be cleaned and treated with an approved herbicide.

**626.4.5. APPLICATION OF SLURRY SEAL COAT:** The surface shall be prewet by fogging ahead of the slurry spreader box. Water used in prewetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the slurry spreader box. The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. Total time of mixing shall not exceed 2 minutes. A sufficient amount of slurry shall be carried in all parts of the spreader box at all times so that complete coverage of all surface voids and cracks is obtained. Care shall be taken not to overload the spreader box that shall be towed at a slow and uniform rate not to exceed 5 miles per hour. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry shall be removed from the pavement surface. A sufficient amount of slurry shall be fed into the box to keep a full supply against the full width of the spreader box. The mixture shall not be permitted to overflow the sides of the spreader box. No breaking of the emulsion will be allowed in the spreader box. The finished surface shall have no more than four (4) tear or drag marks greater than 1/2 inch wide and 4 inches long in any 12 foot by 22 foot section. It shall have no tear or drag marks greater than 1 inch wide and 3 inches long.

The finished surface shall have no transverse ripples of 1/4 inch or more in depth, as measured with a 10-foot straight edge laid upon the surface.

Adjacent lanes shall be lapped at the edges a minimum of 2 inches with a maximum of 4 inches to provide complete sealing at the overlap. Construction longitudinal and transverse joints shall be neat and uniform without buildup, uncovered areas, or unsightly appearance. All joints shall have no more than 1/4 inch difference in elevation when measured across with a 10 foot straight edge.

The fresh slurry seal application shall be protected by barricades and markers and permitted to dry for 4 to 24 hours, depending on weather conditions. Any damage to uncured slurry shall be repaired at the expense of the Contractor.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee. Upon completion of the work, the seal coat shall have no holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform and skid resistant texture satisfactory to the Owner’s Representative. All wasted and unused material and all debris shall be removed from the site prior to final acceptance.

Upon completion of the project, the Contractor shall sweep the finished surface with a conventional power rotary broom, to remove any potential loose material from the surface. The material removed by sweeping shall be disposed of in a manner satisfactory to the Owner’s Representative.
626.4.6. **EMULSION MATERIAL (CONTRACTORS RESPONSIBILITY):** Samples of the emulsion that the Contractor proposes to use, together with a statement as to its source, shall be submitted, and approval shall be obtained before using such material. The Contractor shall submit to the Owner’s Representative a manufacturer’s certified report for each consignment of the emulsion. The manufacturer's certified report shall not be interpreted as a basis for final acceptance. All such reports shall be subject to verification by testing samples of the emulsion as received for use on the project.

626.5 **METHOD OF MEASUREMENT**

626.5.1. The slurry seal surface treatment shall be measured by the square yard.

626.6 **BASIS OF PAYMENT**

626.6.1. Payment shall be made at the contract unit price per square yard of slurry seal treatment areas. These prices shall be full compensation for furnishing all materials, for preparing, mixing, and applying these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bid Item no 76 P-626 Emulsified Asphalt Slurry Seal Treatment - per SY

626.7 **TESTING REQUIREMENTS**

ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

ASTM C 117 Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing

ASTM C 128 Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate

ASTM C 131 Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregates

ASTM D 75 Sampling Aggregates

ASTM D 2419 Sand Equivalent Value of Soils and Fine Aggregate

ISSA A 105 Recommended Performance Guidelines
ISSA TB-100    Wet Track Abrasion Loss
ISSA TB-106    Slurry Seal Consistency
ISSA TB 111    Outline Guide Design Procedure for Slurry Seal
ISSA TB-115    Determination of Slurry Seal Compatibility

626.8 MATERIAL REQUIREMENTS
ASTM D 242    Mineral Filler for Bituminous Paving Mixtures
ASTM D 977    Emulsified Asphalt
ASTM D 2397   Cationic Emulsified Asphalt

END OF ITEM P-626
630. ITEM P-630 Refined Coal Tar Emulsion Without Additives, Slurry Seal Surface Treatment

630.1. GENERAL: This item shall consist of a mixture of refined coal tar emulsion, mineral aggregate, and water properly proportioned, mixed, and applied as a slurry seal on new or existing (aged) asphalt concrete pavement. This is intended as a fuel resistant coating to delay deterioration of the asphalt concrete caused by petroleum spillage.

630.2. MATERIALS

630.2.1. Refined Coal Tar Emulsion: A refined coal tar emulsion prepared from a high temperature refined coal tar conforming to the requirements of ASTM specification D 490 for grade 11-12. The use of oil and water gas tar is not allowed. Base refined coal tar emulsion must conform to all requirements of Federal Specification R-P-355.

630.2.2. Aggregate: The aggregate shall be washed dry silica sand or boiler slag free of dust, trash, clay, organic materials or other deleterious substances. The aggregate shall meet the gradation requirements of Table 1, when tested in accordance with ASTM C 136.

### TABLE 1 - GRADATION OF AGGREGATES

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Retained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td>#20 or coarser (0.850 mm)</td>
<td>0</td>
</tr>
<tr>
<td>#30 (0.600 mm)</td>
<td>0</td>
</tr>
<tr>
<td>#40 (0.425 mm)</td>
<td>2</td>
</tr>
<tr>
<td>#50 (0.300 mm)</td>
<td>5</td>
</tr>
<tr>
<td>#70 (0.212 mm)</td>
<td>5</td>
</tr>
<tr>
<td>#100 (0.150 mm)</td>
<td>5</td>
</tr>
<tr>
<td>#140 (0.106 mm)</td>
<td>0</td>
</tr>
<tr>
<td>#200 (0.075 mm)</td>
<td>0</td>
</tr>
<tr>
<td>Finer than #200</td>
<td>0</td>
</tr>
</tbody>
</table>

1 Table 1 represents the maximum range of aggregate gradations. In all cases the refined coal tar emulsion supplier is to give written approval of the aggregate used in the mix design.

630.2.3. WATER: Water for mixing shall be potable, free of harmful soluble salts, and at least 50°F.

630.2.4. CRACK SEALANT: Crack sealant shall be certified for compatibility with the refined coal tar emulsion by the manufacturer of the refined coal tar emulsion, and approved by the engineer.
630.2.5. **OIL SPOT PRIMER:** Oil spot primer shall be certified for compatibility with the refined coal tar emulsion by the manufacturer of the refined coal tar emulsion, and approved by the engineer.

630.2.6. **PAVEMENT PRIMER:** Pavement primer shall be certified for compatibility with the refined coal tar emulsion by the manufacturer of the refined coal tar emulsion, and approved by the engineer.

630.2.7. **ALTERNATIVE PRODUCTS:** Commercially available sealers may be used provided they meet approval by JWA. These products are proprietary formulations that do not contain coal tar and thus do not pose environmental risks and may or may not contain petroleum products. Some examples are Carbon Plex H-25, EnviroSeal LAS 320.

630.3. **COMPOSITION AND APPLICATION**

630.3.1. **COMPOSITION:** The refined coal tar emulsion seal coat is to consist of a mixture of refined coal tar emulsion, water and aggregate, and be proportioned as shown in Table 2. The composition must have written approval of the coal tar emulsion manufacturer. Alternative products shall be formulated in accordance with manufacturer’s recommendations.

630.3.2. **JOB MIX FORMULA:** The contractor shall submit the recommended formulation of water, emulsion, aggregate and application rate proposed for use to a testing laboratory together with sufficient materials to verify the formulation at least 5 days prior to the start of operations. The mix design shall be within the range shown in Table 2. No seal coat shall be produced for payment until a job mix formula has been approved by the Engineer. The formulation shall pass the fuel resistance test in Appendix A.

The job mix formula for each mixture shall be in effect until modified in writing by the Engineer.
TABLE 2
COMPOSITION OF MIXTURE PER 100 GAL OF REFINED COAL TAR EMULSION

<table>
<thead>
<tr>
<th>Application</th>
<th>Refined Coal Tar Emulsion</th>
<th>Water</th>
<th>Aggregate</th>
<th>Formula Rate of Application of Mix per Square Yard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gallons</td>
<td>Gallons</td>
<td>LBS</td>
<td>Minimum Gallons</td>
</tr>
<tr>
<td>Prime Coat (where required) as specified by the coal tar emulsion manufacturer.</td>
<td>100</td>
<td>25-30</td>
<td>300-500</td>
<td>0.12</td>
</tr>
<tr>
<td>1st Seal Coat</td>
<td>100</td>
<td>25-30</td>
<td>300-500</td>
<td>0.12</td>
</tr>
<tr>
<td>2nd Seal Coat</td>
<td>100</td>
<td>25-30</td>
<td>300-500</td>
<td>0.12</td>
</tr>
</tbody>
</table>

630.3.3. APPLICATION RATE: Application rates are not to exceed 0.17 gal/yd.²/coat (0.77 liters/m²/coat), and at no time are total coats to exceed 0.51 gal/yd² (2.3 liters/m²).

630.3.4. TEST SECTION: Prior to full production, the Contractor shall prepare a quantity of mixture in the proportions shown in the approved mix design. The amount of mixture shall be sufficient to place a test section a minimum of 250 square yards at the rate specified in the job mix formula. The area to be tested will be designated by the Engineer and will be located on a representative section of the pavement to be seal coated. The actual application rate will be determined by the Engineer during placement of the test section and will depend on the condition of the pavement surface.

The test section shall be used to verify the adequacy of the mix design and to determine the application rate. The same equipment and method of operations shall be used on the test section as will be used on the remainder of the work.

If the test section should prove to be unsatisfactory, the necessary adjustments to the job mix formula, mix composition, application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and evaluated, if required. Full production shall not begin without the Engineer's approval. Acceptable test sections shall be paid for in accordance with paragraph 630-7.1.

630.4. CONSTRUCTION METHODS

630.4.1. WEATHER LIMITATIONS: The seal coat shall not be applied when the surface is wet or when the humidity or impending weather conditions will not allow proper curing. The seal coat shall be applied only when the atmospheric or pavement temperature is 50°F (10°C) and rising and is expected to remain above 50°F (10°C) for 24 hours, unless otherwise directed by the Engineer. Alternative products shall be placed in accordance with manufacturer’s recommendations.
630.4.2. EQUIPMENT AND TOOLS: The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

630.4.2.1. DISTRIBUTORS: Distributors or spray units used for the spray application of the seal coat shall be self-propelled and capable of uniformly applying 0.12 to 0.55 gallons per square yard (0.54 to 2.5 liters per square meter) of material over the required width of application. Distributors shall be equipped with removable manhole covers, tachometers, pressure gauges, and volume-measuring devices.

The mix tank shall have a mechanically powered, full-sweep, mixer with sufficient power to move and homogeneously mix the entire contents of the tank.

The distributor shall be equipped with a positive placement pump so that a constant pressure can be maintained on the mixture to the spray nozzles.

630.4.2.2. MIXING EQUIPMENT: The mixing machine shall have a continuous flow mixing unit capable of accurately delivering a predetermined proportion of aggregate, water, and emulsion, and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together and discharging the material to the spreader box without segregation.

630.4.2.3. SPREADING EQUIPMENT: Spreading equipment shall be a mechanical-type squeegee distributor attached to the mixing machine, equipped with flexible material in contact with the surface to prevent loss of slurry from the spreader box. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; coal-tar emulsion and aggregate build-up on the box shall not be permitted.

630.4.2.4. HAND SQUEEGEE OR BRUSH APPLICATION: The use of hand spreading application shall be restricted to places not accessible to the mechanized equipment or to accommodate neat trim work at curbs, etc. Material that is applied by hand shall meet the same standards as that applied by machine.

630.4.2.5. CALIBRATION: The Contractor shall furnish all equipment, materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that conforms to the job mix formula. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the seal coat to the pavement. A copy of the calibration test results shall be furnished to the Engineer.

630.4.3. PREPARATION OF EXISTING ASPHALT PAVEMENT SURFACES: Existing asphalt pavements indicated to be seal coated shall be prepared as follows:
JOHN WAYNE AIRPORT
PAVEMENT MAINTENANCE AND REPAIR
PROJECT NO. 280-280-1400-P305

a. Patch bituminous pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new bituminous concrete similar to that of the existing pavement. If a solvent containing cold-applied material is used, complete patching a minimum of 90 days prior to the planned application of the sealer to permit solvent to escape before sealing.

b. Remove all vegetation and debris from cracks to a minimum depth of 1”. If extensive vegetation exists treat the specific area with a concentrated solution of a water-based herbicide approved by the engineer. Fill all cracks, ignoring hairline cracks (< 1/4” wide) with a crack sealant. Wider cracks (over 1½” wide (38.4 mm)), along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated above.

c. Clean pavement surface immediately prior to placing the prime coat or seal coat by sweeping, flushing well with water leaving no standing water, or a combination of both, so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

d. Remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with the oil spot primer.

e. To insure adhesion to sound but oxidized pavements, mix and apply a prime coat of a type and at a rate recommended by the coal tar emulsion manufacturer, after all loose aggregate is removed.

630.4.4. PREPARATION OF NEW ASPHALT PAVEMENT SURFACES: New asphalt pavements indicated to be seal coated shall be prepared as follows:

a. Cure new asphalt pavement surfaces so that there is no concentration of oils on the surface.

b. A period of at least 60 days at +70ºF daytime temperatures must elapse between the placement of a hot mixed asphalt concrete surface course and the application of the seal coat.

c. Perform a water-break-free test to confirm that the surface oils have degraded and dissipated. (Cast one gallon of clean water out over the surface. The water should sheet out and wet the surface uniformly without crawling or showing oil rings.) If asphalt does not pass this test, additional time must be allowed for extra curing and retesting prior to sealing.

d. Clean pavement surface immediately prior to placing the prime coat or seal coat by sweeping, flushing well with water leaving no standing water, or a combination of
both, so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

e. Where oil spot priming is needed, remove oil or grease that has not penetrated the asphalt pavement by scraping or by scrubbing with a detergent, then wash thoroughly with clean water. After cleaning, treat these areas with the oil spot primer.

630.4.5. MIXING: Blend the coal tar emulsion mixture in the equipment described in paragraph 630.4.2 using the ingredients described in Table 2. The mixing must produce a smooth homogeneous mixture of uniform consistency. (Consult coal tar emulsion supplier for its recommended order of addition of the ingredients.) During the entire mixing and application process, no breaking, segregating or hardening of the emulsion, nor balling or lumping of the sand is to be permitted. Continue to agitate the seal coat mixture in the mixing tank at all times prior to and during application so that a consistent mix is available for application.

Small additional increments of water may be needed to provide a workable consistency, but in no case is the water content to exceed the specified amount.

630.4.6. APPLICATION OF SLURRY SEAL COAT: The aggregate filled slurry seal coat shall be applied at a uniform rate determined in paragraph 630.3.3.

In order to provide maximum adhesion, the pavement shall be dampened with a fog spray of water if recommended by the supplier. No standing water shall remain on the surface.

If a prime coat is required, mix and apply the prime coat as specified in paragraph 630.4.3 for existing pavements or paragraph 630.4.4 for new pavements.

Apply the first coat uniformly to obtain the rate determined in paragraph 630.3.3. Each coat shall be allowed to dry and cure initially before applying any subsequent coats. The initial drying shall allow evaporation of water of the applied mixture, resulting in the coating being able to sustain light foot traffic. The initial curing shall enable the mixture to withstand vehicle traffic without damage to the seal coat.

Apply the second coat in the same manner as outlined for the first coat.

Additional coats shall be applied over the entire surface as directed by the engineer.

The finished surface shall present a uniform texture.

The final coat shall be allowed to dry a minimum of eight hours in dry daylight conditions before opening to traffic, and initially cure enough to support vehicular traffic without damage to the seal coat.
Where marginal weather conditions exist during the eight hour drying time, additional drying time shall be required. The length of time shall be as specified by the supplier. The surface shall be checked after the additional drying time for trafficability before opening the section to vehicle traffic.

Where striping is required, the striping paint utilized shall meet the requirements of P-620, shall be compatible with the seal coat and as recommended by the coal tar emulsion manufacturer.

630.5. QUALITY CONTROL

630.5.1. CONTRACTOR'S CERTIFICATION: The Contractor shall furnish the manufacturer's certification that each consignment of emulsion shipped to the project meets the requirements of Federal specification R-P-355, except that the water content shall not exceed 50 percent. The certification shall also indicate the solids and ash content of the emulsion and the date the tests were conducted. The certification shall be delivered to the Engineer prior to the beginning of work. The manufacturer's certification for the emulsion shall not be interpreted as a basis for final acceptance. Any certification received shall be subject to verification by testing samples received for project use.

The Contractor shall also furnish a certification demonstrating a minimum of three years’ experience in the application of coal-tar emulsion seal coats. For alternative materials a manufacturer’s representative shall be available during planning and installation of the product.

630.5.2. INSPECTION: The Owner shall have an independent technical consultant on the job site at the beginning of operations for application of coal-tar emulsion seal coats. The consultant shall have knowledge of the materials, procedures, and equipment described in this specification and shall assist the Contractor regarding proper mixing of the component materials and application of the seal coat. The consultant shall have a minimum of 3 years’ experience in the use of coal-tar seal coats. Documentation of this experience shall be furnished to the Engineer prior to the start of operations. The cost of the technical consultant shall be paid for by the Owner.

630.5.3. SAMPLING: A minimum of one sample per day shall be tested for the properties of Table 2. A random sample of approximately one-quart of the composite mix will be obtained daily by the contractor and stored in a glass container. The containers shall be sealed against contamination and retained in storage by the Owner for a period of six months. Samples shall be stored at room temperature and not be subjected to freezing temperatures.

A sample of undiluted coal-tar emulsion shall be obtained from each consignment shipped to the job.

630.5.4. ENGINEER'S RECORDS: The Engineer will keep an accurate record of each batch of materials used in the formulation of the seal coat.
630.6. **METHOD OF MEASUREMENT**

630.6.1. Jet Fuel Resistant Seal Coat shall be measured by the square yards placed and accepted by JWA.

630.7. **BASIS OF PAYMENT**

630.7.1. Payment shall be made at the contract unit price per square yard completed and accepted by JWA.

These prices shall be full compensation for furnishing all materials, preparing, mixing, and applying these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item 77  Jet Fuel Resistant Seal Coat - per SY

Item 78  Alternative Jet Fuel Resistant Seal Coat - per SY

630.8. **TESTING REQUIREMENTS**

- ASTM C 67  Sampling and Testing Brick and Structural Clay Tile
- ASTM C 136  Sieve or Screen Analysis of Fine and Coarse Aggregates
- ASTM D 160  Practice of Sampling Bituminous Materials

630.9. **MATERIAL REQUIREMENT**

- ASTM D 490  Standard Specification for Road Tar
- ASTM D 692  Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
- ASTM C 3699  Kerosene
- ASTM D 5727  Emulsified Refined Coal Tar (Mineral Colloid Type)
FED SPEC R-P-355  Pitch, Coal-tar Emulsion (Coating for Bituminous Pavements) ASTM D 5727 Emulsified Refined Coal Tar (Mineral Colloid Type)

END OF ITEM P-630
751. ITEM D-751 3’ x 3’ CATCH BASINS

751.1. DESCRIPTION

751.1.1. This item shall consist of construction of catch basins, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.

751.2. MATERIALS

751.2.1. CONCRETE: Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610, incorporated here-in as Appendix A.

751.2.2. PRECAST CONCRETE PIPE MANHOLE RINGS: Precast concrete pipe manhole rings shall conform to the requirements of ASTM C 478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches (90 cm) nor more than 48 inches (120 cm).

751.2.3. FRAMES, COVERS, AND GRATES: The castings shall conform to one of the following requirements:

   a. Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.

   b. Malleable iron castings shall meet the requirements of ASTM A 47.

   c. Steel castings shall meet the requirements of ASTM A 27.

   d. Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.

   e. Ductile iron castings shall conform to the requirements of ASTM A 536.

   f. Austempered ductile iron castings shall conform to the requirements of ASTM A 897.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A 123.
751.2.4. STEPS: The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

751.3. CONSTRUCTION METHODS

751.3.1. UNCLASSIFIED EXCAVATION

a. The Contractor shall do all excavation for structures and structure footings to the lines and grades or elevations, shown on the plans, or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. Unless otherwise provided, bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

751.3.2. CONCRETE STRUCTURES: Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is placed. All invert channels shall be constructed
and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward the outlet.

751.3.3. PRECAST CONCRETE PIPE STRUCTURES: Precast concrete pipe structures shall be constructed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the plans. All precast concrete pipe sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be cemented with mortar. The top of the upper precast concrete pipe member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal steps that are embedded or built into the side walls shall be aligned and placed at vertical intervals of 12 inches (300 mm). When a metal ladder replaces the steps, it shall be securely fastened into position.

751.3.4. INLET AND OUTLET PIPES: Inlet and outlet pipes shall extend through the walls of the structures for a sufficient distance beyond the outside surface to allow for connections but shall be cut off flush with the wall on the inside surface, unless otherwise directed. For concrete or brick structures, the mortar shall be placed around these pipes so as to form a tight, neat connection.

751.3.5. PLACEMENT AND TREATMENT OF CASTINGS, FRAMES, AND FITTINGS: All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Engineer, and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set. When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall set firm and secure. After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for 7 days, then the grates or covers shall be placed and fastened down.

751.3.6. INSTALLATION OF STEPS: The steps shall be installed as indicated on the plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is poured. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least 7 days. After this period has elapsed, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete pipe structures, they shall be cast into the sides of the pipe at the time the pipe sections are manufactured or set in place after
the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches (300 mm).

In lieu of steps, prefabricated ladders may be installed. In the case of brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. In the case of metal structures, the ladder shall be secured by welding the top support and grouting the bottom support into drilled holes in the foundation or as directed.

751.3.7. BACKFILLING

After a structure has been completed, the area around it shall be filled with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.

Backfilling shall not be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until the concrete has been in place 7 days, or until tests made by the laboratory under supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Backfill shall not be measured for direct payment. Performance of this work shall be considered on obligation of the Contractor covered under the contract unit price for the structure involved.

751.3.8. CLEANING AND RESTORATION OF SITE: After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

751.4. METHOD OF MEASUREMENT

751.4.1. Catch basins shall be measured by the unit.

751.5. BASIS OF PAYMENT

751.5.1. The accepted quantities of catch basins will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials;
furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

Payment will be made under:

Bid Item No. 78  3’ x 3’ Catch Basins - per EA

751.6. MATERIAL REQUIREMENT

ASTM A 27  Steel Castings, Carbon, for General Application
ASTM A 47  Ferritic Malleable Iron Castings
ASTM A 48  Gray Iron Castings
ASTM A 123  Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283  Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A 536  Ductile Iron Castings
ASTM A 897  Austempered Ductile Iron Castings
ASTM C 32  Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 144  Aggregate for Masonry Mortar
ASTM C 150  Portland Cement
ASTM C 478  Precast Reinforced Concrete Manhole Sections
AASHTO M 36  Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains

END OF ITEM 751
610. APPENDIX A - ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

610.1. DESCRIPTION

610.1.1. This item shall consist of structural Portland cement concrete, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

610.2. MATERIALS

610.2.1. GENERAL: Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

Aggregates shall be tested for deleterious reactivity with alkalis in the cement that may cause excessive expansion of the concrete. Acceptance of aggregates shall be based upon satisfactory evidence furnished by the Contractor that the aggregates, combined with other mixture constituents, do not produce excessive expansion in the concrete. This evidence shall include service records of concrete of comparable properties under similar conditions or exposure and certified records of tests by a testing laboratory that meets the requirements of ASTM C 1077. Tests shall be made in accordance with ASTM C 1260. Test specimens shall be produced using all components (e.g. coarse aggregate, fine aggregate, cement and fly ash…) to be included in the produced concrete. If the mean expansion of the test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 16 days from casting the aggregates shall be accepted. If the mean expansion at 16 days is greater than 0.10% but less than 0.15%, the aggregate may be accepted based upon satisfactory service records and acceptance of the aggregate by a State Highway Department specifically addressing Alkali-Silica Reactivity. If the expansion is greater than 0.15%, the aggregate shall not be accepted for use.

610.2.2. COARSE AGGREGATE: The coarse aggregate for concrete shall meet the requirements of ASTM C 33. Crushed stone aggregate shall have a durability factor, as determined by ASTM C 666, greater than or equal to 95. The Engineer may consider
and reserve final approval of other State classification procedures addressing aggregate durability.

Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

610.2.3. **FINE AGGREGATE:** The fine aggregate for concrete shall meet the requirements of ASTM C 33.

The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2 when tested in accordance with ASTM C 136:

**TABLE 1. GRADATION FOR COARSE AGGREGATE**

<table>
<thead>
<tr>
<th>Sieve Designation (square openings)</th>
<th>Percentage by Weight Passing Sieves</th>
<th>2&quot;</th>
<th>1-1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
<th>1/2&quot;</th>
<th>3/8&quot;</th>
<th>No.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4 to 3/4 in. (4.75-19.0 mm)</td>
<td></td>
<td>100</td>
<td>90-100</td>
<td>90-100</td>
<td>20-55</td>
<td>0-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 4 to 1 in. (4.75-25.0 mm)</td>
<td></td>
<td>100</td>
<td>90-100</td>
<td>25-60</td>
<td></td>
<td>0-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. 4 to 1-1/2 in. (4.75-38.1 mm)</td>
<td></td>
<td>100</td>
<td>95-100</td>
<td>35-70</td>
<td>10-30</td>
<td>0-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2. GRADATION FOR FINE AGGREGATE**

<table>
<thead>
<tr>
<th>Sieve Designation (square openings)</th>
<th>Percentage by Weight Passing Sieves</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch (9.5 mm)</td>
<td>100</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>95-100</td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
<td>45-80</td>
</tr>
<tr>
<td>No. 30 (0.60 mm)</td>
<td>25-55</td>
</tr>
<tr>
<td>No. 50 (0.30 mm)</td>
<td>10-30</td>
</tr>
<tr>
<td>No. 100 (0.15 mm)</td>
<td>2-10</td>
</tr>
</tbody>
</table>

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than portland
cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610.2.4. CEMENT: Cement shall conform to the requirements of ASTM C 150 - Type I or Type II. The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610.2.5. WATER: The water used in concrete shall be free from sewage, oil, acid, strong alkalies, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

610.2.6. ADMIXTURES: The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

610.2.6.1. Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolons meeting the requirements of ASTM C 618.

610.2.6.2. Air-entraining admixtures shall meet the requirements of ASTM C 260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

610.2.6.3. Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added
at the mixer separately from air-entraining admixtures in accordance with
the manufacturer's printed instructions.

610.2.7. **PREMOLDED JOINT MATERIAL:** Premolded joint material for expansion
joints shall meet the requirements of ASTM D 1751.

610.2.8. **JOINT FILLER:** The filler for joints shall meet the requirements of Item
P-605, unless otherwise specified in the proposal.

610.2.9. **STEEL REINFORCEMENT:** Reinforcing shall consist of welded steel wire
fabric conforming to the requirements of ASTM A 497.

610.2.10. **COVER MATERIALS FOR CURING:** Curing materials shall conform to
one of the following specifications:

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterproof paper for curing concrete</td>
<td>ASTM C 171</td>
</tr>
<tr>
<td>Polyethylene Sheeting for Curing Concrete</td>
<td>ASTM C 171</td>
</tr>
<tr>
<td>Liquid Membrane-Forming Compounds for Curing Concrete</td>
<td>ASTM C 309, Type 2</td>
</tr>
</tbody>
</table>

610.3. **CONSTRUCTION METHODS**

610.3.1. **GENERAL:** The Contractor shall furnish all labor, materials, and services
necessary for, and incidental to, the completion of all work as shown on the drawings
and specified herein. All machinery and equipment owned or controlled by the
Contractor, which he proposes to use on the work, shall be of sufficient size to meet the
requirements of the work, and shall be such as to produce satisfactory work; all work
shall be subject to the inspection and approval of the Engineer.

610.3.2. **CONCRETE COMPOSITION:** The concrete shall develop a compressive
strength of 3500 psi in 28 days as determined by test cylinders made in accordance with
ASTM C 31 and tested in accordance with ASTM C 39. The concrete shall contain not
less than 470 pounds of cement per cubic yard. The concrete shall contain 5 percent of
entrained air, plus or minus 1 percent, as determined by ASTM C 231 and shall have a
slump of not more than 4 inches (10 cm) as determined by ASTM C 143.

610.3.3. **ACCEPTANCE SAMPLING AND TESTING:** Concrete for each structure
will be accepted on the basis of the compressive strength specified in paragraph 3.2. The
cement shall be sampled in accordance with ASTM C 172. Compressive strength
specimens shall be made in accordance with ASTM C 31 and tested in accordance with
ASTM C 39.

Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and
tested in accordance with ASTM C 39. The Contractor shall cure and store the test
specimens under such conditions as directed. The Engineer will make the actual tests on
the specimens at no expense to the Contractor.
610.3.4. **PROPORTIONING AND MEASURING DEVICES:** When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610.3.5. **CONSISTENCY:** The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

610.3.6. **MIXING:** Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94.

610.3.7. **MIXING CONDITIONS:** The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his/her expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610.3.8. **FORMS:** Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.
610.3.9. **PLACING REINFORCEMENT:** All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610.3.10. **EMBEDDED ITEMS:** Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610.3.11. **PLACING CONCRETE:** All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610.3.12. **CONSTRUCTION JOINTS:** When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete that has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610.3.13. **EXPANSION JOINTS:** Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall
be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610.3.14. **DEFECTIVE WORK:** Any defective work discovered after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610.3.15. **SURFACE FINISH:** All exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610.3.16. **CURING AND PROTECTION:** All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610.3.17. **DRAINS OR DUCTS:** Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610.3.18. **COLD WEATHER PROTECTION:** When concrete is placed at temperatures below 40°F (4°C), the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both,
shall be heated in order to place the concrete at temperatures between 50°F and 100°F (10°C and 38°C).

610.3.19. **FILLING JOINTS:** All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

610.4. **METHOD OF MEASUREMENT**

610.4.1. No separate measurement of concrete and other materials used in catch basin construction shall be determined.

610.5. **BASIS OF PAYMENT**

610.5.1. No payment shall be made for component materials used in catch basin construction.

610.6. **TESTING REQUIREMENTS**

- ASTM C 31 Making and Curing Test Specimens in the Field
- ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens
- ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 138 Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- ASTM C 143 Slump of Hydraulic Cement Concrete
- ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C 666 Resistance of Concrete to Rapid Freezing and Thawing
- ASTM C 1077 Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
- ASTM C 1260 Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

610.7. **MATERIAL REQUIREMENTS**

- ASTM A 184 Specification for Fabricated Deformed Steel Bar or Rod Mats for Concrete Reinforcement
- ASTM A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497  Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615  Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 704  Welded Steel Plain Bars or Rod Mats for Concrete Reinforcement
ASTM C 33   Concrete Aggregates
ASTM C 94   Ready-Mixed Concrete
ASTM C 150  Portland Cement
ASTM C 171  Sheet Materials for Curing Concrete
ASTM C 172  Sampling Freshly Mixed Concrete
ASTM C 260  Air-Entraining Admixtures for Concrete
ASTM C 309  Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494  Chemical Admixtures for Concrete
ASTM C 595  Blended Hydraulic Cements
ASTM C 618  Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM D 1752 Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO T 26 Quality of Water to be used in Concrete

END OF APPENDIX A – ITEM P-610
161. ITEM F-161 WIRE FENCE WITH STEEL POSTS

161.1 DESCRIPTION

161.1.1. This item covers the requirements for furnishing materials and constructing new wire fences and gates with steel posts in accordance with the details included herein and as shown on the plans. The class of fence to be erected shall be either woven wire fencing surmounted by three strands of barbed wire, or three strands on outriggers, as indicated on the plans and in the bid proposal.

161.2 MATERIALS

161.2.1. WIRE

161.2.1.1. WOVEN WIRE (ZINC-COATED): The woven wire fencing shall be 7-bar, 26-inch (66 cm) field fence with top and bottom wires No. 10 gauge, and filler and stay wires No. 12 1/2 gauge. Stay wires shall be spaced 6 inches (150 mm) apart. All wire shall be smooth galvanized steel wire conforming to ASTM A 121, Type B. All wires shall be two-dip and spaced as shown on the plans.

161.2.1.2. BARBED WIRE (ZINC-COATED): Zinc-coated barbed wire shall be 2-strand twisted No. 12 1/2 gauge galvanized steel wire with 4-point barbs of No. 14 gauge galvanized steel wire. All wire shall conform to ASTM A 121, Type A. The barbs shall be spaced approximately 4 inches (100 mm) apart.

161.2.1.3. BARBED WIRE (COPPER-COVERED): Copper-covered steel barbed wire shall conform to ASTM A 121, Type A.

161.2.1.4. BARBED WIRE (ALUMINUM-COATED): Aluminum-coated steel barbed wire shall be 2-strand twisted No. 12 1/2 gauge. The 4-point barbs of No. 14 gauge aluminum-coated steel wire shall be spaced approximately 5 inches (125 mm) apart. The steel wire shall have a tensile strength of between 60,000 and 80,000 pounds per square inch (413 400 and 551 200 kPa) and the aluminum coating shall have a minimum weight of .30 ounce per square foot (0.07 kilogram per square meters) of wire surface on the No. 12 1/2 gauge line wire and .25 ounce per square foot (0.06 kg/square meter) of wire surface on the No. 14 gauge barbs.

161.2.1.5. BRACING WIRE (ZINC-COATED): Wire used for cable for bracing shall be No. 9 smooth galvanized soft wire.

161.2.2. FENCE POSTS, GATES, RAILS, BRACES, AND ACCESSORIES: These items, when specified, shall conform to the requirements of Fed. Spec. RR-F-191 and shall be zinc-coated.

161.2.3. CONCRETE: Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 2500 psi.
161.2.4. PRIVACY SCREEN: Cloth screening shall be installed on the fencing as directed by JWA to obscure visibility. It shall have the following properties of:

- Polypropylene close mesh with solid weave pattern, minimum 5.6 oz / sq yard
- Color: Green
- High UV resistance
- Shading: Provides 80 to 90% shade
- Hems: heavy 3 ply tape reinforced hems
- Grommets: Brass Grommets 2 feet apart on all sides

Prior to use the Contractor shall submit a sample for approval by JWA.

161.3 CONSTRUCTION METHODS

161.3.1. GENERAL: The fence shall be constructed in accordance with the details on the plans and as specified herein using new materials, and all work shall be performed in a workmanlike manner satisfactory to the Engineer. Prior to the beginning of the work or upon the request of the Contractor, the Engineer shall locate the position of the work by establishing and marking the property line or fence line. When directed, the Contractor shall span the opening below the fence with barbed wire fastened to stakes of the required length at locations of small natural or drainage ditches where it is not practical to conform the fence to the general contour of the ground surface. The new fence shall be permanently tied to the terminals of existing fences whenever required by the Engineer. The finished fence shall be plumb, taut, true to line and ground contour, and complete in every detail. When directed, the Contractor shall stake down the woven wire fence at several points between posts.

When directed, in order to keep stock on adjoining property enclosed at all times, the Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet (90 m) or such length that the stock can be kept in the proper field. The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence. Any openings in the fence shall be guarded when stock is using the adjoining property.

161.3.2. CLEARING FENCE LINE: The site of the fence shall be sufficiently cleared of obstructions, and surface irregularities shall be graded so that the fence will conform to the general contour of the ground. The fence line shall be cleared to a minimum width of 2 feet (60 cm) on each side of the centerline of the fence. This clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be placed a uniform distance above ground, as specified in the plans. When shown on the plans or as directed by the Engineer, the existing fences which coincide with, or are in a position to interfere with, the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with
suitable soil, gravel, or other material acceptable to the Engineer and shall be compacted properly with tampers.

The work shall include the handling and disposal of all material cleared, excavated or removed, regardless of the type, character, composition, or condition of such material encountered.

161.3.3. INSTALLING POSTS: All posts shall be spaced as shown on the plans. Corner, brace, anchor, end, and gate posts shall be set in concrete bases as shown on the plans. The top of the base shall be slightly above the ground surface, trowel finished, and sloped to drain. Holes of full depth and size for the concrete bases for posts shall be provided even if blasting of rock or other obstructions is necessary. All line posts may be either driven or set in dug holes to a penetration of 3 feet (90 cm). All post setting shall be done carefully and to true alignment. Dirt removed for placing posts, anchor bars, flanges, etc., shall be replaced, tamped, and leveled. When posts are driven, care shall be exercised to prevent marring or buckling of the posts. Damaged posts shall be replaced at the Contractor's expense. No extra compensation will be made for rock excavation. Rock excavation shall not be grounds for extension of time.

161.3.4. BRACING: All corner, anchor, end, and gate posts shall be braced as shown on the plans. Anchor posts shall be set at approximately 500-foot (150 meters) intervals and braced to the adjacent posts.

161.3.5. INSTALLING WIRE: All barbed wire and woven wire shall be placed on the side of the post away from the airport, or as directed, at the height indicated on the plans. The woven wire shall be carefully stretched and hung without sag and with true alignment. Care shall be taken not to stretch the wire so tightly that it will break in cold weather or pull up corner and brace posts. All horizontal wires shall be fastened securely to each post by fasteners or clips designed for use with the posts furnished. The woven wire shall be wrapped around end, corner, and gate posts, and the ends of all horizontal wires shall be tied with snug, tight twists. The wire shall be secured to prevent slipping up and down the post. Barbed wire strands shall be stretched and each strand secured to each post to prevent slipping out of line or becoming loose. At end, corner, and gate posts the barbed wire shall be securely wrapped and anchored once about the post from outside and secured against slipping by tying the ends with snug, tight twists. However, on spans of less than 100 feet (30 m) both ends of the span need not be wrapped around the posts. The bottom wire of the woven wire fencing shall clear the ground by not more than 4 inches (100 mm) or less than 1 inch (25 mm) at any place.

161.3.6. SPLICING WIRE: Splices in barbed and woven wire will be permitted if made with an approved galvanized bolt-clamp splice or a wire splice made as follows: The ends of each wire shall be carried 3 inches (75 mm) past the splice tool and wrapped around the other wire for at least six turns in opposite directions. After the tool is removed, the space occupied by it shall be closed by pulling the ends together. The unused ends of the wire shall be cut close to make a neat, workmanlike job.
161.3.7. INSTALLING GATES: The gates shall be hung on gate fittings as shown on the plans. They shall be attached in such a manner that the gate cannot be lifted off the hinges. Gates shall be erected to swing in the direction indicated and shall be provided with gate stops, as specified or as shown on the plans. Gates shall be erected at locations shown on the plans.

161.3.8. EXISTING FENCE CONNECTIONS: Wherever the new fence joins an existing fence, either at a corner or at the intersection of straight fence lines, a corner or anchor post shall be set at the junction and braced and anchored the same as herein described for corner posts.

If the connection is made at other than the corner of the new fence, the last span of the old fence shall contain a brace span.

161.3.9. CLEANING UP: The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction.

161.4 METHOD OF MEASUREMENT

161.4.1. Fences shall be measured in place from outside to outside of end posts or corner posts and shall be the length of fence actually constructed, except for the space occupied by the gates.

161.5 BASIS OF PAYMENT

161.5.1. Payment shall be made at the contract unit price per linear foot Class D wire fence. This price shall be full compensation for furnishing all materials and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made at the contract unit price per each for driveway or for walkway gates. This price shall be full compensation for furnishing all materials and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

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<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
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<tbody>
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<td>Install Fence, (Permanent 8’) with 3 Strands Barbed Wire</td>
<td>per LF</td>
</tr>
<tr>
<td>93</td>
<td>Install Fence, (Permanent 8’) with Outriggers and 3 Strands Barbed Wire</td>
<td>per LF</td>
</tr>
<tr>
<td>94</td>
<td>Green Fabric for Fence (Privacy Screen)</td>
<td>per SF</td>
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161.6 MATERIAL REQUIREMENTS

ASTM A 121 Standard Specification for Zinc Coated (Galvanized) Steel Barbed Wire

FED SPEC Fencing, Wire, and Post, Metal RR-F-191/Gen

END OF ITEM F-161
# PAVEMENT REPAIR & MAINTENANCE

John Wayne Airport  
Orange County, California

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**NOTE:**
See Accompanying Specifications for additional information and requirements regarding each repair detail for the Terminal Apron. These specifications have the same number as the corresponding sheet for the repair detail.

## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>@</td>
<td>AT (The Rate Of)</td>
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<tr>
<td>AC</td>
<td>ASPHALT CONCRETE</td>
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<tr>
<td>CONT</td>
<td>CONTINUOUS / CONTINUE</td>
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<tr>
<td>MAX</td>
<td>MAXIMUM</td>
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<td>MIN</td>
<td>MINIMUM</td>
</tr>
<tr>
<td>OC</td>
<td>ON CENTER (S)</td>
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<tr>
<td>PCC</td>
<td>PORTLAND CEMENT CONCRETE</td>
</tr>
<tr>
<td>PSI</td>
<td>Pounds per Square Inch</td>
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<tr>
<td>R</td>
<td>RADIUS</td>
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<tr>
<td>SBM</td>
<td>SIMILAR</td>
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<tr>
<td>TYP</td>
<td>TYPICAL</td>
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## KEY TO SYMBOLS FOR MATERIALS

- **Existing PCC Pavement (5,000 PSI Concrete)**
- **New PCC Pavement (5,000 PSI Concrete)**
- **Existing AC Pavement**
- **New AC Pavement**
- **Existing Subgrade or Earth**
- **Existing Crushed Aggregate Base**
- **New Polymer Concrete**
- **Existing Joint Sealant with Backing**
- **New Joint Sealant with Backing**
- **Existing Joint Sealant with Backer Rod**
- **New Joint Sealant with Backer Rod**
- **Existing Preformed Joint Filler**
- **New Preformed Joint Filler**
NOTES:

1. PCC Pavement Plan is a Typical Layout of the Existing Terminal Apron. However, it does not encompass all PCC Pavement Joint Conditions which shall be determined in the field.

2. Expansion Joints in the Existing PCC Pavement occur at approximately 50' Spacing (North to South Direction). Expansion Joints can be easily identified by their poor construction as evidenced by significant corner and edge spalling, planar irregularities and wide joint width.

3. For orientation purposes, this PCC Pavement Plan is to be used in conjunction with the Pavement Repair Details which follow.

4. Existing PCC Pavement has the following Approximate Properties:
   - Compressive Strength ........................................... 5,000 PSI
   - Flexural Strength .................................................. 650 PSI
   - Max Aggregate Size ............................................... 2 Inches

5. For Approximate Quantity of Repair Items, see "Bid Schedule". For Location of Repairs, see other Contract Document(s).
Plan View of Interior Cavity or Spall (2A)

Interior Cavity or Spall Section View (2B)

Typical Interior Cavity & Spall Repair Detail

Scale: N/A
Typical Corner & Edge Spall Repair Detail

Scale: None

(At Contraction or Construction Joint)

Preparation (3B)

Finished Repair (3C)

Note:
The minimum Corner Spall Repair shall be 6" x 6".

Edge Spall

Corner Spall

Note:
The minimum Edge Spall Repair shall be 2" x 6".

Typical Plans (3A)
**Plan View**

**Note:** The Minimum Edge Spall Repair shall be 2" x 4".

**Elevation View**

**Note:** T = Thickness of slab

**Typical Plans (4A)**

**Preparation (4B)**

**Finished Repair (4C)**

**Typical Corner & Edge Spall Repair Detail**

*Scale: None (At Expansion Joint)*

- **Existing Expansion Joint**
- **New Joint Sealer**
- **Outermost Limit of Spall**
- **Sawcut**
- **Fill Size Overcut with Polymer Concrete Mortar (Typ)**
- **2" Hm**
- **Top Surface of PCC Pavement**
- **4B (4C)**
- **4B 4C**
- **New Joint Sealer**
- **Outermost Limit of Spall**

**Typical Plans (4A)**

**Finished Repair (4C)**

**Note:**
- The Minimum Corner Spall Repair shall be 6" x 6".

**Note:**
- The Minimum Edge Spall Repair shall be 2" x 4".

**Note:**
- T = Thickness of slab

**Note:**
- Sawcut for Joint Filler

**Note:**
- Clean and Remove Existing Preferred Joint Filler Material to this Depth

**Note:**
- Clean Out Spall

**Note:**
- RemoveExisting Joint Sealer, See (40)

**Note:**
- Sandblast Face

**Note:**
- Only 20" where Practical and Close to Sound Concrete

**Note:**
- Sandblasted Surfaces and Air Filter Cavity. Apply Polymer Primer to Clean, Dry and Sound Surface

**Note:**
- Place Polymer Concrete

**Note:**
- Caulking around Perimeter to Prevent Polymer Concrete leakage into cavity

**Note:**
- Sawcut for Joint Filler

**Note:**
- Mastic Existing Joint Width (5" to 10") from Joint and install Joint Sealer

**Note:**
- 3" - 3½" Below Surface

**Note:**
- "D" to Depth of Sealant

**Note:**
- Increase Depth of Joint as Required

**Note:**
- Masking Tape (High Temperature)

**Note:**
- Carefully cut and shape preferred Joint Filler (same formulation as existing Joint) to fill Barrier and Ends of Cavity. Initially inlay to top of repair, then saw to depth indicated after Polymer Concrete has cured.

**Note:**
- E buddy-prefilled Joint Filler to remain.

**Note:**
- The Minimum Corner Spall Repair shall be 6" x 6".
**Typical Full Depth PCC Pavement Repair Detail**

**Scale:** None

**Plan (5A)**
- 12" x 26" Type Bay
- Existing Contraction Joint
- Provide Dowels all sides per (5B) except at Expansion Joint
- Remove existing concrete (5,000 PSF) and replace with new PCC Pavement
- Top Surface of PCC Pavement

**Plan (5B)**
- 12" x 26" Type Bay
- Existing Contraction Joint
- Provide Dowels all sides per (5B) except at Expansion Joint
- Remove existing concrete (5,000 PSF) and replace with new PCC Pavement
- Top Surface of PCC Pavement

**Section (5C)**
- Drill 19/32 x 100" Holes and epoxy grout Dowels in place
- Install PCC Pavement (space Monolithically)
- Provide for site Dowel if needed
- Grease this end of Dowel

**Notes:**
1. Where necessary to facilitate removal of existing concrete, double cut concrete (Full Depth) about 16 inches inward from specified saw-cut.
2. If repair consists of less than a full bay, provide 95 @ 6" OC Longitudinal and 97 @ 12" OC transverse at mid-depth of main slab. Minimum planer dimension of repair shall be 3'-0" x 12'-6". Contact Engineer Prior to constructing partial bay repairs.

**Details:**
- Saw-cut 4 sides full depth, including existing 12/32 Dowels @ 15" OC then remove existing concrete.
- Recompact upper 6" of aggregate to 100% of maximum density.

**Additional Instructions:**
- Existing PCC Pavement
- Install performed Joint Filler at Expansion Joint (where occurring)
Plan at PCC Pavement (6A)

Plan at Trench Drain (6B)

Section (6C)

Typical Crack Repair Detail

Scale: None
Typical Trench Drain Spall Repair Detail

Scale: None
Typical Repair Section (9A)

Prior to placing Polymer Concrete, secure frame to rigid side forms so that at least 1/4" clearance will be achieved with Trench Drain Cover.

Existing Trench Frame L1/2" x 1/2" x 1/4" welded to L2 1/2" x 1 1/2" x 1/4" with 3/8" O.D. thread Stud Anchors spaced 10'OC. Remove existing concrete from both frame and anchors. Paint all faces of frame with inorganic Zinc Paint.

Existing Trench Drain Cover

Cone Saw-cut 1" Deep Prior to removal

Provide 4 Sets of 2-1/8 x 6" Long Headed Stud Anchors (Galv) with full penetration weld or 3/8" Fillet Weld around. For Spacing see 20

Existing #8 @ 6" OC

Typical Trench Drain Spall Repair Detail (Continued)

Joint Section (9B)

Preformed Joint Filler full width of repair (Caulk around perimeter to prevent concrete leakage). Initially install to top of repair, then remove to depth indicated. For sequence of repair, see "Both Sides" condition.

Joint Sealant with Backer Rod

End Section (9C)

Saw-cut 1" Prior to Removal

Sandblast and apply Polymer Primer

Remove existing Concrete by careful chipping

PAVEMENT REPAIR & MAINTENANCE
TYPICAL TRENCH DRAIN SPALL REPAIR DETAIL

Scale: None
HMA Crack Repair - Type 1 (10A)
Crack Width \( \frac{1}{4}'' \) - \( \frac{3}{4}'' \)

HMA Crack Repair - Type 2 (10B)
Crack Width \( \frac{3}{4}'' \) - 2'', Existing HMA Thickness > 5''

Saw and Seal HMA Pavements (10C)

HMA Crack Repair - Type 3 (10D)
Crack Width \( \frac{3}{4}'' \) - 2'', Existing HMA Thickness < 5''