STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management**

**DFCM**

# STANDARD LOW BID PROJECT

**May 20, 2010**

# REDWOOD ROAD CAMPUS ASPHALT OVERLAY

# SALT LAKE COMMUNITY COLLEGE

# SALT LAKE CITY, UTAH

DFCM Project Number 10031660

King Engineering, Inc.
2825 East Cottonwood Parkway
Salt Lake City, Utah 84121

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Current copies of the following documents are hereby made part of these contract documents by reference These documents are available on the DFCM web site at http://dfcm.utah.gov/StdDocs/index.html "Standard Documents" – "Reference Documents I" – "Item 7. Supplemental General Conditions" or are available upon request from DFCM:

DFCM Supplemental General Conditions revised May 11, 2010 *
DFCM Supplemental General Conditions dated July 1, 2009 *
DFCM Supplemental General Conditions dated July 15, 2008
DFCM General Conditions dated May 25, 2005
DFCM Application and Certification for Payment dated May 25, 2005.

*** NOTE: THE NEW SUPPLEMENTAL GENERAL CONDITIONS EFFECTIVE JULY 1, 2009 AND REVISED MAY 11, 2010 ADDRESSING HEALTH INSURANCE AND IMMIGRATION ARE REFERENCED AT THE LINK ABOVE.**

The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at http://dfcm.utah.gov

# NOTICE TO CONTRACTORS

Sealed bids will be received by the Division of Facilities Construction and Management (DFCM) for:

**REDWOOD ROAD CAMPUS ASPHALT OVERLAY**
**SALT LAKE COMMUNITY COLLEGE – SALT LAKE CITY, UTAH**
**DFCM PROJECT NO: 10031660**

Bids will be in accordance with the Contract Documents that will be available on **Thursday, May 20, 2010**, and distributed in electronic format only on CDs from DFCM, 4110 State Office Building, Salt Lake City, Utah and on the DFCM web page at http://dfcm.utah.gov. For questions regarding this project, please contact Brent Lloyd, DFCM, at 801-550-5882. No others are to be contacted regarding this bidding process. The construction estimate for this project is $161,000.00.

A **mandatory** pre-bid meeting will be held at **2:00 PM on Wednesday, May 26, 2010**. Meet at Parking Lot "P" located on the Southwest corner of 4445 South Redwood Road, Salt Lake City, Utah. All bidders wishing to bid on this project are required to attend this meeting.

Bids will be received until the hour of **2:30 PM on Monday, June 7, 2010** at DFCM, 4ll0 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. NOTE: Bids must be received at 4110 State Office Building by the specified time.

A bid bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's bid bond form, shall accompany the bid.

The Division of Facilities Construction and Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of DFCM.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
Joanna Reese, Contract Coordinator
4110 State Office Building, Salt Lake City, Utah 84114

# PROJECT DESCRIPTION

The Contractor shall prepare the site at Salt Lake Community College, Parking Lot “M” and the roadway entrance to the “Pay Lot” for installation of a 2” asphalt overlay with geo-fabric (approx. 76,700 SF) per plans and specifications provided. The project will also include approx. 360 SF of patching and edge milling in this same area.

The project may need to be accomplished during hours of operation for the College. Therefore, coordination with the SLCC Facilities Staff will be important. The Contractor will be responsible for maintaining a safe work-site at all time and shall be responsible for coordinating traffic flow using all necessary signage and barricades.

# PROJECT SCHEDULE

**PROJECT NAME: Redwood Campus Asphalt Overlay**
**Salt Lake Community College – Salt Lake City, Utah**
**DFCM PROJECT NO. 10031660**

| Event | Day | Date | Time | Place |
|---|---|---|---|---|
| Bidding Documents Available | Thursday | May 20, 2010 | 2:00 PM | DFCM<br>4110 State Office Bldg<br>SLC, UT and the DFCM web site * |
| **Mandatory** Pre-bid Site Meeting | Wednesday | May 26, 2010 | 2:00 PM | Parking Lot "M" located on the Southwest corner of 4445 South Redwood Road, Salt Lake City, Utah |
| Last Day to Submit Questions | Thursday | May 27, 2010 | 2:00 PM | In Writing To:<br>Brent Lloyd – DFCM<br>brentlloyd@utah.gov<br>Fax 801-538-3267 |
| Addendum Deadline (exception for bid delays) | Tuesday | June 1, 2010 | 2:00 PM | DFCM web site * |
| Prime Contractors Turn In Bid and Bid Bond | Monday | June 7, 2010 | 2:30 PM | DFCM<br>4110 State Office Bldg<br>SLC, UT |
| Sub-contractor List Due | Tuesday | June 8, 2010 | 2:30 PM | DFCM<br>4110 State Office Bldg<br>SLC, UT<br>Fax 801-538-3677 |
| Substantial Completion Date | Friday | July 30, 2010 | | |

* **NOTE: DFCM's web site address is http://dfcm.utah.gov**

# BID FORM

NAME OF BIDDER _____ DATE _____

To the Division of Facilities Construction and Management
4110 State Office Building
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **Redwood Road Campus – Asphalt Overlay – Salt Lake Community College – Salt Lake City, Utah - DFCM Project Number 10031660** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: _____

**UNIT PRICE PROPOSAL**
**SLCC REDWOOD ROAD CAMPUS ASPHALT OVERLAY 2010**

| Item No. | Work or Materials | Approximate Quantities/Units | | Unit Price | Amount |
|---|---|---|---|---|---|
| 1. | Saw Cut Asphalt | 192 | L.F. | $_____ | $_____ |
| 2. | Remove and Dispose of Existing Asphalt Off Site | 360 | S.F. | $_____ | $_____ |
| 3. | Adjust Utility Covers to Grade | 1 | L.S. | $_____ | $_____ |
| 4. | Mill 1" of Asphalt and Dispose of Off Site | 21,600 | L.F. | $_____ | $_____ |
| 5. | Furnish and Install 2" of Compacted Asphalt Overaly w/Fabric | 76,635 | L.S. | $_____ | $_____ |
| 6. | Furnish and Install 8" of Compacted Road Base | 360 | S.F. | $_____ | $_____ |
| 7. | Furnish and Install 3" of Compacted Asphalt | 360 | S.F. | $_____ | $_____ |
| 8. | Signing and Striping | 1 | L.S. | $_____ | $_____ |

BID FORM
PAGE NO 2

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

_____ DOLLARS ($_____)
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by July 30, 2010. Should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **$500.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of _____

The undersigned Contractor's License Number for Utah is _____.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable l00% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization:
_____
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:
_____

Respectfully submitted,

_____
Name of Bidder

ADDRESS:

_____

_____

_____
Authorized Signature

# INSTRUCTIONS TO BIDDERS

## 1. Drawings and Specifications, Other Contract Documents

Drawings and Specifications, as well as other available Contract Documents, may be obtained as stated in the Invitation to Bid.

## 2. Bids

Before submitting a bid, each contractor shall carefully examine the Contract Documents, shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the Contract Documents. If the bidder observes that portions of the Contract Documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Representative and the necessary changes shall be accomplished by Addendum.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Invitation to Bid prior to the deadline for submission of bids.

A bid bond properly signed by a qualified surety, as indicated on the DFCM Bid Bond form provided along with this Instruction to Bidders, in the amount of 5% of the bid, shall accompany the bid submission to DFCM. THIS BID BOND MUST BE ON THE DFCM BID BOND FORM PROVIDED WITH THIS INSTRUCTION TO BIDDERS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID unless only one bid is received by DFCM, or the failure to comply with the bid bond requirements is determined by the Director of DFCM to be nonsubstantial based on the following:

(a) the bid bond is submitted on a form other than DFCM's required Bid Bond form and the bid bond meets all other requirements including being issued by a surety firm authorized to do business in the State of Utah and be listed in the U.S. Department of the Treasury Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies for an amount not less than the amount of the bond to be issued. A co-surety may be utilized to satisfy this requirement; and

(b) the contractor provides a bid bond properly signed by a qualified surety and on the required DFCM Bid Bond form by the close of business of the next succeeding business day after the DFCM notifies the bidder of the defective bid bond.

## 3. Contract and Bond

The Contractor's Agreement will be in the form provided in this document. The Contract Time will be as indicated in the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the contract sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for subcontractors will be specified in the Supplementary General Conditions.

## 4. Listing of Subcontractors

Listing of Subcontractors shall be as summarized in the "Instructions and Subcontractor's List Form", which are included as part of these Contract Documents. The Subcontractors List shall be delivered to DFCM or faxed to DFCM at 801-538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the Contract Documents.

DFCM retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements is subject to a debarment hearing and may be debarred from consideration for award of contracts for a period of up to three years.

## 5. Interpretation of Drawings and Specifications

If any person or entity contemplating submitting a bid is in doubt as to the meaning of any part of the drawings, specifications or other Contract Documents, such person shall submit to the DFCM Project Manager a request for an interpretation thereof. The person or entity submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addenda posted on DFCM's web site at http://dfcm.utah.gov. Neither the DFCM nor A/E will be responsible for any other explanations or interpretations of the proposed documents. A/E shall be deemed to refer to the architect or engineer hired by DFCM as the A/E or Consultant for the Project.

## 6. Addenda

Addenda will be posted on DFCM's web site at http://dfcm.utah.gov. Contractors are responsible for obtaining information contained in each addendum from the web site. Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the bid form. Failure to acknowledge addenda may result in disqualification from bidding.

## 7. Award of Contract

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of the State of Utah to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. DFCM reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.

## 8. DFCM Contractor Performance Rating

As a contractor completes each DFCM project, DFCM, the architect/engineer and the using agency will evaluate project performance based on the enclosed "DFCM Contractor Performance Rating" form. The ratings issued on this project will not affect this project but may affect the award on future projects.

**9. Licensure**

The Contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

**10. Permits**

In concurrence with the requirements for permitting in the General Conditions, it is the responsibility of the Contractor to obtain the fugitive dust plan requirements from the Utah Division of Air Quality and the SWPPP requirements from the Utah Department of Environmental Quality and submit the completed forms and pay any permit fee that may be required for this specific project. Failure to obtain the required permit may result in work stoppage and/or fines from the regulating authority that will be the sole responsibility of the Contractor. Any delay to the project as a result of any such failure to obtain the permit or noncompliance with the permit shall not be eligible for any extension in the Contract Time.

**11. Right to Reject Bids**

DFCM reserves the right to reject any or all Bids.

**12. Time is of the Essence**

Time is of the essence in regard to all the requirements of the Contract Documents.

**13. Withdrawal of Bids**

Bids may be withdrawn on written request received from bidder prior to the time fixed for opening. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

**14. Product Approvals**

Where reference is made to one or more proprietary products in the Contract Documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the Contract Documents, the products of other manufacturers will be accepted, provided they equal or exceed the standards set forth in the drawings and specifications and are compatible with the intent and purpose of the design, subject to the written approval of the A/E. Such written approval must occur prior to the deadline established for the last scheduled addenda to be issued. The A/E's written approval will be in an issued addendum. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the A/E.

## 15. Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors

Contractors shall respond promptly to any inquiry in writing by DFCM to any concern of financial responsibility of the contractor, subcontractor or sub-subcontractor.

## 16. Debarment

By submitting a bid, the Contractor certifies that neither it nor its principals, including project and site managers, have been, or are under consideration for, debarment or suspension, or any action that would exclude such from participation in a construction contract by any governmental department or agency. If the Contractor cannot certify this statement, attach to the bid a detailed written explanation which must be reviewed and approved by DFCM as part of the requirements for award of the Project.

# BID BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

**KNOW ALL PERSONS BY THESE PRESENTS:**

That _____ hereinafter referred to as the "Principal," and_____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of $_____ (5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**THE CONDITION OF THIS OBLIGATION IS SUCH** that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the_____ _____ Project.

**NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH**, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

**PROVIDED, HOWEVER,** that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

**IN WITNESS WHEREOF,** the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

**DATED** this _____ day of _____, 20_____ .

**Principal's name and address (if other than a corporation):**

_____

_____

By:_____

Title: _____

**Principal's name and address (if a corporation):**

_____

_____

By:_____

Title: _____

(Affix Corporate Seal)

**Surety's name and address:**

_____

_____

By: _____

Attorney-in-Fact (Affix Corporate Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this ____ day of _____, 20____, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.
My Commission Expires: _____
Resides at: _____

_____
NOTARY PUBLIC

**Agency:** _____
**Agent:** _____
**Address:** _____
**Phone:**

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

# INSTRUCTIONS AND SUBCONTRACTORS LIST FORM

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, based on the following:

**DOLLAR AMOUNTS FOR LISTING**

**PROJECTS UNDER $500,000: ALL FIRST-TIER SUBS $20,000 OR OVER MUST BE LISTED**
**PROJECTS $500,000 OR MORE: ALL FIRST-TIER SUBS $35,000 OR OVER MUST BE LISTED**

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- If there are no subcontractors for the job that are required to be reported by State law (either because there are no subcontractors that will be used on the project or because there are no first-tier subcontractors over the dollar amounts referred to above), then you do not need to submit a sublist. If you do not submit a sublist, it will be deemed to be a representation by you that there are no subcontractors on the job that are required to be reported under State law. At any time, DFCM reserves the right to inquire, for security purposes, as to the identification of the subcontractors at any tier that will be on the worksite.

## LICENSURE:

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

## 'SPECIAL EXCEPTION':

A bidder may list 'Special Exception' in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A.Section 63A-5-208(4). The bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The Director must find that the bidder complied in good faith with State law requirements for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the Director shall supervise the bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sublist form shall also include amount allocated for that work.

## GROUNDS FOR DISQUALIFICATION:

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for

such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. If such correction is submitted timely, then the sublist requirements shall be considered met.

**CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:**

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the Director based on complying with all of the following criteria.

(1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
(2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
(3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
(4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
(5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
(6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

**EXAMPLE:**

Example of a list where there are only four subcontractors:

| TYPE OF WORK | SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION" | SUBCONTRACTOR BID AMOUNT | CONTRACTOR LICENSE # |
|---|---|---|---|
| ELECTRICAL | ABCD Electric Inc. | $350,000.00 | 123456789000 |
| LANDSCAPING | "Self" * | $300,000.00 | 123456789000 |
| CONCRETE (ALTERNATE #1) | XYZ Concrete Inc | $298,000.00 | 987654321000 |
| MECHANICAL | "Special Exception" (attach documentation) | Fixed at: $350,000.00 | (TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR) |

* Bidders may list "self", but it is not required.

**PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.**

# SUBCONTRACTORS LIST

**FAX TO 801-538-3677**

**PROJECT TITLE:** _____

**Caution: You must read and comply fully with instructions.**

| TYPE OF WORK | SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION" | SUBCONTRACTOR BID AMOUNT | CONT. LICENSE # |
|---|---|---|---|
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We certify that:

1. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.
2. We have listed "Self" or "Special Exception" in accordance with the instructions.
3. All subcontractors are appropriately licensed as required by State law.

FIRM: _____

DATE: _____ SIGNED BY: _____

**NOTICE**: FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR OWNER'S REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY OWNER. ATTACH A SECOND PAGE IF NECESSARY.

# CONTRACTOR'S AGREEMENT

FOR:

_____
_____
_____

THIS CONTRACTOR'S AGREEMENT, made and entered into this ____ day of _____, 20__, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and _____, incorporated in the State of _____ and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is _____.

WITNESSETH: WHEREAS, DFCM intends to have Work performed at _____ _____.

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, DFCM and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

**ARTICLE 1. SCOPE OF WORK.** The Work to be performed shall be in accordance with the Contract Documents prepared by _____ and entitled "_____."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 and Supplemental General Conditions dated July 15, 2008, July 1, 2009, and revised May 11, 2010 ("also referred to as General Conditions") on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

**ARTICLE 2. CONTRACT SUM.** The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of _____ _____ DOLLARS AND NO CENTS ($_____.00), which is the base bid, and which sum also includes the cost of a 100% Performance Bond and a 100%

Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

**ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY.** The Work shall be Substantially Complete by _____. Contractor agrees to pay liquidated damages in the amount of $_____ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its or Subcontractor or suppliers at any tier, against the DFCM or State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, in which to complete the Work under this Contractor's Agreement in accordance with the General Conditions.

**ARTICLE 4. CONTRACT DOCUMENTS.** The Contract Documents consist of this Contractor's Agreement, the Conditions of the Contract (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Invitation to Bid, Instructions to Bidders/ Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor's Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

**ARTICLE 5. PAYMENT.** The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the Contractor requests payment and agrees to

safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor's obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

**ARTICLE 6. INDEBTEDNESS.** Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by DFCM to Contractor.

**ARTICLE 7. ADDITIONAL WORK.** It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The DFCM specifically reserves the right to modify or amend this Contractor's Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

**ARTICLE 8. INSPECTIONS.** The Work shall be inspected for acceptance in accordance with the General Conditions.

**ARTICLE 9. DISPUTES.** Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. DFCM reserves all rights to pursue its rights and remedies as provided in the General Conditions.

**ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT.** This Contractor's Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

**ARTICLE 11. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF.** The DFCM may withhold from payment to the Contractor such amount as, in DFCM's judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

**ARTICLE 12. INDEMNIFICATION.** The Contractor shall comply with the indemnification provisions of the General Conditions.

**ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT.** The DFCM and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor’s Agreement. The Contractor shall not assign this Contractor’s Agreement without the prior written consent of the DFCM, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor’s Agreement, without prior written consent of the DFCM.

**ARTICLE 14. RELATIONSHIP OF THE PARTIES.** The Contractor accepts the relationship of trust and confidence established by this Contractor's Agreement and covenants with the DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; to furnish efficient business administration and supervision; to make best efforts to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the DFCM.

**ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT.** Contractor and DFCM each represent that the execution of this Contractor's Agreement and the performance thereunder is within their respective duly authorized powers.

**ARTICLE 16. ATTORNEY FEES AND COSTS.** Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor's Agreement or recover damages or any other action as a result of a breach thereof.

**IN WITNESS WHEREOF**, the parties hereto have executed this Contractor's Agreement on the day and year stated hereinabove.

**CONTRACTOR:** _____

_____
Signature Date

Title: _____

State of _____)
)
County of _____)

_____
Please type/print name clearly

On this ____ day of _____, 20____, personally appeared before me, _____, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the _____ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

_____
**Notary Public**

(SEAL)

My Commission Expires _____

APPROVED AS TO AVAILABILITY OF FUNDS:

_____
David D. Williams, Jr. Date
DFCM Administrative Services Director

**DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT**

_____
Lynn A. Hinrichs Date
Assistant Director Construction Management

APPROVED AS TO FORM:
ATTORNEY GENERAL
May 11, 2010
By: Alan S. Bachman
Asst Attorney General

APPROVED FOR EXPENDITURE:

_____
Division of Finance Date

# PERFORMANCE BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That _____ hereinafter referred to as the "Principal" and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee, " in the amount of _____ _____ DOLLARS ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS,** the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____, for the approximate sum of _____ _____ Dollars ($_____), which Contract is hereby incorporated by reference herein.

**NOW, THEREFORE,** the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

**PROVIDED, HOWEVER,** that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

**IN WITNESS WHEREOF,** the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20_____.

**WITNESS OR ATTESTATION:**

_____

**PRINCIPAL:**

_____

By: _____ (Seal)

Title: _____

**WITNESS OR ATTESTATION:**

_____

**SURETY:**

_____

By: _____ (Seal)

Attorney-in-Fact

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20___, personally appeared before me _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.

My commission expires: _____

Resides at: _____

_____

NOTARY PUBLIC

**Agency:** _____

**Agent:** _____

**Address:** _____

**Phone:** _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

# PAYMENT BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

**KNOW ALL PERSONS BY THESE PRESENTS:**

That _____ hereinafter referred to as the "Principal," and _____ _____, a corporation organized and existing under the laws of the State of _____authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of _____, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of _____ Dollars ($_____) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS,** the Principal has entered into a certain written Contract with the Obligee, dated the _____ day of _____, 20____, to construct _____ in the County of _____, State of Utah, Project No. _____ for the approximate sum of _____ _____ Dollars ($_____), which contract is hereby incorporated by reference herein.

**NOW, THEREFORE,** the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, l953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

**PROVIDED, HOWEVER,** that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

**IN WITNESS WHEREOF,** the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

**WITNESS OR ATTESTATION:**

_____

**PRINCIPAL:**

_____

By: _____ (Seal)

Title: _____

**WITNESS OR ATTESTATION:**

_____

**SURETY:**

_____

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20_____, personally appeared before me _____ _____, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this _____ day of _____, 20_____.

My commission expires: _____

Resides at: _____

_____
NOTARY PUBLIC

**Agency:** _____
**Agent:** _____
**Address:** _____
**Phone:** _____

Approved As To Form: May 25, 2005
By Alan S. Bachman, Asst Attorney General

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management**

**DFCM**

# CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT _____ PROJECT NO: _____

AGENCY/INSTITUTION _____

AREA ACCEPTED _____

The Work performed under the subject Contract has been reviewed on this date and found to be Substantially Completed as defined in the General Conditions; including that the construction is sufficiently completed in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the State of Utah can occupy the Project or specified area of the Project for the use for which it is intended.

The DFCM - (Owner) accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at _____ (time) on _____ (date).

The DFCM accepts the Project for occupancy and agrees to assume full responsibility for maintenance and operation, including utilities and insurance, of the Project subject to the itemized responsibilities and/or exceptions noted below:

_____

_____

The Owner acknowledges receipt of the following closeout and transition materials:

As-built Drawings  O & M Manuals  Warranty Documents  Completion of Training Requirements

A list of items to be completed or corrected (Punch List) is attached hereto. The failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents, including authorized changes thereof. The amount of _____(Twice the value of the punch list work) shall be retained to assure the completion of the punch list work.

The Contractor shall complete or correct the Work on the list of (Punch List) items appended hereto within _____ ____calendar days from the above date of issuance of this Certificate. The amount withheld pending completion of the list of items noted and agreed to shall be: $_____. If the list of items is not completed within the time allotted the Owner has the right to be compensated for the delays and/or complete the work with the help of independent contractor at the expense of the retained project funds. If the retained project funds are insufficient to cover the delay/completion damages, the Owner shall be promptly reimbursed for the balance of the funds needed to compensate the Owner.

_____ by: _____

CONTRACTOR (include name of firm)  (Signature)  DATE

_____ by: _____

A/E (include name of firm)  (Signature)  DATE

_____ by: _____

USING INSTITUTION OR AGENCY  (Signature)  DATE

_____ by: _____

DFCM (Owner)  (Signature)  DATE

4110 State Office Building, Salt Lake City, Utah 84114 cc: Parties Noted

telephone 801-538-3018 • facsimile 801-538-3267 • http://dfcm.utah.gov DFCM, Director

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

# General Contractor Performance Rating Form

| | | | |
|---|---|---|---|
| Project Name: | | DFCM Project# | |
| Contractor:<br>(ABC Construction, John Doe, 111-111-1111) | A/E:<br>(ABC Architects, Jane Doe, 222-222-2222) | Original Contract Amount: | Final Contract Amount: |
| DFCM Project Manager: | | Contract Date: | |
| Completion Date: | | Date of Rating: | |

| Rating Guideline | QUALITY OF PRODUCT OR SERVICES | COST CONTROL | TIMELINESS OF PERFORMANCE | BUSINESS RELATIONS |
|---|---|---|---|---|
| **5-Exceptional** | Contractor has demonstrated an exceptional performance level in any of the above four categories that justifies adding a point to the score. Contractor performance clearly exceeds the performance levels described as "Very Good" | | | |
| **4-Very Good** | Contractor is in compliance with contract requirements and/or delivers quality product/service. | Contractor is effective in managing costs and submits current, accurate, and complete billings | Contractor is effective in meeting milestones and delivery schedule | Response to inquiries, technical/service/ administrative issues is effective |
| **3-Satisfactory** | Minor inefficiencies/errors have been identified | Contractor is usually effective in managing cost | Contractor is usually effective in meeting milestones and delivery schedules | Response to inquires technical/ service/administrative issues is somewhat effective |
| **2-Marginal** | Major problems have been encountered | Contractor is having major difficulty managing cost effectively | Contractor is having major difficulty meeting milestones and delivery schedule | Response to inquiries, technical/service/administrative issues is marginally effective |
| **1-Unsatisfactory** | Contractor is not in compliance and is jeopardizing achievement of contract objectives | Contractor is unable to manage costs effectively | Contractor delays are jeopardizing performance of contract objectives | Response to inquiries, technical/service/administrative issues is not effective |

| **1. Rate Contractors quality of workmanship, management of sub contractor performance, project cleanliness, organization and safety requirement.** | **Score** |
|---|---|
| Agency Comments: | |
| A & E Comments: | |
| DFCM Project Manager Comments: | |

| 2. Rate Contractor administration of project costs, change orders and financial management of the project budget. | Score |
|---|---|
| Agency Comments: | |
| A & E Comments: | |
| DFCM Project Manager Comments: | |

| 3. Rate Contractor's performance and adherence to Project Schedule, delay procedures and requirements of substantial completion, inspection and punch-list performance. | Score |
|---|---|
| Agency Comments: | |
| A & E Comments: | |
| DFCM Project Manager Comments: | |

| 4. Evaluate performance of contractor management team including project manager, engineer and superintendent also include in the rating team's ability to work well with owner, user agency and consultants. | Score |
|---|---|
| Agency Comments: | |
| A & E Comments: | |
| DFCM Project Manager Comments: | |

| 5. Rate success of Contractor's management plan, completion of the plans mitigation of project risks and performance of value engineering concepts. | Score |
|---|---|
| Agency Comments: | |
| A & E Comments: | |
| DFCM Project Manager Comments: | |

| Signed by: | Date: | Mean Score |
|---|---|---|
| | | |

**Additional Comments:**

**10031660 SLCC REDWOOD ROAD ASPHALT OVERLAY**

**SECTION** **TECHNICAL SPECIFICATIONS** **PAGE(S)**

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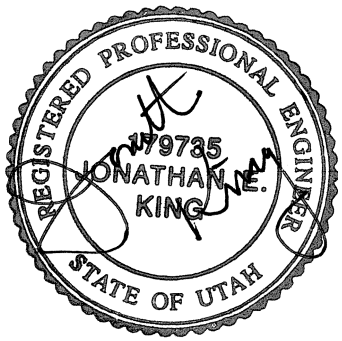

# SECTION 02 41 14
# PAVEMENT REMOVAL

## PART 1 GENERAL

1.1 **SECTION INCLUDES**

A. Removal of roadway Pavement.

B. Milling roadway Pavement.

C. Removal of curb, gutter, sidewalk, Driveway Approach, waterway, or similar flatwork.

D. Disposal of removed materials.

1.2 **RELATED WORK**

A. Demolition of structures and utilities.

1.3 **DEFINITIONS**

A. ADA: Americans with Disabilities Act.

1.4 **SUBMITTALS**

A. Traffic control plan, Section 01 55 26.

1.5 **SITE CONDITIONS**

A. Control dust, Section 01 57 00.

## PART 2 PRODUCTS Not Used

## PART 3 EXECUTION

3.1 **PREPARATION**

A. General

1. Coordinate utility location, Section 01 31 13.
2. Preserve all active utilities.
3. Notify neighborhood of day and time of operation.
4. Make sure invert covers are properly installed in storm drain and sanitary sewer systems, Section 01 71 13.
5. Mark existing utilities on redline drawings.

B. Traffic Control: Provide worker and public safety, Section 01 55 26.

C. Tree Roots:

1. Avoid or minimize damage to tree roots. Roots provide anchorage, storage of energy, and absorption and conduction of water and

mineral elements. Loss of root connection affects health and stability of tree and safety of people and property.

2. Provide certified arborist observation of root cuts larger than 4 inches diameter. Notify ENGINEER of such root cut.

D. Existing Surfaces:

1. Do not damage adjacent concrete surfaces that are not scheduled for removal.
2. Use rubber cleats or Pavement pads when operating backhoes, outriggers, track equipment, or any other equipment on or crossing paved surfaces.
3. Restore paved surfaces that are damaged by removal operations at no additional cost to the OWNER. Match the existing Pavement surface plus 1 inch.

## 3.2 SAW-CUT PEDESTRIAN TRIP HAZARDS

A. Make saw cuts 1:8 slope measured to grade.

B. Eliminate trip hazards across the full width of the hazard.

## 3.3 SAW-CUT CURB HORIZONTALLY

A. Saw cut curbs for ADA ramps at 1:12 slope. No trip hazard at gutter flow line.

B. Saw cut curbs for flares:

1. 1:4 slope measured to grade, or
2. 1:12 slope measured horizontally when complying with ADA.

## 3.4 REMOVE PORTLAND CEMENT CONCRETE

A. Remove concrete to the nearest expansion joint or vertical saw cut.

B. Make concrete cuts straight, vertical to the surface, true, full depth.

C. DO NOT use machine mounted impact hammers.

## 3.5 REMOVE ASPHALT CONCRETE

A. Saw cut full depth and remove Pavement.

B. When asphalt concrete overlays Portland cement concrete Pavements do not use a machine mounted impact hammer.

## 3.6 MILLING

A. Machine:

1. Equipped to prevent air pollution.
2. Equipped with a system to control slope of mill cut.

B. Tolerances:

1. Milling Depth: As indicated plus or minus 10 percent not uniformly high or uniformly low.
2. Striation Texture: Uniform, discontinuous, longitudinal, 3/16 inch deep maximum, 3/4 inch center to center.

3. Smoothness: Plus or minus 5/16 inch in 25 feet.
4. Cross Slope: Plus or minus 1/4 inch in 10 feet.

C. Performance:

1. Lower utility frames, covers, and other Street Fixtures.
2. Mill surfaces to the depth shown on the Drawings or indicated by ENGINEER. Do not disfigure adjacent work or existing surface improvements.
3. If milling exposes smooth underlying Pavement surfaces, mill the smooth surfaces to make them rough.
4 Mill off material if it ponds water or if it has been damaged by water.
5. Where vehicles or pedestrians must pass over milled edges provide safe temporary ramps suitable to speed of user vehicles (or suitable for wheel chair user needs).
6. Remove excess material and clean milled surfaces.
7. If work equipment is removed from the milling site and milled surface awaits further work, provide appropriate traffic control and cleaning.

## 3.7 GRINDING

A. Machine:

1. Cutting head 36 inches wide minimum.
2. 50 to 60 diamond blades per foot of head.

B. Preparation:

1. Control traffic.
2. Provide water truck, waste truck, and other support machinery.
3. Mark areas to be ground.

C. Tolerances:

1. 1/4 inch lip transverse to the direction of vehicular travel. Potential for ponding not allowed.
2. 1/8 inch lip (or dent) parallel to direction of vehicular travel.
3. Taper ground areas from the lane/shoulder line into the shoulder area at 1/4 inch per foot.

D. Performance:

1. Skid resistance of final ground surface must be comparable to adjacent sections not requiring corrective work.
2. Surface treatement of ground areas.
   a. Asphalt Concrete: Asphalt tack coat and sand blotter, Section 32 12 14.
   b. Hydraulic Concrete: Water repellant, Section 07 19 00.
3. Waste grindings legally.
4. Protect downstream fish habitat.

## 3.8 CLEANING

A. Remove all debris and concrete dust. Clean surrounding rails, sidewalks, Driveways, landscaping and other objects in vicinity of work.

END OF SECTION

# SECTION 32 05 10
# BACKFILLING ROADWAYS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Roadway backfill materials.

B. Roadway backfilling requirements.

### 1.2 DEFINITIONS

A. Embankment: A raised earthen structure to carry a roadway.

B. Pavement: Artificially covered surfaces including but not limited to roadway surfaces, parking lot surfaces, sidewalks, curb, gutter, curb ramps, Driveway ramps, etc.

C. Subgrade: A surface of earth or Rock leveled off as to receive backfill materials.

### 1.3 SUBMITTALS

A. Submit maximum laboratory dry density and optimum laboratory moisture content for:

1. Subgrade material, and
2. Each type of fill to be used.

B. Submit aggregate batch delivery tickets showing name of material source, Serial number of ticket; date and truck number; name of Supplier; job name and location; volume of material delivered, And aggregate classification.

C. Upon ENGINEER's request, submit a written quality control Inspections and testing report describing source and field quality control activities performed by CONTRACTOR and its Suppliers.

### 1.4 QUALITY ASSURANCE

A. Do not change material sources, or aggregate without ENGINEER's knowledge.

B. Reject backfill material that does not comply with requirements specified in this section.

### 1.5 STORAGE

A. Safely stockpile backfill materials.

B. Separate differing materials, prevent mixing, and maintain optimum moisture content of backfill materials.

C. Avoid displacement of and injury to Work while compacting or operating equipment.

D. Movement of construction machinery over Work at any stage of construction is solely at CONTRACTOR's risk.

## 1.6 SITE CONDITIONS

A. Do not place, spread, or roll any backfill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.

B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.

C. Reshape and compact damaged structural section re required density.

D. Soil Cement: Do not spread soil cement mixture when air temperature is less than 40 deg. F. in the shade.

E. Drainage: Immediately prior to suspension of construction operations for any reason, provide proper and necessary drainage of Work area.

## 1.7 ACCEPTANCE

A. General:

1. Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.
2. For material acceptance refer to.
   a. Common fill, Section 31 05 13.
   b. Crushed aggregate base, Section 32 11 23.
   c. Cement treated fill, Section 31 05 15.

B. Backfilling: One test per Lot.

**Table No.1 – Lot Sizes**

| Material | Test Criteria | Lot Size |
|---|---|---|
| Subgrade | Standard (a) | 1000 square yards |
| Common Fill | Standard (a) | PCC or AC Surface Course: 1,000 square yards per lift<br>Driveway Approach: 400 square feet per lift<br>Sidewalk: 400 lineal feet per lift |
| Crushed Aggregate Base | Modified (a) | PCC or AC Surface Course: 1,000 square yards per lift<br>Driveway Approach: 400 square feet per lift<br>Sidewalk: 400 lineal feet per lift<br>Curb, Gutter, and Waterways: 200 lineal feet per lift |
| Flowable Fill | Strength (b) | 250 cubic yards |

NOTES
(a) Proctor density, Section 33 05 05
(b) Cement treated fill, Section 31 05 15
(c) Lift thickness before compaction, 8 inches.

1.8 **WARRANTY**

A. Any settlement noted in Embankment or Pavement construction will be considered to be caused by improper compaction methods and shall be corrected at no cost to the OWNER.

B. Restore incidentals damaged by settlement at no additional cost to OWNER.

## PART 2 PRODUCTS

2.1 **BACKFILL MATERIALS**

A. Common Fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

C. Cement treated fill, Section 31 05 15.

2.2 **ACCESSORIES**

A. Water:

1. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
2. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

B. Geotextile Fabric, Section 31 05 19.

## PART 3 EXECUTION

3.1 **PREPARATION**

A. Verify.

1. Backfill material meets gradation requirements.
2. Areas to be backfilled are free of debris, snow, ice or water, and
3. Bearing surfaces are not frozen.

B. If extra excavation is required, secure ENGINEER’s written permission and follow Section 31 23 16 requirements.

C. Place geotextile fabrics, Section 31 05 19.

3.2 **SUBGRADE PREPARATION**

A. Protect Subgrade from desiccation, flooding, and freezing.

B. If ground water table is in the intended construction operations, dewater.

C. Before beginning backfilling operations over Subgrade, secure ENGINEER's review of Subgrade surface preparations.

## 3.3 EMBANKMENTS

A. Place backfill material in lifts not exceeding 8 inches after compaction.

B. Build shoulders to a grade higher than that of adjacent fills. Provide surface runoff at all times.

C. Commence compaction along edge of area to be compacted and gradually advance toward center.

D. Operate compaction equipment along lines parallel or concentric with the center-line of the Embankment being constructed.

E. Do not damage subsurface structures or utilities.

## 3.4 BASE COURSES

A. Place backfill material in lifts not exceeding 8 inches before compaction.

B. Maintain moisture content in compaction operations.

C. Avoid segregation when spreading backfill. Keep surfaces free from pockets of coarse and fine aggregate.

D. Rework fills which do not conform to compaction requirements until requirements are met.

E. Protect cement treated fill against freezing and traffic for 7 days.

## 3.5 MODIFIED BACKFILL LAYER METHOD

A. Section 33 05 20.

## 3.6 COMPACTION

A. Compact backfill, Section 33 05 05 as follows.

1. A-1 soils: greater than or equal to 95 percent of a Modified Proctor Density.
2. Other soils: greater than or equal to 95 percent of a Standard Proctor Density.

## 3.7 COMPRESSIVE STRENGTH

A. Where a flowable fill is used, provide compressive strength indicated in Section 31 05 15.

## 3.8 PROOF ROLLING TEST

A. Prior to placing fill material for roadbed backfills, proof roll Subgrade using gross weight of 18,000 pounds/tandem axle, with a tire pressure at least 90 psi.

B. All proof roll passes will traverse the Subgrade parallel to the roadbed centerline. All subsequent passes will be offset 1/2 the vehicle width until the entire Subgrade is tested.

C. ENGINEER will analyze, determine, designate and measure the areas, if any, requiring additional compaction or reconstruction.

D. Once Subgrade passes the proof rolling test, protect the surface from construction operations and traffic damage. Repair all cuts, ruts, and breaks. Keep surface in a satisfactory condition until geotextile fabric or base course has been placed.

## 3.9 CLEANING

A. Remove stockpiles from the site upon Work Completion. Grade site to prevent free standing surface water.

B. Leave borrow areas clean and neat.

END OF SECTION

# SECTION 32 11 23
# CRUSHED AGGREGATE BASE

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Treated or untreated base course requirements.

### 1.2 REFERENCES

A. ASTM C 29: Standard Test Method for Unit Weight and Voids in Aggregate.

B. ASTM C 131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

C. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM D 75: Standard Practice for Sampling Aggregates.

E. ASTM D 448: Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

F. ASTM D 1883: Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.

G. ASTM D 2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

H. ASTM D 3665: Standard Practice for Random Sampling of Construction Materials.

I. ASTM D 3740: Standard Recommended Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

J. ASTM D 4318: Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

K. ASTM D 5821: Standard Test Method for Determining the percentage of Fractured Particles in Coarse Aggregate.

### 1.3 DEFINITIONS

A. Aggregate Grading Band: Allowable deviation from Target Gradation Curve based upon the number of gradation tests in a Lot. It is possible that gradation for any sieve may lie outside of its respective Master Grading Band limits.

B. Master Grading Band: Gradation limits allowed for various sieve sizes ranging from the maximum size sieve to the No. 200 sieve.

C. Mean of Deviations: The sum of the absolute values of the variance between each screen target value and each measured value divided by the number of tests in the Lot.

D. RAP (acronym for reclaimed asphalt pavement): See Section 32 01 16.

E. Target Gradation Curve: A smooth locus of points within the limits of the Master Grading Band.

1.4 **SUBMITTALS**

A. Name of Supplier and aggregate source.

B. Target Gradation Curve.

1.5 **QUALITY ASSURANCE**

A. Use a laboratory that follows and complies with Section 01 45 00 and ASTM D 3740.

1.6 **ACCEPTANCE**

A. General:

1. Defective work, Section 01290.

2. Dispute resolution, Section 01460.

B. Treated or Untreated Base Course: Lot size is one day's production. Sub-lot size is 500 tons.

1. ENGINEER is not obligated to accept changes in Target after any material is delivered to site.

2. Lot is acceptable if gradation test deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation greater than pay factor 0.70 limits may stay in place at 50 percent cost.

**Table 1- Pay Factors for Price Determination**

| Criteria | Pay Factor | Mean of Deviations of Acceptance Tests From the Target Gradation Curve Expressed in Percentage Points | | | | |
|---|---|---|---|---|---|---|
| | | 1 Sample | 2 Samples | 3 Sample | 4 Sample | 5 or More Samples |
| 1/2" Sieve | 1.00 | 0 – 15 | 0.0 – 12.1 | 0.0 – 10.8 | 0.0 – 10.0 | 0.0 – 9.5 |
| | 0.95 | 16 – 17 | 12.2 – 13.9 | 10.9 – 12.4 | 10.1 – 11.5 | 9.6 – 11. |
| | 0.90 | 18 – 19 | 14.0 – 15.1 | 12.5 – 13.5 | 11.6 – 12.5 | 11.1 – 11.9 |
| | 0.80 | 20 – 21 | 15.2 – 17.2 | 13.6 – 15.3 | 12.6 – 14.2 | 12. – 13.5 |
| | 0.70 | 22 – 23 | 17.3 – 18.8 | 15.4 – 16.7 | 14.3 – 15.5 | 13.6 – 14.7 |
| 3/8" Sieve | 1.00 | 0 – 15 | 0.0 – 11.5 | 0.0 – 9.8 | 0.0 – 8.8 | 0.0 – 8.0 |
| | 0.95 | 16 – 17 | 11.6 – 13.2 | 9.9 – 11.3 | 8.9 – 10.1 | 8.1 – 9.2 |
| | 0.90 | 18 – 19 | 13.3 – 14.4 | 11.4 – 12.3 | 10.2 – 11 | 9.3 – 10.0 |
| | 0.80 | 20 – 21 | 14.5 – 16.3 | 12.4 – 13.9 | 11.1 – 12.5 | 10.1 – 22.4 |
| | 0.70 | 22 – 23 | 16.4 – 17.9 | 14.0 – 15.2 | 12.6 – 13.6 | 11.5 – 12.4 |
| No. 4 Sieve | 1.00 | 0 – 14 | 0.0 – 10.5 | 0.0 – 8.8 | 0.0 – 7.8 | 0.0 – 7.0 |
| | 0.95 | 15 – 17 | 10.6 – 12.1 | 8.9 – 10.1 | 7.9 – 9.0 | 7.1 – 8.0 |
| | 0.90 | 18 | 12.2 – 13.1 | 10.2 – 11 | 9.1 – 9.8 | 8.1 – 8.7 |
| | 0.80 | 19 – 20 | 13.2 – 14.9 | 11.1 – 12.5 | 9.9 – 11.1 | 8.8 – 10.0 |
| | 0.70 | 21 – 22 | 15.0 – 16.3 | 12.6 – 13.6 | 11.2 – 12.1 | 10.1 – 10.8 |
| No. 16 Sieve | 1.00 | 0 – 11 | 0.0 – 8.2 | 0.0 – 6.9 | 0.0 – 6.2 | 0.0 – 5.6 |
| | 0.95 | 12 – 13 | 8.3 – 9.4 | 7.0 – 7.9 | 6.3 – 7.1 | 5.7 – 6.4 |
| | 0.90 | 14 | 9.5 – 10.3 | 8.0 – 8.6 | 7.2 – 7.8 | 6.5 – 7.0 |
| | 0.80 | 15 – 16 | 10.4 – 11.6 | 8.7 – 9.8 | 7.9 – 8.8 | 7.1 – 8.0 |
| | 0.70 | 17 | 11.7 – 12.7 | 9.9 - 10.7 | 8.9 – 9.6 | 8.1 – 8.7 |

| Table 1- Pay Factors for Price Determination | | | | | | |
|---|---|---|---|---|---|---|
| Criteria | Pay Factor | Mean of Deviations of Acceptance Tests From the Target Gradation Curve Expressed in Percentage Points | | | | |
| | | 1 Sample | 2 Samples | 3 Sample | 4 Sample | 5 or More Samples |
| No. 50 Sieve | 1.00 | 0 – 9 | 0.0 – 7.0 | 0.0 – 6.1 | 0.0 – 5.5 | 0.0 – 5.2 |
| | 0.95 | 10 | 7.1 – 8.0 | 6.2 – 7.0 | 5.6 – 6.3 | 5.3 – 6.0 |
| | 0.90 | 11 | 8.1 – 8.8 | 7.1 – 7.6 | 6.4 – 6.9 | 6.1 – 6.5 |
| | 0.80 | 12 – 13 | 8.9 – 10.0 | 7.7 – 8.7 | 7.0 – 7.8 | 6.6 – 7.4 |
| | 0.70 | 14 | 10.1 - 10.9 | 8.8 – 9.5 | 7.9 – 8.5 | 7.5 – 8.1 |
| No. 200 Sieve | 1.00 | 0 – 4.5 | 0.0 – 3.4 | 0.0 – 2.9 | 0.0 – 2.5 | 0.0 – 2.3 |
| | 0.95 | 4.6 – 5.2 | 3.5 – 3.9 | 3.0 – 3.3 | 2.6 – 2.9 | 2.4 – 2.6 |
| | 0.90 | 5.3 – 5.6 | 4.0 – 4.3 | 3.4 – 3.6 | 3.0 – 3.1 | 2.7 – 2.9 |
| | 0.80 | 5.7 – 6.4 | 4.4 – 4.9 | 3.7 – 4.1 | 3.2 – 3.6 | 3.0 – 3.3 |
| | 0.70 | 6.5 – 7.0 | 4.9 – 5.3 | 4.2 – 4.5 | 3.7 – 3.9 | 3.5 – 3.6 |

3. Suitability of Source: Meet Table 2 properties. A reduction in aggregate class will be accepted providing any costs for difference in excavation, backfill, and alternate design for CBR does not increase the Contract Price.

## PART 2 PRODUCTS

### 2.1 UNTREATED BASE COURSE

A. Material: Crushed rock, gravel, sand or other high quality mineral particle, or combination.

| Table 2 – Properties | | | | | |
|---|---|---|---|---|---|
| Physical Property | Units | Aggregate Class | | | ASTM Test |
| | | A | B | C | |
| Dry Rodded Unit Weight, min. | $lb/ft^3$ | 75 | | | C 29 |
| Liquid Limit, max. | | 25 | | | D 4318 |
| Plastic Index, max. | | 0 | 0 | 6 | D 4318 |
| Sand Equivalent, min. | percent | 35 | | | D 2419 |
| Wear (hardness), max. | percent | 50 | | | C 131 |
| Gradation | | Table 3 | | | C 136 |
| Two Fractured Faces, min. | percent | 90 | 50 | 50 | D 5821 |
| CBR, min. | percent | 70 | 55 | 40 | D 1883 |

NOTES
(a) Liquid limit, plastic limit, sand equivalent: Passing No. 40 sieve.
(b) Wear: Retained on No. 8 sieve.
(c) CBR: Use a 10 lb surcharge measured at 0.20 inch penetration at 95 percent of modified Proctor.
(d) Faces: Retained on No. 4 sieve.

| Table 3 – Gradation | | | |
|---|---|---|---|
| US Sieve Size | Master Grading Bands Limits | | |
| | Grade 1-1/2 | Grade 1 | Grade 3/4 |
| 2" | – | – | – |
| 1-1/2" | 100 | – | – |
| 1" | – | 100 | – |
| 3/4 " | 81 – 91 | – | 100 |
| 1/2 " | 67 – 77 | 79 – 91 | – |
| 3/8" | – | – | 78 – 92 |
| No. 4 | 43 – 53 | 49 – 61 | 55 – 67 |
| No. 16 | 23 – 29 | 27 – 35 | 28 – 38 |
| No. 200 | 6 – 10 | 7 – 11 | 7 – 11 |

2.2 **ASPHALT TREATED BASE COURSE**

A. Meet requirements of this Section Article 2.1 and the following.

1. Sand equivalent and fractured face measured after asphalt residue is burned off.
2. Plasticity and wear requirements apply to virgin aggregate portion only.
3. Allowable asphalt content is controlled by CBR.

B. If aggregate contains RAP.

1. Screen crushed RAP to remove debris.
2. Mechanically blend virgin and RAP aggregates. Do not use windrows for blending.

2.4 **SOURCE QUALITY CONTROL**

A. Sample, ASTM D 75 on a random basis, ASTM D 3665.

B. Reject crushed aggregate base products that do not meet requirements of this Section.

## PART 3 EXECUTION

3.1 **INSTALLATION**

A. Trenches, Section 33 05 20.

B. Structures, Section 31 23 23.

C. Landscaping, Section 32 92 19.

D. Pavements, Section 32 05 10.

3.2 **FIELD QUALITY CONTROL**

A. Remove any product found defective after installation and install acceptable product at no additional cost to the OWNER.

END OF SECTION

# SECTION 32 12 03
# PAVING ASPHALTS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Performance graded asphalt, asphalt cement, cutback asphalt, emulsified asphalt, recycle asphalt, and crack patch asphalt.

B. Requirements for accepting non-complying paving asphalts.

### 1.2 REFERENCES

A. ASTM D 113: Standard Test Method for Ductility of Bituminous Materials.

B. ASTM D 977: Standard Specification for Emulsified Asphalt.

C. ASTM D 2026: Standard Specification for Cutback Asphalt (Slow-Curing Type).

D. ASTM D 2027: Standard Specification for Cutback Asphalt (Medium-Curing Type).

E. ASTM D 2028: Standard Specification for Cutback Asphalt (Rapid-Curing type).

F. ASTM D 2397: Standard Specification for Cationic Emulsified Asphalt.

G. ASTM D 3381: Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

H. ASTM D 4552: Standard Practice for Classifying Hot-Mix Recycling Agents.

I. ASTM D 5710: Standard Specification for Trinidad Lake Modified Asphalt.

J. ASTM D 6373: Standard Specification for Performance Graded Asphalt Binder.

### 1.3 SUBMITTALS

A. Submit bill of lading for each shipment of paving asphalt from vendor. Identify the following.

1. Source of product (manufacturer);
2. Type and grade of asphalt, And
3. Type and amount of additives in the product.

### 1.4 QUALITY ASSURANCE

A. Reject paving asphalts which are not uniform in appearance and consistency or which foam when heated to mixing temperature.

B. Do not use storage containers contaminated with other types or grades of Petroleum products.

C. Do not use Petroleum product that does not comply with contract requirements.

1.5 **ACCEPTANCE**

A. General:

1. Acceptance is by Lot. One Lot is one day's production.
2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00
3. Dispute resolution, Section 01 35 10.

B. Performance Graded Asphalt Binder (PGAB): Sub-lot size is 20,000 gallons. Collect sub-lot Sample randomly from oil storage unit.

1. Refer to limits identified in Section 209 of UDOT's "Manual of Instruction Part 8 Materials". Pay factors are as follows.
   a. If none of the critical properties are outside rejection limit a composite price adjustment of 25 percent or less is allowed.
   b. If one or more of the critical properties falls outside the rejection limit or if a composite price adjustment is more than 25 percent, paving asphalt will be rejected.

C. Asphalt Cement (AC) Binder: Sub-lot size is 20,000 gallons. Collect sub-lot Sample randomly from oil storage unit.

1. Ductility: Meet this Section's requirements, <u>or</u>
2. Viscosity or Penetration: Meet graphics published in Section 955 of UDOT's "Manual of Instructions, Part 8 Materials".
   a. Lot may be accepted using the published graphics. If price adjustment exceeds 30 percent, reject paving asphalt, or
   b. If allowed to remain after placement, price adjustment will be 50 percent.

D. Cut-back Binder: Meet this Section's requirements for ductility.

E. Trinidad Lake Modified Asphalt: Supplier's certificate for ASTM compliance.

F. Emulsifie Asphalt: Supplier's certificate for ASTM compliance.

G. Recycle Asphalt: Identity of source (asphalt cement or tar products).

H. Crack Patch: Meet material requirements in Section 32 01 17.

## PART 2 PRODUCTS

2.1 **PERFORMANCE GRADE ASPHALT BINDER (PGAB)**

A. Petroleum asphalt that complies with ASTM D 6373. Blending the paving asphalt with polymers or natural asphalts is CONTRACTOR's choice.

## 2.2 ASPHALT CEMENT (AC)

A. Petroleum asphalt that complies with Table 2 of ASTM D 3381 except as follows:

1. Replace ductility at 77 deg. F. (25 deg. C.) with ductility at 39.2 deg. F. (4 deg. C.). Use the following values.
   - AC-5: greater than 25.
   - AC-10: greater than 15.
   - AC-20: greater than 5.
2. Delete the loss on heating requirement on residue from "Thin-Film Oven Test".

B. AC-5 Latex Additive: Anionic emulsion of butadiene-styrene low-temperature copolymer consisting of 2 percent by weight (solids basis), stabilized with fatty-acid soap for storage stability.

## 2.3 TRINIDAD LAKE MODIFIED ASPHALT (TLA)

A. Petroleum asphalt that complies with ASTM D 5710 (a blend of natural asphalts).

## 2.4 SLOW CURE CUT-BACK ASPHALT (SC)

A. Petroleum asphalt that complies with ASTM D 2026 (fluxed with a light oil) except if penetration of residue is more than 200 and its ductility at 77 deg. F (25 deg. C) is less than 100 cm., the material will be acceptable if the ductility at 59 deg. F. (15 deg. C) is greater than 100.

## 2.5 MEDIUM CURE CUT-BACK ASPHALT (MC)

A. Petroleum asphalt that complies with ASTM D 2027 (fluxed or blended with a kerosene-type solvent, non-foaming when heated to application temperature) except if penetration of residue is more than 200 and its ductility at 77 deg. F. (25 deg. C) is less than 100 cm., the material will be acceptable if the ductility at 59 deg. F. (15 deg. C) is greater than 100.

## 2.6 RAPID CURE CUT-BACK ASPHALT (RC)

A. Petroleum that complies with ASTM D 2028 asphalt (fluxed or blended with a naphtha-solvent, non-foaming when heated to application temperature).

## 2.7 EMULSIFIED ASPHALT

A. Petroleum asphalt uniformly emulsified with water, homogeneous throughout, and when stored, shows no separation within 30 days after delivery. Frozen emulsions not accepted.

1. Anionic, ASTM D 977 (breaks by evaporation).
2. Cationic, ASTM D 2397 (breaks chemically).

## 2.8 RECYCLE ASPHALT (RA)

A. Petroleum asphalt that complies with ASTM D 4552 (homogeneous, free-flowing at pumping temperature made from maltene fractions of asphalt cement for surface revitalization or from tar products to make Pavements resistant to fuel spillage.

1. RA-1, RA-5, RA-25 or RA-75 for recycling RAP when less than 30 percent virgin aggregate is added.

2. RA-250 or RA-500 when more than 30 percent virgin aggregate is added to the RAP.

## PART 3 EXECUTION

### 3.1 INSTALLATION

A. Prime coat, Section 32 12 13.

B. Tack coat, Section 32 12 14.

C. Plant mix paving, Section 32 12 17.

D. Road mix paving, Section 32 12 17.

E. Seal coating, Section 32 01 13.

F. Crack patch, Section 32 01 17.

END OF SECTION

# SECTION 32 12 05
# ASPHALT CONCRETE

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Composition of asphalt - aggregate mix.

B. This specification does not apply to polymer modified asphalt concrete. Refer to Section 32 12 06.

### 1.2 REFERENCES

A. AI Manual Series No. 2: Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

B. AASHTO T 324: Hamburg Wheel-track Testing of Compacted Hot-Mix Asphalt (HMA).

C. ASTM C 29: Standard Test Method for Unit Weight and Voids in Aggregate.

D. ASTM C 88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

E. ASTM C 117: Standard Test Method for Materials Finer Than 0.075mm (No. 200) Sieve in Mineral Aggregates by Washing.

F. ASTM C 131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

G. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregate.

H. ASTM C 142: Standard Test Method for Clay Lumps and Friable Particles in Aggregates.

I. ASTM D 75: Standard Practice for Sampling Aggregates.

J. ASTM D 140: Standard Practice for Sampling Bituminous Materials.

K. ASTM D 242: Standard Specification for Mineral Filler for Bituminous Paving Mixtures.

L. ASTM D 979: Standard Methods for Sampling Bituminous Paving Mixtures.

M. ASTM D 2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

N. ASTM D 3203: Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

O. ASTM D 3381: Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

P. ASTM D 3515: Standard Specification for Hot-Mixed, Hot-Laid

Bituminous Paving Mixtures.

Q. ASTM D 3665: Standard Practice for Random Sampling of Construction Materials.

R. ASTM D 3666: Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.

S. ASTM D 4318: Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

T ASTM D 4552: Standard Practice for Classifying Hot-Mix Recycling Agents.

U. ASTM D 4791: Standard Test Method for Flat or Elongated Particles in Coarse Aggregate.

V. ASTM D 4867: Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures.

W. ASTM D 5444: Standard Test Method for Mechanical Size Analysis of Extracted Aggregate.

X. ASTM D 5581: Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6-jnch_Diameter Specimen)

Y. ASTM D 5821: Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

Z. ASTM D 6307: Standard Test Method for Determining Asphalt Content of Hot-Mix Asphalt by Ignition Method.

AA. ASTM D 6373: Standard Specification for Performance Graded Asphalt Binder.

## 1.3 DEFINITIONS

A. Asphalt-Aggregate Designator: Alpha-numeric code that indicates type and grade of asphalt, and type and grade of aggregate in an asphalt-aggregate mix. For example;

1. "*AC-20-DM-3/4*" means asphalt-aggregate mix shall be composed of AC-20 type and grade asphalt cement and DM-3/4 type and grade aggregate.
2. "*RA-1-DM-1*" means asphalt-aggregate mix shall be composed of RA-1 type and grade asphalt recycling agent and DM-1 type and grade aggregate.
3. "*RS-1-SS-II*" means asphalt-aggregate mix shall be composed of RS-1 type and grade asphalt emulsion and SS-II type and grade aggregate.

B. Mean of Deviations: Defined in Section 32 11 23.

## 1.4 SUBMITTALS

A. **Quality Assurance**: Submit names, certification levels, and years of experience of testing agency's field technicians that are assigned to the Work. Verify laboratory complies with ASTM standards.

B. **Mix Design**: Submit.

1. Date of mix design. If older than 365 days, recertify mix design.

2. Asphalt cement source, type and chemical composition.
3. Aggregate gradation target.
4. Asphalt cement target, dust to asphalt ratio, moisture sensitivity (tensile strength) stability, flow and voids in the bituminous mix.
5. Paving asphalt grade if RAP is used in the mix.
6. RAP, mineral filler, antistrip, and recycle agent percentages.

C. **Pre-approved mix design**, submit name and address of Supplier.

D. **Before changing mix design**, submit a new design and give ENGINEER 10 days to evaluate the changes.

E. **Source Quality Control Inspections and Testing Report**: If requested, submit report describing CONTRACTOR's and Supplier's quality control activities and test results.

1.5 **QUALITY ASSURANCE**

A. Use a laboratory that follows and complies with ASTM D 3666.

B. Do not change aggregate source or paving asphalt source without ENGINEER's written approval.

C. Do not use non-complying sources.

1.6 **ACCEPTANCE**

A. General:

1. Acceptance is by Lot. One Lot is one day's production.
2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation, Section 01 29 00.
3. Dispute resolution, Section 01 35 10.

B. Installation: Accepted as specified in Section 32 12 16.

C. Materials:

1. At the Source:
   a. Aggregate: Verify gradation. Collect sample from conveyor belt or stockpile if belt is not accessible.
   b. Paving Asphalt: See Section 32 12 03 provisions.
   c. Mix: 325 deg. F. maximum in transport vehicle.
2. At the Site:
   a. One sub-lot is 500 tons.
   b. Sampling: Two random samples per sub-lot. Location as follows.
      1) Behind paver before compaction, or
      2) Where sub-lot exhibits non-uniform appearance.
3. At the Laboratory:
   a. Air Voids:
      1) Basis of evaluation is laboratory compacted samples (not field

compacted samples).

2) If test results are not within this Section's limits, options include correction of production procedures or alternate mix design acceptable to ENGINEER.

b. Dust to asphalt ratio.

c. Asphalt Content, Aggregate Gradation: Lot is acceptable if test deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation greater than pay factor 0.85 limits may stay in place at 50 percent cost.

**Table 1 – Pay Factors for Non-complying Materials**

| Criteria | Pay Factor | Range of Mean of Deviations of Tests Results from the Design Mix Target in Percentage Points | | | | |
|---|---|---|---|---|---|---|
| | | 500 Tons | 1,000 Tons | 1,500 Tons | 2,000 Tons | ≥2,500 Tons |
| Asphalt Content | 1.00 | 0.00–0.70 | 0.00–0.54 | 0.00–0.46 | 0.00–0.41 | 0.00–0.38 |
| | 0.975 | 0.71–0.80 | 0.55–0.61 | 0.47–0.52 | 0.42–0.46 | 0.39–0.43 |
| | 0.95 | 0.81–0.90 | 0.62–0.68 | 0.53–0.58 | 0.47–0.52 | 0.44–0.47 |
| | 0.90 | 0.91–1.00 | 0.69–0.75 | 0.59–0.64 | 0.53–0.56 | 0.48–0.52 |
| | 0.85 | 1.01–1.10 | 0.76–0.82 | 0.65–0.69 | 0.57–0.61 | 0.53–0.56 |
| 1/2" and larger Sieve | 1.00 | 0.0–10.9 | 0.0–7.3 | 0.0–6.5 | 0.0–5.6 | 0.0–5.2 |
| | 0.975 | 11.0–12.9 | 7.4–8.3 | 6.4–7.1 | 5.7–6.3 | 5.3–5.8 |
| | 0.95 | 13.0–13.9 | 8.4–9.3 | 7.2–7.9 | 6.4–7.0 | 5.9–6.4 |
| | 0.90 | 14.0–14.9 | 9.4– 10.3 | 8.0–8.7 | 7.1–7.7 | 6.5–7.1 |
| | 0.85 | 15.0–16.0 | 10.4–11.3 | 8.8–9.5 | 7.8–8.4 | 7.2–7.7 |
| 3/8" Sieve | 1.00 | 0.0–9.9 | 0.0–6.9 | 0.0–5.9 | 0.0–5.3 | 0.0–4.9 |
| | 0.975 | 10.0–10.9 | 7.0–7.8 | 6.0–6.6 | 5.4–6.9 | 5.0–5.5 |
| | 0.95 | 11.0–11.9 | 7.9–8.7 | 6.7–7.3 | 6.0–6.6 | 5.6–6.1 |
| | 0.90 | 12.0–13.9 | 8.8–9.6 | 7.4–8.0 | 6.7–7.2 | 6.2–6.6 |
| | 0.85 | 14.0–15.0 | 9.7–10.5 | 8.1–8.9 | 7.3–7.9 | 6.7–7.2 |
| No. 4 Sieve | 1.00 | 0.0–9.9 | 0.0–6.7 | 0.0–5.7 | 0.0–5.2 | 0.0–4.8 |
| | 0.975 | 10.0–11.0 | 6.8–7.6 | 5.8–6.3 | 5.3–5.8 | 4.9–5.4 |
| | 0.95 | 11.1–11.9 | 7.7–8.5 | 6.4–6.9 | 5.9–6.4 | 5.5–5.9 |
| | 0.90 | 12.0–12.9 | 8.6–9.4 | 7.0–7.5 | 6.5–7.0 | 6.0–6.5 |
| | 0.85 | 13.0-14.0 | 9.5–10.2 | 7.6–8.0 | 7.1–7.6 | 6.6–7.0 |
| No. 8 Sieve | 1.00 | 0.0–7.9 | 0.0–5.6 | 0.0–4.8 | 0.0–4.3 | 0.0–4.0 |
| | 0.975 | 8.0–8.9 | 5.7–6.3 | 4.9–5.4 | 4.4–4.8 | 4.1–4.5 |
| | 0.95 | 9.0–9.9 | 6.4–7.0 | 5.5–6.0 | 4.9–5.3 | 4.6–4.9 |
| | 0.90 | 10.0–10.9 | 7.1–7.7 | 6.1–6.6 | 5.4–5.8 | 5.0–5.4 |
| | 0.85 | 11.0–12.0 | 7.8–8.5 | 6.7–7.2 | 5.9–6.4 | 5.5–5.8 |
| No. 16 Sieve | 1.00 | 0.0–7.9 | 0.0–5.2 | 0.0–4.6 | 0.0–4.2 | 0.0–3.9 |
| | 0.975 | 8.0–8.9 | 5.3–5.8 | 4.7–5.1 | 4.3–4.6 | 4.0–4.3 |
| | 0.95 | 9.0–9.9 | 5.9–6.4 | 5.2–5.6 | 4.7–5.1 | 4.4–4.7 |
| | 0.90 | 10.0–10.9 | 6.5–7.0 | 5.7–6.1 | 5.2–5.5 | 4.8–5.1 |
| | 0.85 | 11.0–12.0 | 7.1–7.6 | 6.2–6.6 | 5.6–5.9 | 5.2–5.4 |
| No. 50 Sieve | 1.00 | 0.0–6.9 | 0.0–4.3 | 0.0–3.8 | 0.0–3.4 | 0.0–3.2 |
| | 0.975 | 7.0–7.9 | 4.4–4.8 | 3.9–4.1 | 3.5–3.8 | 3.3–3.5 |
| | 0.95 | 8.0–8.9 | 4.9–5.3 | 4.2–4.5 | 3.9–4.1 | 3.6–3.8 |
| | 0.90 | 9.0–9.9 | 5.4–5.8 | 4.6–4.9 | 4.2–4.4 | 3.9–4.1 |
| | 0.85 | 10.0–11.0 | 5.9–6.4 | 5.0–5.5 | 4.5–4.9 | 4.2–4.5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| No. 200 Sieve | 1.00 | 0.0–3.0 | 0.0–2.4 | 0.0–2.0 | 0.0–1.8 | 0.0–1.7 |
| | 0.975 | 3.1–3.5 | 2.5–2.7 | 2.1–2.2 | 1.9–2.0 | 1.8–1.9 |
| | 0.95 | 3.6–4.0 | 2.8–3.0 | 2.3–2.4 | 2.1–2.2 | 2.0–2.1 |
| | 0.90 | 4.1–4.5 | 3.1–3.3 | 2.5–2.7 | 2.3–2.4 | 2.2–2.3 |
| | 0.85 | 4.6–5.0 | 3.4–3.6 | 2.8–3.0 | 2.5–2.6 | 2.4–2.5 |

NOTES
(a) Test paving asphalt content using a burn-off oven, ASTM D 6307.
(b) Determine aggregate gradation be extraction, ASTM D 5444.

## PART 2 PRODUCTS

### 2.1 PAVING ASPHALT

A. Asphalt Cement: Section 32 12 03. Substitutes for asphalt cement are as follows.

| ASTM D 3381 | ASTM D 6373 |
|---|---|
| AC 10 | PG 64-22 or PG 70-28 |
| AC 20 | PG 70-28 |

B. Recycle Asphalt: Section 32 12 03.

### 2.2 AGGREGATE

A. Material: Clean, hard, durable, angular, sound, consisting of crushed stone, crushed gravel, slag, sand, or combination.

B. Source: Use the following requirements to determine suitability of aggregate source and not for project control.

1. Coarse Aggregate:
   a. Angularity (fractured faces), ASTM D 5821: 50 percent maximum by weight of particles with at least 2 fractured faces.
   b. Hardness (toughness), ASTM C 131: 40 percent minimum wear of aggregate retained above the No. 4 sieve unless specific aggregates having higher values are known to be satisfactory.
   c. Flat or Elongated Particles, ASTM D 4791: 20 percent maximum retained above 3/8 inch sieve has a 3:1 length to width ratio.
2. Fine Aggregate:
   a. Friable Particles, ASTM C 142: 2 percent maximum passing No. 4 sieve.
   b. Plasticity, ASTM D 4318: Aggregate passing No. 40 sieve is non-plastic even when filler material is added to the aggregate.
      1) Liquid limit: Less than 25.
      2) Plastic limit: Less than 6.

## 2.3 ADMIXTURES

A. Reclaimed Asphalt Pavement (RAP) Aggregate: Restrictions include.

1. 15 percent by weight maximum providing grading and voids in the bituminous mix are met.
2. Greater than 15 percent requires separate mix design.

B. Mineral Filler: ASTM D 242.

C. Recycle Agent: ASTM D 4552.

D. Antistrip: Heat stable cement slurry or lime slurry.

## 2.4 MIX DESIGN

A. Selection of Materials:

1. Paving Asphalt, Section 32 12 03:
   a. AC-10 or AC-20: Light traffic pavement.
   b. AC-20: Medium traffic pavement.
   c. RA: For hot-laid recycled asphalt pavement. Choice by CONTRACTOR.
2. Aggregate: This Section Article 2.2.

B. Selection of Design Aggregate Structure:

1. Gradation: Maximum particle size is 1/2 compacted lift thickness.
   a. Target Gradation Curve must lie within one of the Master Grading Bands in the following table, or
   b. If acceptable to ENGINEER, use fractionated proportioning to select or adjust gradation.

**Table 2 – Master Grading Bands**

| Sieve Size | Dense | | | | Open | Friction | |
|---|---|---|---|---|---|---|---|
| | DM-1 | DM-3/4N | DM-3/4 | DM-1/2 | OM-1/2 | FM-1 | FM-2 |
| 1 inch | 100 | | | | | | |
| 3/4 inch | | 100 | 100 | | | 100 | |
| 1/2 inch | 75 – 91 | 74 – 99 | | 100 | 100 | 90 –100 | 100 |
| 3/8 inch | | 69 – 91 | 75 – 91 | | 93 – 100 | 60 – 100 | 90 – 100 |
| No. 4 | 47 – 61 | 49 – 65 | 46 – 62 | 60 – 80 | 36 – 44 | 15 – 40 | 30 – 50 |
| No. 8 | | 33 – 47 | | | 14 – 21 | 4 – 12 | 5 – 15 |
| No. 16 | 23 – 33 | 21 – 35 | 22 – 34 | 28 – 42 | | | |
| No. 50 | 12 – 22 | 6 – 18 | 11 – 23 | 11 – 23 | | | 2 – 5 |
| No.200 | 3 – 7 | 2 – 6 | 3 – 7 | 3 – 7 | 2 – 4 | 2 – 5 | |

NOTES
(a) Gradation expressed in percent passing by weight, ASTM C 136.
(b) It is assumed fine and coarse aggregate have same bulk specific gravity.
(c) Friction Mixture: See ASTM D 3515.
(d) DM -3/4N is 100% crushed.
(e) Percentage of fines passing No. 200 sieve determined by washing, ASTM C 117.

2. Aggregate Blend:

a. Dry-rodded Unit Weight, ASTM C 29: 75 pounds per cubic foot minimum.

b. Weight Loss (soundness), ASTM C 88: 16 percent maximum using sodium sulfate.

c. Clay Content (cleanliness), ASTM D 2419: Sand equivalent value after going through the dryer or prior to the drum mixer.

1) 45 percent minimum if Medium Traffic Classification.

2) 60 percent minimum if Heavy Traffic Classification.

The sand equivalent requirement is waived for the RAP aggregate but applies to the remainder of the aggregate blend.

C. Selection of Admixture: CONTRACTOR's choice.

1. RAP: Adjust paving asphalt grade to account for RAP binder viscosity.

2. Cement or Hydrated Lime: Add if mix is moisture sensitive.

D. Selection of Mix Properties: Use AI Manual Series No. 2 procedure for stability, flow and voids.

1. Stability, Flow Voids: If traffic classification is not specified elsewhere, use Medium Traffic Classification.

**Table 3 – Stability, Flow, Voids Limits**

| Criteria | Traffic Classifications | | |
|---|---|---|---|
| | **Light** | **Medium** | **Heavy** |
| Number of compaction blows each end of specimen | 50 | 75 | 112 |
| Stability, lbs., minimum | 750 | 1200 | 1800 |
| Flow, in 0.01 inch units | 10 – 18 | 10 – 18 | 10 – 18 |
| Voids in Mineral Aggregate (VMA), percent minimum | | | |
| 1" nominal maximum particle size | 13 | 13 | 13 |
| 3/4" nominal maximum particle size | 14 | 14 | 14 |
| 1/2" nominal maximum particle size | 15 | 15 | 15 |
| 3/8" nominal maximum particle size | 16.5 | 16.5 | 16.5 |
| Voids in Bituminous Mix, percent | 3 – 5 | 3 – 5 | 3 – 5 |

NOTES

(a) Traffic Classifications:

**Light**: (ESAL $<10^4$ per year)

Class I: Parking lots, Driveways, light traffic residential streets, light traffic farm roads.

**Medium**: (ESAL between $10^4$ and $10^6$ per year)

Class II: Residential streets, rural farm and residential roads.

Class III: Urban minor collector streets, rural minor collector roads.

**Heavy**: (ESAL $>10^6$ per year)

Class IV: Urban minor arterial and light industrial and light industrial streets, rural major collector and minor arterial highways.

Class V: Urban major arterial and heavy industrial streets, freeways, expressways, arterial highways, rural interstate and other principal arterial highways.

(b) Stability, Flow, Voids: ASTM D 5581.
(c) VMA: ASTM D 3203
(d) Nominal maximum particle size is the largest sieve size listed in this Section upon which any material is retained.

2. Dust to Asphalt Ratio: 0.8 to 1.6.
3. Moisture Sensitivity, ASTM D 4867: Tensile strength ratio less than 0.80 using freeze-thaw conditioning. Test specimen shall be 150 mm in diameter and 95 mm in height and compacted at 7 percent plus or minus 1 percent air voids)
4. Rut Susceptibility, AASHTO T 324: Maximum rut depth is 10 mm at 20,000 passes.

2.5 **SOURCE QUALITY CONTROL**

A. General: Collect samples, ASTM D 3665. Do not change sampling points.
1. Aggregate sampling, ASTM D 75.
2. Paving asphalt sampling, ASTM D 140. Test for viscosity and penetration.

B. Asphalt-Aggregate Mix: Sample, ASTM D 979. Test for the following.
1. Air voids, ASTM D 3203 or ASTM D 5581.
2. Paving asphalt content, ASTM D 6307.
3. Aggregate gradation, ASTM D 5444.
4. Tensile strength of bitumen-aggregate mixtures, ASTM D 4867.

C. Mixing Plant: ASTM D 3515.

## PART 3 EXECUTION

3.1 **INSTALLATION**

A. Roadway paving, Section 32 12 17.
B. Patching, Section 33 05 25.

END OF SECTION

# SECTION 32 12 06
# SUPERPAVE

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Composition of performance grade asphalt - aggregate mix.

### 1.2 REFERENCES

A. AASHTO T304: Uncompacted Void Content of Fine Aggregate

B. AASHTO T312: Standard Method of Test for Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor.

C. AASHTO T 324: Hamburg Wheel-track Testing of Compacted Hot-Mix Asphalt (HMA).

D. AI SP-2: Superpave Series No. 2.

E. ASTM C 29: Standard Test Method for Unit Weight and Voids in Aggregate.

F. ASTM C 88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

G. ASTM C 131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

H. ASTM C 142: Standard Test Method for Clay Lumps and Friable Particles in Aggregates.

I. ASTM C 242: Standard Specification for Mineral Filler for Bituminous Paving Mixtures.

J. ASTM D 75: Standard Practice for Sampling Aggregates.

K. ASTM D 140: Standard Practice for Sampling Bituminous Materials.

L. ASTM D 979: Standard Methods for Sampling Bituminous Paving Mixtures.

M. ASTM D 2041: Standard Test Method for Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.

N. ASTM D 2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

O. ASTM D 3203: Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.

P. ASTM D 3515: Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

Q. ASTM D 3665: Standard Practice for Random Sampling of Construction Materials.

R. ASTM D 3666: Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.

S. ASTM D 4318: Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

T. ASTM D 4552: Standard Practice for Classifying Hot-Mix Recycling Agents.

U. ASTM D 4791: Standard Test Method for Flat or Elongated Particles in Coarse Aggregate.

V. ASTM D 4867: Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures.

W. ASTM D 5444: Standard Method for Mechanical Size Analysis of Extracted Aggregate.

X. ASTM D 5821: Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

Y. ASTM D 6307: Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method.

## 1.3 DEFINITIONS

A. Asphalt-Aggregate Designator: Alpha-numeric code that indicates nominal maximum size of aggregate, and type and grade of asphalt in aggregate-asphalt mix. For example; "*12.5 PG70-28*" means aggregate-asphalt mix shall be composed of an aggregate gradation with a 12.5 mm nominal maximum size and a performance grade asphalt binder designed to perform between temperatures of 70 deg C. and –28 deg C.

B. ESAL (acronym for equivalent single axle load): Number used in designing Pavement thickness. It relates axle load of any mass and number to an equivalent number (18,000 lb).

C. Mean of Deviations: Defined in Section 32 11 23.

D. Nominal Maximum Size: One sieve size larger than first sieve size retaining more than 10 percent of the Sample. The nominal maximum size sieve will retain a minimum of 0 and a maximum of 10 percent of the sample. Maximum size is one sieve size larger than the nominal maximum size.

## 1.4 SUBMITTALS

A. **Quality Assurance**: Submit names, certification levels, and years of experience of testing agency's field technicians that are assigned to the Work. Verify laboratory complies with ASTM standards.

B. **Mix Design**: Submit.

1. Date of mix design. If older than 365 days, recertify mix design.
2. Paving asphalt source, type, and chemical composition.
3. Nominal maximum size of aggregate.
4. Temperature of mix at plant and in the field for for optimum field compaction.
5. Paving asphalt target, dust to asphalt ratio, rut susceptibility, moisture sensitivity (tensile strength), voids in the mineral aggregate (VMA)

and voids filled with asphalt (VFA).

6. RAP, mineral filler, antistrip, and recycle agent percentages.
7. Compaction at $N_{max}$.

C. **Pre-approved mix design**, submit name and address of Supplier.

D. **Before changing mix design**, submit a new design and give ENGINEER 10 days to evaluate the changes.

E. **Source Quality Control Inspections and Testing Report**: If requested, submit report describing CONTRACTOR's and Supplier's quality control activities and test results.

1.5 **QUALITY ASSURANCE**

A. Use a laboratory that follows and complies with ASTM D 3666.

B. Do not change aggregate source or paving asphalt source without ENGINEER's written approval.

C. Do not use non-complying sources.

1.6 **ACCEPTANCE**

A. General:

1. Acceptance is by Lot. One Lot is one day's production.
2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00.
3. Dispute resolution, Section 01 35 10.

B. Installation: Accepted as specified in Section 32 12 16.

C. Materials:

1. At the Source:
   a. Aggregate: Verify gradation prior to the drum mixer or after going through the drier.
   b. Paving Asphalt: See Section 32 12 03 provisions.
   c. Mix: 325 deg. F. maximum in transport vehicle.
2. At the Site:
   a. One sub-lot is 500 tons.
   b. Sampling: Two random samples per sub-lot. Location as follows.
      1) Behind paver before compaction, or
      2) Where sub-lot exhibits non-uniform appearance.
3. At the Laboratory:
   a. Air Voids:
      1) Basis of evaluation is laboratory compacted samples (not field compacted samples).
      2) If test results are not within this Section's limits, options include correction o f production procedures or alternate mix design acceptable to ENGINEER.

b. Dust to asphalt ratio.

c. Asphalt Content, Aggregate Gradation: Lot is acceptable if test deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation greater than pay factor 0.85 limits may stay in place at 50 percent cost.

**Table 1 – Pay factors for Non-complying Materials**

| Criteria | Pay Factor | Range of Mean of Deviations of Tests Results from Design Mix Target in Percentage Points | | | |
|---|---|---|---|---|---|
| | | 500 Tons | 1,000 Tons | 1,500 Tons | ≥ 2,000 Tons |
| Asphalt Content | 1.00 | 0.0 – 0.7 | 0.0 – 0.54 | 0.0 – 0.46 | 0.0 – 0.41 |
| | 0.975 | 0.71 – 0.8 | 0.55 – 0.61 | 0.47 – 0.52 | 0.42 – 0.46 |
| | 0.95 | 0.81 – 0.9 | 0.62 – 0.68 | 0.53 – 0.58 | 0.47 – 0.52 |
| | 0.90 | 0.9 – 1.0 | 0.69 – 0.75 | 0.59 – 0.64 | 0.53 – 0.56 |
| | 0.85 | 1.01 – 1.1 | 0.76 – 0.82 | 0.65 – 0.69 | 0.57 – 0.61 |
| ≥ 12.5 mm Sieve | 1.00 | 0.0 – 10.0 | 0.0 – 7.3 | 0.0 – 6.3 | 0.0 – 0.56 |
| | 0.975 | 11.0 – 12.0 | 7.4 – 8.3 | 6.4 – 7.1 | 5.7 – 6.3 |
| | 0.95 | 13.0 – 13.9 | 8.4 – 9.3 | 7.2 – 7.9 | 6.4 – 7.0 |
| | 0.90 | 14.0 – 14.9 | 9.4 – 10.3 | 8.0 – 8.7 | 7.1 – 7.7 |
| | 0.85 | 15.0 – 16.0 | 10.4 – 11.3 | 8.8 – 9.5 | 7.8 – 8.4 |
| 9.5 mm Sieve | 1.00 | 0.0 – 9.9 | 0.0 – 6.9 | 0.0 – 5.9 | 0.0 – 5.3 |
| | 0.975 | 10.0 – 10.9 | 7.0 – 7.8 | 6.0 – 6.6 | 5.4 – 5.9 |
| | 0.95 | 11.0 – 11.9 | 7.9 – 8.7 | 6.7 – 7.3 | 6.0 – 6.6 |
| | 0.90 | 12.0 – 13.9 | 8.8 – 9.6 | 7.4 – 8.0 | 6.7 – 7.2 |
| | 0.85 | 14.0 – 15.0 | 9.7 – 10.5 | 8.1 – 8.9 | 7.3 – 7.9 |
| 4.75 mm Sieve | 1.00 | 0.0 – 9.9 | 0.0 – 6.7 | 0.0 – 5.7 | 0.0 – 5.2 |
| | 0.975 | 10.0 – 10.9 | 6.8 – 7.6 | 5.8 – 6.3 | 5.3 – 5.8 |
| | 0.95 | 11.0 – 11.9 | 7.7 – 8.5 | 6.4 – 6.9 | 5.9 – 6.4 |
| | 0.90 | 12.0 – 12.9 | 8.6 – 9.4 | 7.0 – 7.5 | 6.5 – 7.0 |
| | 0.85 | 13.0 – 14.0 | 9.5 – 10.2 | 7.6 – 8.0 | 7.1 – 7.6 |
| 2.36 mm Sieve | 1.00 | 0.0 – 7.9 | 0.0 – 5.6 | 0.0 – 4.8 | 0.0 – 4.3 |
| | 0.975 | 8.0 – 8.9 | 5.7 – 6.3 | 4.9 – 5.4 | 4.4 – 4.8 |
| | 0.95 | 9.0 – 9.9 | 6.4 – 7.0 | 5.5 – 6.0 | 4.9 – 5.3 |
| | 0.90 | 10.0 – 10.9 | 7.1 – 7.7 | 6.1 – 6.6 | 5.4 – 5.8 |
| | 0.85 | 11.0 – 12.0 | 7.8 – 8.5 | 6.7 – 7.2 | 5.9 – 6.4 |
| 0.075 mm Sieve | 1.00 | 0.0 – 3.0 | 0.0-2.4 | 0.0 – 2.0 | 0.0 – 1.8 |
| | 0.975 | 3.1 – 3.5 | 2.5 – 2.7 | 2.1 – 2.2 | 1.9 – 2.0 |
| | 0.95 | 3.6 – 4.0 | 2.8 – 3.0 | 2.3 – 2.4 | 2.1 – 2.2 |
| | 0.90 | 4.1 – 4.5 | 3.1 – 3.3 | 2.5 – 2.7 | 2.3 – 2.4 |
| | 0.85 | 4.6 – 5.0 | 3.4 – 3.6 | 2.8 – 3.0 | 2.5 – 2.6 |

NOTES
(a) Test bitumen content using a burn-off oven, ASTM D 6307.
(b) Determine aggregate gradation by extraction, ASTM D 5444.

## PART 2 PRODUCTS

### 2.1 PAVING ASPHALT

A. Performance Grade Asphalt Binder (PGAB): Section 32 12 03.

1. Blending with polymers or natural asphalts is CONTRACTOR's choice.
2. Do not use acid blends without documentation supporting need.
3. As a rule of thumb, if the two numbers in an asphalt binder designation are added together and are greater than 90, then the binder will most likely contain a polymer or natural asphalt.

B. Recycle Asphalt: Section 32 12 03.

## 2.2 AGGREGATE

A. Material: Clean, hard, durable, angular, sound, consisting of crushed stone, crushed gravel, slag, sand, or combination.

B. Source: Use the following requirements to determine suitability of aggregate source and not for project control.

1. Coarse Aggregate:
   a. Angularity (fractured faces), ASTM D 5821: At least one fracture as follows.
      1) 55 percent minimum if ESALs are less than 0.3 million.
      2) 85 percent minimum if ESALs are more than 0.3 million.
   b. Hardness (toughness), ASTM C 131: Retained above 2.36 mm sieve.
      1) 40 percent maximum if ESALs are less than 0.3 million.
      2) 35 percent maximum if ESALs are more than 0.3 million.
   c. Flat and Elongated Particles, ASTM D 4791: 20 percent maximum retained above the 9.5 mm sieve has a 3:1 length to width ratio.
2. Fine Aggregate:
   a. Angularity, AASHTO T304: 45 percent minimum uncompacted void content.
   b. Friable Particles, ASTM C 142: 2 percent maximum by weight passing 4.75 mm sieve.
   c. Plasticity, ASTM D 4318: Aggregate passing 4.75 mm sieve is non-plastic even when filler material is added to the aggregate.
      1) Liquid limit: Less than 25.
      2) Plastic limit: Less than 6.

## 2.3 ADMIXTURES

A. Reclaimed Asphalt Pavement (RAP) Aggregate: Restrictions include.

1. 15 percent by weight maximum providing grading, VMA and VFA are met.
2. Greater than 15 percent requires separate mix design.

B. Mineral Filler: ASTM D 242.

C. Recycle Agent: ASTM D 4552.

D. Antistrip: Heat stable, cement slurry, or lime slurry.

2.4 **MIX DESIGN**

A. Selection of Materials:

1. Paving Asphalt. Section 32 12 03.
   a. PG70-28: Less than 3 million EASLs.
   b. PG70-28: 3 million to 30 million EASLs.
2. Aggregate: This Section Article 2.2.

B. Selection of Design Aggregate Structure.

1. Gradation: Maximum particle size is 1/4 compacted lift thickness.
   a. Target Gradation Curve must lie within one of the following Master Grading Bands. It must lie below the restricted zone in traffic class IV and traffic class V (Table 3 Section 32 12 05). In all other classes it may lie above, below, or pass through the zone.
   b. If acceptable to ENGINEER, use fractionated proportioning to select or adjust gradation.

**Table 2 – Master Grading Bands**

| Sieve Size (mm) | | Aggregate Grade | | | |
|---|---|---|---|---|---|
| | | | | **12.5** | **9.5** |
| Control Sieves | 37.5 | 100.0 | – | – | – |
| | 25 | 90 – 100 | 100.0 | – | – |
| | 19 | < 90 | 90 – 100 | 100 | – |
| | 12.5 | – | < 90 | 90 – 100 | 100 |
| | 9.5 | – | – | < 90 | 90 – 100 |
| | 4.75 | – | – | – | < 90 |
| | 2.36 | 19 – 45 | 23 – 49 | 28 – 58 | 32 – 6 |
| | 0.075 | 1 – 7 | 2 – 8 | 2 – 10 | 2 – 10 |
| Restricted Zone | 4.75 | 39.5 | – | – | – |
| | 2.36 | 29.8 – 30.8 | 34.6 | 39.1 | 47.2 |
| | 1.18 | 18.1 – 24.1 | 22.3 – 28.3 | 25.6 – 31.6 | 31.6 – 37.6 |
| | 0.6 | 13.6 – 17.6 | 16.7 – 20.7 | 19.1 – 23.1 | 23.5 – 27.5 |
| | 0.3 | 11.4 | 13.7 | 15.5 | 18.7 |

NOTES
(a) Gradation in percent passing by weight, ASTM D 4759.
(b) It is assumed fine and coarse aggregate have same bulk specific gravity.
(c) Percentage of fines passing 0.075 mm control sieve determined by washing per ASTM C 117.

2. Aggregate Blend:
   a. Dry-rodded Unit Weight, ASTM C 29: 75 pounds per cubic foot minimum.
   b. Weight Loss (soundness), ASTM C 88: 16 percent maximum using sodium sulfate.
   c. Clay Content (cleanliness), ASTM D 2419: Sand equivalent value after going through the dryer or prior to the drum mixer.
      1) 45 percent minimum if ESALs are less than 0.3 million.
      2) 60 percent minimum if ESALs are more than 0.3 million.

      The sand equivalent requirement is waived for the RAP aggregate but applies to the remainder of the aggregate blend.

C. Selection of Admixture:
   1. RAP: Adjust pavement asphalt grade to account for RAP binder viscosity.
   2. Cement or Hydrated Lime: Add if mix is moisture sensitive.

D. Selection of Mix Properties: Use AI SP-2 volumetric procedure.
   1. Compaction:

**Table 4 – Compaction Parameters**

| 20 Year design ESALs (Million) | $N_{initial}$/ % of $G_{mm}$ | $N_{design}$/ % of $G_{mm}$ | $N_{max}$/ % of $G_{mm}$ |
|---|---|---|---|
| Less than 0.3 | 6 / ≤ 91.5 | 50 / 96 | 75 / ≤ 98 |
| 0.3 to <3 | 7 / ≤ 90.5 | 75 / 96 | 115 / ≤ 98 |
| 3 to <30 | 8 / ≤ 89 | 100 / 96 | 160 / ≤ 98 |
| 30 or more | 9 / ≤ 89 | 125 / 98 | 205 / 98 |

NOTES
(a) N = Number of gyrations.
(b) $G_{mm}$ = maximum specific gravity of mix, ASTM D 2041 (Rice method)
(c) Specific gravity of specimen: AASHTO T 312.
(d) 20 year design ESALs defined as follows.
- Less than 0.3 = parking lots, light traffic, residential streets
- 0.3 to 3 = collector roads (most county roads)
- 3 to 90 = city streets, state routes
- 30 or more = interstate, weigh stations.

   2. Voids in the mineral aggregate (VMA) at $N_{design}$:

| Nominal Maximum Size | Voids (VMA) |
|---|---|
| 37.5 mm | 11 to 13 percent |
| 25.0 mm | 12 to 14 percent |
| 19.0 mm | 13 to 15 percent |
| 12.5 mm | 14 to 16 percent |
| 9.5 mm | 16 percent minimum |

3. Voids filled with asphalt (VFA) at $N_{design}$:

| **20 Year Design ESALs (million)** | **Voids Filled with Asphalt (VFA)** |
|---|---|
| Less than 0.3 | 70 – 80 percent |
| 0.3 to <3 | 65 – 78 percent |
| 3 to <30 | 65 – 75 percent |
| 30 or more | 65 – 75 percent |

   a. For 9.5 mm nominal maximum size mixtures, the specified VFA range is 73 percent to 76 percent for design traffic levels 3 million ESALs or greater.

   b. For 25.0 mm nominal maximum size mixtures, the specified lower limit of the VFA is 67 percent for design traffic levels less than 0.3 million ESALs.

   c. For 37.5 mm nominal maximum size mixtures, the specified lower limit of the VFA is 64 percent for all design traffic levels.

4. Dust to Asphalt Ratio:

   a. 0.6 to 1.2 if aggregate gradation passes through or over the restricted zone.

   b. 0.8 to 1.6 if aggregate gradation passes under the restricted zone.

5. Moisture Sensitivity, ASTM D 4867: Tensile strength ratio less than 0.80 using freeze-thaw conditioning. Test specimen shall be 150 mm in diameter and 95 mm in height and compacted at 7 percent plus or minus 1 percent air voids.

6. Rut Susceptibility, AASHTO T 324: Maximum rut depth is 10 mm at 20,000 passes.

## 2.5 SOURCE QUALITY CONTROL

A. General: Collect Samples randomly, ASTM D 3665. Do not change sampling points.

   1. Aggregate sampling, ASTM D 75.

   2. Paving asphalt sampling, ASTM D 140.

B. Asphalt-aggregate mix sampling, ASTM D 979. Test for

   1. Air voids, ASTM D 3203.

   2. Paving asphalt content, ASTM D 6307.

   3. Aggregate gradation, ASTM D 5444.

   4. Tensile strength of bitumen-aggregate mixtures, ASTM D 4867.

C. Mixing Plant: ASTM D 3515.

## PART 3 EXECUTION

### 3.1 INSTALLATION

A. Pavement placement, Section 32 12 17.

B. Pavement restoration, Section 33 05 25.

END OF SECTION

# SECTION 32 12 14
# TACK COAT

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Application of asphaltic material to existing asphalt concrete or portland cement concrete surfaces preparatory to placing an asphalt concrete Pavement.

### 1.2 SUBMITTALS

A. Certificate showing asphaltic material complies with Section 32 12 03.
   1. Identify water/asphalt dilution ratio.
   2. Identify tack coat application rate.

B. Identify asphalt material recommended by fabric manufacturer.

### 1.3 WEATHER

A. Apply tack coat only when air and roadbed temperatures in the shade are greater than 40 deg. F. The temperature restrictions may be waived only upon written authorization from ENGINEER.

B. Do not apply tack coat during rain, fog, dust, or other unsuitable weather. Do not apply coat to wet surfaces.

### 1.4 NOTICE

A. Send written notice to residents or business owners 24 hours prior to applying coat.

## PART 2 PRODUCTS

### 2.1 ASPHALT MATERIAL

A. Select from the following.
   1. Emulsified Asphalt: Grade MS-1, SS-1 or SS-1h, Section 32 12 03.
   2. Cationic Emulsified Asphalt: Grade CSS-1 or CSS-1h, Section 32 12 03.
   3. Rapid Cure Cutback Asphalt: Grade RC-70, Section 32 12 03.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Select and advise ENGINEER of the type of tack material to be used.

B. Clean the surface to be treated free of dust and other foreign material. If flushed, allow surface to dry. If leaves from trees, blow clean.

C. Provide surface for pedestrian access across tack coat.

D. Prevent pedestrians, vehicles, pets, etc., access to tack surfaces.

## 3.2 APPLICATION

A. General:

1. Triple coverage by spray bar required. Stop application if any nozzle is not working properly.
2. Apply tack only to area covered with asphalt concrete in the same day.

B. Application rate: Typically as follows.

1. Emulsions, 0.05 to 0.15 gallons per square yard.
2. Cutback, CONTRACTOR's choice.

C. Tack Substrate for Fabric Application: Comply with manufacturer's recommendation. If none, then as follows.

1. Dry Pavement surface, 0.20 to 0.30 gallons per square yard. Within street intersections, on steep grades and in zones where vehicle speed changes are commonplace reduce the application rate to no less than 0.20 gallons per square yard.
2. Heavy duty fabrics, 0.30 to 0.40 gallons per square yard.

## 3.3 PROTECTION

A. Protect all surfaces exposed to public view from being spattered or marred. Remove any spattering, over-coating, or marring.

B. Do not discharge bituminous material into borrow pits or gutters.

## 3.4 OPENING TO TRAFFIC AND MAINTENANCE

A. Do not permit traffic to travel over the tacked surface until bituminous tack coat has cured or is not picked up by traffic.

B. If detours cannot be provided, restrict operations to a width suitable at least for one-way traffic over the remaining portion of the road.

C. If one-way traffic is provided, control traffic appropriately.

END OF SECTION

# SECTION 32 12 16
# PLANT-MIX - ASPHALT PAVING

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Place Superpave or plant-mix asphalt concrete in base, leveling and surface courses, or overlay.

### 1.2 REFERENCES

A. AASHTO T 324: Hamburg Wheel-track Testing of Compacted Hot-Mix Asphalt (HMA).

B. ASTM D 979: Standard Practice for Sampling Bituminous Paving Mixtures.

C. ASTM D 2041: Standard Test Method for Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.

D. ASTM D 3549: Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

E. ASTM D 3665: Standard Practice for Random Sampling of Construction Materials.

F. ASTM E 950: Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference.

G. ASTM E 1274: Standard Test Method for Measuring Pavement Roughness Using a Profilograph.

### 1.3 SUBMITTALS

A. Before Delivery:
1. Traffic control plan, Section 01 55 26.
2. Type and number of rollers.
3. Manufacturer's certificate of compliance for paving geotextiles, Refer to Section 31 05 19.
4. Location and name of asphalt concrete production facility.
5. Proof of profilograph and profilograph operator certification.

B. At Delivery: Supply batch ticket identifying.
1. Serial number of ticket.
2. Date and truck number.
3. Job name, location, and mix identification.
4. Type, grade, and weight of asphalt.
5 Type, grade, and weight of aggregate.
6. Mix design method.

C. After Delivery:
1. Profile deviation report.

2. Profile roughness index report.
3. Quality Control Inspections and Testing Report: Upon ENGINEER's request, submit report describing source and field quality control activities and test results performed by CONTRACTOR and CONTRACTOR's Suppliers.

1.4 **QUALITY ASSURANCE**

A. Do not change asphalt or aggregate sources until ENGINEER accepts new source and new mix design.

B. Reject product and work that does not meet requirements of this Section.

C. Remove product found defective after installation and install acceptable product at no additional cost to OWNER.

D. Foreman of paving crew has completed at least three (3) projects of similar size and nature.

1.5 **WEATHER**

A. Do not pave until air temperature is 45 deg F. and rising.

B. Cease paving if air temperature falls below 50 deg F.

C. Do not pave if surface is wet or weather is unsuitable.

D. Do not pave if wind or ground cools mix material before compaction.

1.6 **NOTICE**

A. Send written notice to residents and businesseswithin affected area at least 3 days before start of paving.

B. Indicate paving time and when new surface can be used.

C. Warn of potential vehicle tow away and other construction issues affecting neighborhood.

D. Should work not occur on specified day, send a new notice.

1.7 **ACCEPTANCE**

A. General:

1. Acceptance is by Lot. Lot size is specified below.
2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00.
3. Dispute resolution, Section 01 35 10.
4. Opening a paved surface to traffic does not constitute acceptance.

B. Mix: Accepted as specified in Section 32 12 05, or Section 32 12 06.

C. Installation:

1. Mix Temperature:
   a. Reject mixes exceeding 325 deg F. in transport vehicle.
   b. Dispose of cold mix in paver hopper as thin spread underlay.
2. Compaction and Thickness:
   a. Lot size is 1,000 square yards or part thereof.

b. Verify with at least 2 tests per Lot.

c. Select test locations by ASTM D 3665 and sample per ASTM D 979 after compaction.

d. Compaction determinations are full core depth or overlay depth in overlay construction.

e. Thickness measurement will not apply in overlay construction.

f. Based upon core samples, compaction and thickness is acceptable if test deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation greater than Reject may stay in place at 50 percent cost.

**Table 1 – Compaction Pay Factors**

| Pay Factor | Density, in Percent (ASTM D 2041) | |
|---|---|---|
| | Average | Lowest Test |
| 0.70 | More than 96 | – |
| 1.00 | 92 to 96 | 89 or greater |
| 0.90 | 92 to 96 | Less than 89 |
| Reject | Less than 92 | – |

NOTES
(a) At CONTRACTOR's discretion and expense, do Hamburg wheel track test (AASHTO T 324) on 3 additional random core samples from a non-complying sub-lot. The sub-lot will be accepted if average rut depth is less than 10 mm at 20,000 passes.

**Table 2 – Thickness Pay Factor**

| Pay Factors | Thickness Deficiency, in Inches (ASTM D 3549) |
|---|---|
| 1.00 | 0.00 to 0.25 |
| 0.90 | 0.26 to 0.50 |
| 0.70 | 0.51 to 0.75 |
| Reject | 0.76 to 1.00 |

3. Grade, Cross Slope: Verify tolerance is not exceeded.

4. Roughness: Verify "must grind" bumps are removed and tolerance for profile roughness index is not exceeded.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Asphalt concrete, Section 32 12 05.

B. Superpave, Section 32 12 06.

C. Prime coat, Section 32 12 13.

D. Tack coat, Section 32 12 14.

E. Paving geotextile, Section 31 05 19.

F. Paving geogrid, Section 31 05 21.

## PART 3 EXECUTION

### 3.1 CONSTRUCTION EQUIPMENT

A. Lay Down Machine: Use track equipment when operating on fabrics, geogrids or Pavement mats hotter than 180 deg. F.

B. Compactors: Steel wheel static or vibratory. Use pneumatic tire roller for intermediate rolling only.

### 3.2 PREPARATION

A. General:

1. Coordinate utility location, Section 01 31 13. Contact utility companies and other agencies, for dangerous concentration of combustible, flammable, or explosive matter.
2. Lower Street Fixtures if paving machine is not capable of passing over the fixtures.
3. Remove vegetation from cracks, edges and joints. Sweep surface clean. Blow cracks clean. Remove leaves.
4. Fill cracks and fix Potholes, Section 32 01 17.
5. Stabilize concrete Subgrade slabs.

B. Trees, Plants, Ground Cover:

1. Protect trees, plants and other ground cover from damage.
2. Prune trees, Section 32 01 93 to allow equipment passage underneath. Repair tree damage at no additional cost to OWNER.

C. Traffic Control:

1. Provide worker and public safety, Section 01 55 26.
2. Apply temporary traffic and lane marking tape or paint after layout has been verified with ENGINEER.

D. Aggregate Base Course:

1. Verify base course is placed to grade and compacted.

2. If indicated, follow Section 31 25 00 for herbicide treatment or Section 32 12 13 for prime coat.

E. Tack Coat: Apply tack coat, Section 32 12 14 if inlay or subbase Pavement surface is dirty or older than 24 hours.

## 3.3 TEMPORARY SURFACING

A. Place, roll, maintain, remove and dispose of temporary surfaces.

B. In sidewalk areas construct temporary Pavements at least 1 inch thick and in all other areas at least 2 inches thick. At major intersections and other critical locations a greater thickness may be required.

## 3.4 PLACE PAVING FABRIC

A. Section 31 05 19.

## 3.5 PLACE PAVEMENT MIXTURE

A. General:

1. Provide continuous forward movement such that minimum temperature 10 feet behind paver is as follows.

**Table 3 – Minimum Temperature, Degrees F.**

| Air Temperature Deg F. | Compacted Mat Thickness | | | | | |
|---|---|---|---|---|---|---|
| | 3/4" | 1" | 1-1/2" | 2" | 3" | 4"+ |
| 45 – 50 | – | – | – | – | 280 | 265 |
| 50 - 59 | – | – | – | 280 | 270 | 255 |
| 60 - 69 | – | – | 285 | 275 | 265 | 250 |
| 70 - 79 | 285 | 285 | 280 | 270 | 265 | 250 |
| 80 - 89 | 280 | 275 | 270 | 265 | 260 | 250 |
| 90 + | 275 | 270 | 265 | 260 | 250 | 250 |

2. Do not leave unsafe butt joints if paving operation stops.

3. Barricade or eliminate fall off edges.

B. Overlays or Subsequent Lifts:

1. Allow new base Pavement or new inlay Pavement to harden (cure) prior to placing overlays.

2. Apply tack coat per Section 32 12 14 if inlay or sub-base pavement surface is dirty or older than 24 hours.

C. Irregular Areas: Handwork is acceptable if specified grades, slopes, compaction and smoothness is achieved.

D. Compaction:

1. Do not over compact or under compact.

2. Complete compaction before temperature drops to 180 deg. F.

E. Joints:

1. Construct joints to have same texture, density and smoothness as other sections of new Pavement course.

2. Clean contact surfaces and apply tack coat. Ensure continuous bond between old and new Pavements, or between successive day's work.

3. Offset longitudinal joints a minimum of 12 inches in succeeding

courses and at least 6 feet transversely to avoid a vertical joint through more than one course. In the top course restrict longitudinal joint to 1 foot either side of lane lines.

4. Prevent traffic, including construction traffic, from crossing vertical edges. Apply tack coat to vertical edges prior to making another pass with the paver if the mix has cooled to 90 deg. F.

## 3.6 TOLERANCES

A. Compaction: 94 percent plus or minus 2 percent of theoretical maximum specific gravity, ASTM D 2041 (Rice Method).

B. Lift Thickness:

1. Not less than 2 times the maximum aggregate size in compacted asphalt concrete mixes.
2. Not less than 4 times the nominal maximum aggregate size in compacted SUPERPAVE mixes.
3. Not more than limits established by pneumatic or vibratory compactor equipment manufaturer.

C. Grade: 1/8 inch in 10 feet parallel to centerline.

D. Cross Slope: 1/4 inch in 10 feet perpendicular to centerline except at cross section grade breaks.

E. Roughness:

**Table 4 – Roughness Tolerance**

| Speed and Traffic Class | | Profile Roughness Index, (PRI) Inches / Mile | | | | Profile Deviation Inches/25 feet Maximum |
|---|---|---|---|---|---|---|
| | | IRI | | PI | | |
| | | Min | Max | Min | Max | |
| 0 to 29 mph | I or II | – | – | – | – | 0.4 |
| | III or IV | 129 | 177 | 46 | 66 | 0.4 |
| 30 to 44 mph | I or II | 90 | 115 | 35 | 50 | 0.4 |
| | III or IV | 70 | 90 | 21 | 35 | 0.4 |
| 45 mph + | All Classes | – | 70 | – | 21 | 0.3 |

NOTES
(a) Use a zero blanking band.
(b) As a minimum, trace right wheel path in direction of travel
(c) Traffic class is defined in Table 3 of Section 32 12 05.
(d) IRI (International Roughness Index), ASTM E 950
(e) PI (Profile Index), ASTM E 1274.

1. Profile Deviation: Begin traces 50 feet before edge of new pavement and end traces 50 feet after edge of new pavement. Areas exceeding profile deviation tolerance are “must grind” areas.
2. Profile Roughness Index: (PRI)
   a. Lot is 0.1 lane mile (528 feet long one lane wide). Add segments shorter than 250 feet to preceding Lot. Treat partial segments longer than 250 feet as a Lot.
   b. Exclude from the Lot are turn lanes, parking lanes, medians,

Street Fixtures, crowns of intersecting streets, bridge decks, grades greater than 8 percent, and vertical curves less than 1,000 feet radius (including super-elevation transitions).

## 3.7 PROTECTION AND REPAIR

A. General: All expenses are at no cost to OWNER.

B. Protection.

1. Protect all structures, including curb, gutter, sidewalks, guard rails and guide posts.
2. Remove spatter, over-coat, or mar.
3. Do not discharge bituminous materials into borrow pits or gutters.
4. Protect hot pavement from traffic until mixture has cooled enough not to become marked.
5. Protect neighborhood, storm drains and down-stream fish habitat.

C. Repair.

1. Corrective Action for Profile Deviations ("Must Grinds"): Grinding is acceptable, Section 02 41 14. Apply Section 32 12 03 cationic or anionic emulsion and sand friction blotter over grind areas.
2. Corrective Action for Profile Roughness Index: Grinding is acceptable. Skin patch for depressions is not acceptable. Raise depressions by milling and inlay. Re-profile corrected segments to verify index meets tolerance. Apply a Section 32 12 03 cationic or anionic emulsion and sand friction blotter over grind areas.
3. When thickness is deficient, place additional material over deficient areas. DO NOT skin patch. Mill for inlay if necessary.
4. Defective Joints, Seams, Edges: Repair.
5. Unacceptable Paving: Remove and replace.

END OF SECTION

# SECTION 32 17 23
# PAVEMENT MARKINGS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Paints for Pavement striping.

B. Words and other markings in paint or plastic film.

C. One or two-way prismatic reflectors for Pavement marking.

### 1.2 REFERENCES

A. AASHTO M 237: Standard Specification and Recommended Practice for Epoxy Resin Adhesive for Bonding Traffic Markers to Hardened Concrete.

B. AASHTO M 247: Standard Specification for Glass Beads Used in Traffic Paint.

C. AASHTO M 248: Standard Specification for Ready-Mixed White and Yellow Traffic Paints.

D. AASHTO M 249: Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form).

E. ASTM D 638: Standard Test Method for Tensile Properties of Plastics.

F. ASTM E 303: Standard Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.

G. FS L-S-300: Sheeting and Tape, Reflective: Nonexposed Lens.

H. Federal Standard 141: Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling, and Testing.

I. Federal Standard 370: Instrumental Photometric Measurements of Retroflective Materials and Retroreflective Devices.

J. MUTCD: Manual on Uniform Traffic Control Devices for Streets and Highways.

### 1.3 SUBMITTALS

A. Specifications of primer to be used for tape applications.

B. Manufacturer's affidavit certifying paint products meet or exceed material requirements of this section.

C. Sample of prismatic reflector to be used along with manufacturer's statement of the reflector's minimum reflective area and specific intensity at the 0.2 degree observation angle.

D. Manufacturer's recommendation for type of epoxy to be used when installing prismatic reflectors and markers.

E. Samples of each thermoplastic or preformed plastic Pavement markings along with a statement of how the materials will be applied.

## PART 2 PRODUCTS

### 2.1 ALKYD RESIN PAINT

A. White or yellow Type F (Fast dry) ready-mixed, AASHTO M 248.

### 2.2 THERMOPLASTIC PAINT

A. White or yellow, AASHTO M 249.

### 2.3 GLASS BEADS

A. Type 1, AASHTO M 247.

### 2.4 REFLECTIVE TAPE

A. Type II white or yellow with a Class 1 (pressure-sensitive) adhesive, FS L-S-300.

### 2.5 PREFORMED PLASTIC FILM MATERIALS

A. Film: A retroflective pliant polymer with white or yellow pigments selected and blended to conform to standard highway colors throughout the expected life of the film and glass beads distributed throughout its base cross-sectional area, with a reflective layer of beads bonded to the top surface and composed of the following materials.

| Materials | Minimum Percent By Weight |
|---|---|
| Resing and Plasiticizers | 20 |
| Pigments and Extenders | 30 |
| Graded Glass Beads | 33 |

1. Type 1: Subjected to high traffic volume and severe wear conditions such as repeated shear action from crossover, encroachment on edge and channelization lines, and stop, start, or turn movements.
   a. Class 1: Without precoated adhesive, for application with epoxy cement.
   b. Class 2: With precoated pressure sensitive adhesive.
2. Type 2: Subjected to lower traffic volumes and less severe wear action such as most highway edge lines, markings on rural highways, lane lines in well-channelized areas and transverse and word/symbols subjected primarily to free rolling traffic.
   a. Class 1: Without precoated adhesive, for application with epoxy cement.
   b. Class 2: With precoated pressure sensitive adhesive

B. Tensile Strength: Sample 6 x 1 x 0.06 inches at a temperature between 70 deg. F. and 80 deg. F. using a jaw speed of 10 inches to 12 inches per minute tested per ASTM D 638 requirements.

1. Type 1: 150 pounds per square inch of cross-section.
2. Type 2: 40 pounds per square inch of cross-section.

C. Elongation: 75 percent minimum at break when tested per ASTM D 638 requirements using a Sample 6 x 1 x 0.06 inches at a jaw speed of 10 inches to 12 inches per minute.

D. Skid Resistance: Initial minimum skid resistance values are 35 BPN as measured by the British Portable Skid Test, ASTM E 303 requirements.

E. Reflectance: Minimum reflectance values at 0.2 degrees and 0.5 degrees observation angles and 86.0 degrees entrance angle as measured per the testing procedures of Federal Standard 370.

| **Film Type** | **Observation Angles** | | | |
|---|---|---|---|---|
| | **White** | | **Yellow** | |
| | **0.2°** | **0.5°** | **0.2°** | **0.5°** |
| Type 1: SL (mcd/sf/fc) | 550 | 380 | 410 | 250 |
| Type 2: SL (mcd/sf/fc) | 960 | 760 | 680 | 510 |

1. The photometric quantity is measured in specific luminance (SL), and expressed as millicandelas per square foot per footcandle (mcd/sf/fc).
2. Use a test distance 50 feet and a Sample size of 2. x 2.5 feet.
3. Use an angular aperture of both the photoreceptor and light projector of 6 minutes of arc.
4. The reference center is the geometric center of the Sample, and the reference axis is taken perpendicular to the test Sample.

F. Film Reflectivity Retention: Not more than 15 percent of the beads lost due to popout and the predominate mode of Failure is "wear down" of the beads, when subjected to 200 cycles of a Taber Abraser Simulation test using an H-18 wheel and 125 gram load.

G. Thickness: 0.06 inch without adhesive.

H. Effective Performance Life: The film, when applied according to the recommendations of the manufacturer, will provide a neat, durable marking that will not flow or distort due to temperature if the Pavement surface remains stable. Although reflectivity is apply wear, the pliant polymer will provide a cushioned, resilient substrate that reduces bead crushing and loss. Use a film that shows no appreciable fading, lifting, or shrinkage throughout the useful life of the marking, and shows no significant tearing, roll back, or other signs of poor adhesion.

I. Abrasion Resistance: Use a material that when tested will not wear through to the conformable backing surface in less than 5,000 cycles when tested per Federal Standard 141, Method 6192, using a CS-17 wheel and a 1,000 gram load.

J. Acid Resistance: Use a material that will show resistance to etching, hazing, or delamination of bead surface after exposure to a 1 percent solution of sulfuric acid.

## 2.6 PRISMATIC REFLECTORS

A. Unless indicated otherwise, provide single lens snowplow resistant reflectors of the color indicated.

1. With a cast iron housing and acrylic prismatic reflector.
2. With an overall size not less than 9 inches long, 5 inches wide, and 1-3/4 inch thick with a 7/16 inch maximum projection above the roadway.
3. With a minimum reflective area of 1.6 square inches per face.

B. Reflector Specific Intensity:

| | **Intensity at 0.2 Degree Observation Angle** | |
|---|---|---|
| **Color** | **0 Degree Entrance Angle** | **20 Degree Entrance Angle** |
| White | 3. | 1.2 |
| Yellow | 1.8 | 0.72 |

## 2.7 EPOXY ADHESIVE

A. Epoxy, AASHTO M 237 requirements and as recommended by the manufacturer of the reflector. Provide a minimum adhesion value of 1.1 pounds per inch width.

# PART 3 EXECUTION

## 3.1 CONSTRUCTION EQUIPMENT

A. Use equipment manufactured for Pavement marking. Use workers experienced in operating such equipment.

B. Use equipment capable of applying a strip, or strips with a width tolerance of plus or minus 1/4 inch. Equip the machine with an automatic skip control giving a 10 feet long marked segment and a 30 feet long gap within a linear tolerance of 6 inches over that cycle.

C. If applying glass beads, locate bead applicator directly behind and synchronized with marking applicator.

D. For thermoplastic paint materials, use equipment that is designed to agitate the paint to prevent scorching, discoloration, or excessive high temperatures.

## 3.2 PREPARATION

A. Broom or flush the surface to remove dirt, loose stones, or other foreign material immediately prior to applying.

B. Prior to applying, mark roadway between control points established by ENGINEER. ENGINEER will establish points on tangent at least every 100 feet and at 25 feet long intervals on curves. Maintain the line within 1 inch of the established control points. ENGINEER may also designate other Pavement striping locations such as stop bars, crosswalks, zebra striping, etc.

C. Markings that adhere to asphalt concrete or Portland cement concrete by

either a pressure sensitive precoated adhesive or an epoxy cement shall mold to the Pavement contours by traffic action at normal Pavement temperatures and shall be ready for traffic immediately after application.

D. Begin Pavement painting and marking operations not later than 24 hours after receipt of written order by ENGINEER.

E. Apply striping and markings per MUTCD requirements.

F. Apply all materials in accordance with manufacturer's and ENGINEER's directions.

3.3 **APPLICATION**

A. Apply Pavement paintings and markings only when Pavement surface is dry and air temperature is above 40 deg. F. during daylight hours.

B. Do not apply paints and markings when rain is anticipated within 12 hours.

3.4 **ALKYD RESIN PAINT STRIPING**

A. Adjust Pavement striping machine to apply paint at rate recommended by paint manufacturer.

B. Glass Bead Application Rate: 5.9 to 6.1 pounds per gallon of paint.

C. Protect the markings until dry by placing approved guarding or warning device wherever necessary. Remove any markings not authorized or smeared or otherwise damaged, or correct as approved by ENGINEER.

3.5 **THERMOPLASTIC PAINT STRIPING**

A. Clean off dirt, glaze, and grease before prestriping.

B. Prestripe the application area with a binder material that will form, when sprayed, a continuous film over the Pavement surface, and will dry rapidly and mechanically adhere to the Pavement surface. Install the material in varying widths if indicated.

C. Extrude the thermoplastic material at a temperature of 412 plus or minus 12 deg. F. from approved equipment to produce a line 1/8 inch to 3/16 inch thick, continuous and uniform in shape, and have clean and sharp dimensions.

D. Do not use material which produce fumes that are toxic, obnoxious, or injurious to persons or property.

E. Apply so that finished lines have well-defined edges free of waviness.

F. Glass Beads Application Rate: 6 pounds of glass beads to every 100 square feet of marking.

3.6 **TAPE STRIPING**

A. Apply Pavement marking tape as indicated or directed. ENGINEER will establish control points.

B. Apply the tape only on surfaces that are dry and free of oils, grease, dust and dirt, and primed at the rate of approximately 1 quart per 60 feet with an approved primer material.

C. Maintain the line on established control points. Apply intermittent Pavement marking tape 24 inches long, spaced approximately 100 feet on tangents, and approximately 25 feet on curves unless otherwise

directed. The ENGINEER will designate other Pavement striping locations such as stop bars, crosswalks, zebra striping, etc.

D. Press down the tape immediately after application until it adheres and conforms to the surface of the Pavement.

E. Completely remove all tape on sections where tape conflicts with revised traffic lanes prior to opening new lanes to traffic.

## 3.7 PAVEMENT MARKING FILMS

A. Use Pavement marking films that are capable of being applied to new, dense, and open-graded asphalt concrete wearing courses during the paving operation in accordance manufacturer's instructions, and that are capable of conforming to Pavement contours through the action of traffic at normal Pavement temperatures.

B. Use a Pavement marking film that is capable of use for patching worn areas of the same type film.

C. Apply before traffic is allowed on the freshly paved surface.

D. Unless indicated otherwise, provide Type C, Class II, polymer film markings in specified widths and shapes. Provide and layout words and marking symbol configurations per MUTCD requirements and as indicated.

E. When indicated, inlay the markings in fresh asphalt surface by a compaction roller during the paving operation.

F. Apply all markings in accordance with manufacturer's recommendations.

## 3.8 PRISMATIC REFLECTOR INSTALLATION

A. Install reflectors by cutting Pavement and partially filling cut area with epoxy adhesive. Place reflector housing in the adhesive and apply pressure to properly seat. Allow epoxy to completely set before allowing traffic on markers.

B. Install marker so that housing edges are flush with Pavement and so that the angle formed by the longitudinal axis of the marker and the adjacent Pavement stripe does not exceed 5 degrees.

## 3.9 WORDS AND OTHER MARKINGS

A. Wet sandblast existing or temporary Pavement markings that may be confusing. Removal of markings by high-pressure water may be used if approved by ENGINEER.

B. Apply word markings, letters, numerals and symbols with indicated stencils and templates. In the absence of such information all stencils and templates shall be identical to those currently used by OWNER.

## 3.10 TEMPORARY PAVEMENT MARKINGS

A. Renew when stripes and markings have lost 50 percent of their original visual effectiveness.

END OF SECTION

# SECTION 33 05 14
# UTILITY GRADE ADJUSTMENT

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Raise, lower, or change slope of Street Fixtures.

B. Install Cover Collars.

C. This section is NOT APPLICABLE to raising and lowering Street Fixtures that withstand internal pressure.

### 1.2 DEFINITIONS

A. Box: A structure such as a valve box, meter box, monument box, fire hydrant box, electrical pull box, cleanout box or other like structure not intended for human entry.

B. Cover Collar: A concrete filled annular space between metal frames and the adjacent Pavement structural section.

C. Extension Ring: A concrete or metal ring used to adjust surface elevations and surface cross slopes of Street Fixture covers. Metal rings are used between metal frames and metal covers or grates. Concrete rings are used below metal frames or in the concrete structure below.

D. Manhole: A structure designed to permit human entry and working space inside and to confine and control the flow of pipe-conveyed fluids. These structures are collectively referred to as manholes regardless of composition, design, type or depth.

E. Street Fixture: The top of existing structures such as but not limited to Manholes, catch basin, sumps, inlets, valve boxes, meter boxes, monument boxes, and similar structure in a thoroughfare surface.

F. Vault: A structure intended for human entry containing electrical/telephone facilities or other like utilities.

## PART 2 PRODUCTS

### 2.1 PAVEMENT

A. Asphalt Concrete: AC-20-DM-1/2, Section 32 12 05.

B. Cast-in-place Concrete: Class 4000, Section 03 30 04.

2.2 **GROUT**

A. Hydraulic cement, Section 03 61 00.

2.3 **EXTENSION RINGS**

A. Metal: Cast iron or steel, Section 05 56 00.

B. Cast-in-place Concrete: Class 4000, Section 03 30 04.

## PART 3 EXECUTION

3.1 **PREPARATION**

A. Determine condition of existing incidental structure. Any item not reported damaged prior to construction shall be considered unbroken and must be replaced by CONTRACTOR at no additional cost to OWNER.

B. Provide invert cover over pipe in cleanout box to prevent gravel, concrete, or debris from entering pipeline.

C. Unless indicated otherwise, arrange for utility companies to adjust their own structures.

D. Coordinate all adjustments with requirements of affected utility company.

3.2 **ADJUST STRUCTURE TO GRADE**

A. Restrict excavation around the structure to a minimum area.

B. At the completion of the structure adjustment, backfill the void around the structure and compact before paving or landscaping.

C. Apply mortar to inside and outside of concrete grade rings used to make adjustments.

D. If the cone is cracked during construction, restack the Manhole with shorter Manhole sections and install a new cone at no additional cost to the OWNER.

3.3 **ADJUST COVER IN PAVEMENT SURFACE**

A. Method A - Metal Extension Rings:

1. Use rings that lock together.
2. Set frame at desired elevation and cross-slope.
3. Seal joints between Pavement and ring, Section 32 01 17.

B. Method B – Concrete Extension Rings:

1. Place concrete grade rings under frame or in structure riser shaft.
2. Set frame at desired elevation and cross-slope.
3. Provide 100 percent concrete support under frame. Do not use wood, bricks, concrete fragments, blocks or particles as support.
4. Grout seams between concrete rings and between frame and concrete rings.

C. Method C – Place Concrete:

1. Set frame at desired elevation and cross-slope.
2. Place concrete and provide 100 percent concrete support under frame.

D. Method D – Concrete Deck:

1. Remove existing concrete deck.
2. Reset steel rebar.
3. Set frame to grade, set forms.
4. Pour concrete. Provide complete concrete support under Street Fixture.

## 3.4 INSTALLING COVER COLLAR

A. Open an annular space between pavement and Street Fixture cover. Unless indicated otherwise, provide 12 inches of annular space.

B. Set concrete collar to 1/4 inch minimum to 1/2 inch maximum below asphalt concrete pavement surface and 1/4 inch below portland cement concrete pavement surface.

C. Trowel finish, Section 03 35 00.

## 3.5 PAVEMENT SURFACE RESTORATION

A. In new streets or overlays, adjust Street Fixture cover after bituminous paving is complete.

B. Pavement restoration, Section 33 05 25.

END OF SECTION

# SECTION 33 05 25
# PAVEMENT RESTORATION

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Aggregate base restoration.

B. Concrete base restoration.

C. Surface restoration.

### 1.2 REFERENCES

A. ACI 305: Hot Weather Concreting.

B. ACI 306: Cold Weather Concreting.

C. ASTM C 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

D. ASTM C 78: Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading).

E. ASTM C 928: Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.

F. ASTM D 1664: Standard Test Method for Coating and Stripping of Bitumen-Aggregate Mixtures.

### 1.3 SUBMITTALS

A. Mix design for,

1. Temporary patching material.
2. Permanent cold weather patching material.

B. Manufacturer's chemical additive data sheets.

### 1.4 WEATHER

A. Asphalt Concrete Pavement Patch:

1. Provide temporary or permanent cold weather asphalt patching material when air and roadbed temperature in the shade are less than 40 deg. F.
2. Remove any temporary patching and provide permanent patching material when temperatures exceed 40 deg. F. CONTRACTOR may perform work after cold weather season if authorized in writing by ENGINEER.

B. Portland Cement Concrete Pavement Patch: Comply with hot and cold weather requirements, ACI 305 or ACI 306.

1.5 **ACCEPTANCE**

A. Aggregate base compaction.

B. Asphalt concrete compaction.

C. Grade and cross slope of pavement surface.

## PART 2 PRODUCTS

2.1 **MATERIALS**

A. Untreated Base Course: Section 32 11 23.

B. Flowable Fill Base: Section 31 05 15.

C. Portland Cement Concrete Base: Class 4000, Section 03 30 04.

D. Tack Coat: Section 32 12 14, Grade SS-1.

E. Permanent Warm Weather Asphalt Concrete Patching Material: Section 32 12 05, AC-20-DM-1/2 unless indicated otherwise.

F. Permanent Cold Weather Asphalt Concrete Patching Material: MC-250-FM-1, Section 32 12 05 modified as follows.

1. Asphalt Cement:

   a. Kinematic viscosity at 140 deg F: 250 to 800 cSt.

   b. Flash Point: 175 deg F.

   c. Water: 0.2 percent maximum.

   d. Distillate Test:

      To 437 deg F: None.

      To 500 deg F: 0 - 15 percent.

      To 600 deg F: 15 - 75 percent.

      To 680 deg F: 75 percent minimum.

   e. Residue Tests:

      Penetration at 77 deg F: None.

      Ductility at 77 deg F: 100 cm minimum.

      Solubility in Trichloroethylene: 99 percent minimum.

2. Composition of Mixture:

   a. Minimum Mix: 115 pounds asphalt cement per finished ton (5.75 percent).

   b. Maximum Mix: 135 pounds asphalt cement per finished ton (6.75 percent).

   c. Stripping: Not more than 5 percent, ASTM D 1664, after mixing.

   d. Workability: Material stockpiled for 1 year shall be capable of being shoveled, raked, spread and compacted.

3. Chemical Additives: Capable of coating wet aggregates without stripping and maintains adhesive qualities in damp or wet applications.

G. Temporary Cold Weather Asphalt Concrete Patching Material: Type MC-250-DM-1/2, Section 32 12 05 with hydrated lime or anti-stripping agent as indicated in the mix design.

H. Pavement Sealing:

1. Slurry seal Type RS-1-SS-II, Section 32 01 13.
2. Chip seal Type MC-250-CS-A, Section 32 01 14.

I. Portland Cement Concrete Patching Material: Class 4000, Section 03 30 05.

J. High Early Strength Portland Cement Concrete Patching Material:

1. Concrete compressive strength of 3,000 psi minimum in 4 hours.
2. Cementatious Material: Rapid hardening or very rapid hardening, ASTM C 928.
3. Cement content of mix, per cement manufacturer's recommendations or approved mix design.
4. Non-reactive aggregates in applications subjected to wetting, extended exposure to humid atmosphere, or contact with moist ground.

K. Pavement Marking: Tape or paint, Section 32 17 23.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. At site, post name, address and telephone number of CONTRACTOR to contact in emergencies.

B. Notify ENGINEER within 24 hours of commencing work of this section but not less than 4 hours.

C. Provide worker and public safety; Section 01 55 26.

D. Cutting Pavements: Cut full depth and straight, Section 02 41 14. Remove all bonding inhibitors.

### 3.2 AGGREGATE BASE OR FLOWABLE FILL BASE

A. Match depth of existing aggregate base or 8 inches thick minimum.

B. Place crushed aggregate base in lifts not exceeding 8 inches before compaction. Compact per Section 33 23 26 to a Modified Proctor Density of 95 percent or greater.

C. When providing controlled low strength material (CLSM as specified in 31 05 15) match depth of existing aggregate base. Use fill that flows easily and vibration is not required. Cure the fill before placing surface patch.

## 3.3 CONCRETE SUBSTRATE

A. Apply concrete bonding compound, Section 03 30 10, to edge of existing concrete. Place concrete, Section 03 30 10.

## 3.4 ASPHALT CONCRETE PATCH

A. Match existing Pavement thickness plus 1 inch, but not less than 4 inches.

B. Clean all vertical surfaces that butt against new patchwork. Provide full coverage spray tack coat. Do not spray tack coat on surfaces exposed to public view. Do not apply tack coat by brush.

C. Place asphalt concrete in lifts not exceeding 3 inches after compaction

D. Compaction: 94 percent of ASTM D 2041 (Rice) plus or minus 2 percent.

E. Match adjacent surface slopes.

1. Plane off surface distortions that exceed 1/4-inch vertical deviation in 10 feet.
2. Coat planed surfaces with a cationic or anionic tack emulsion that complies with Section 32 12 03. Cover tack with sand.

## 3.5 PORTLAND CEMENT CONCRETE PATCH

A. Full Depth restorations:

1. Clean vertical surfaces in patchwork. Install dowels in vertical load bearing joints. Apply concrete bonding compound, Section 03 30 10.
2. Match adjacent surface slopes. Apply membrane forming compound, Section 03 39 00 immediately to protect work from hot or cold weather.
3. After concrete cure, plane off surface distortions that exceed 1/4 inch deviation in 10 feet. Use a water repelling product, Section 07 19 00 to water proof planed surfaces.
4. Do not allow traffic on the repaired area until concrete strength is achieved.

B. Partial Depth Patching:

1. Chip, hydro-blast or saw cut concrete to a minimum depth of 1 inch.
2. Make surfaces free of frost, ice, mud, water, grease, dirt and other materials that hamper bonding.
3. Install bonding agent per manufacturer's recommendations.
4. Apply membrane forming compound, Section 03 39 00 immediately to protect work from hot or cold weather.
5. After concrete cure, plane off surface distortions that exceed 1/4 inch deviation in 10 feet. Use a water repelling product, Section 07 19 00 to water proof planed surfaces.
6. Do not allow traffic on the repaired area until concrete strength is achieved.

## 3.6 CONCRETE PAVERS

A. Screed Bedding with a notched and cambered screed board to achieve a crown between existing pavers. Use graded aggregate, geotextile, and bedding sand, Section 32 14 13.

B. In asphalt concrete or portland cement concrete surfaces place pavers against Pavement cuts to form a border course, i.e. the short side of the paver against the cut except at corners.

C. After placement, use a plate-type vibrating compactor to compact pavers. Size compactor to provide at least 5,000 lbf. force. Sweep sand into the joints and vibrate until joints are full. Remove excess sand.

D. Match adjacent surface grades with no more than 1/4 inch vertical deviation in 10 feet.

## 3.7 PAVEMENT MARKINGS

A. Unless indicated otherwise, repair all damaged Pavement markings with matching type of materials and installation.

END OF SECTION

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