

## LEGAL NOTICE

Bids will be received by the Champaign County Commissioners at their office located at 1512 South US 68, Suite A-100, Urbana, Ohio 43078 until 9:15 A.M., May 21, 2019 for the installation of an asphalt overlay on Millerstown Eris road between Heck Hill and SR 560 in Johnson and Concord Townships, Champaign County, Ohio. Bids shall be accompanied by a bid guaranty bond in the amount of 100% of the bid or a certified check, cashier's check or letter of credit in the amount of 10% of the bid in accordance with ORC 153.54. Bids shall be submitted in sealed envelopes marked "Millerstown Eris Road Paving". Specifications are on file at the office of the Champaign County Engineer, 428 Beech Street, Urbana, Ohio 43078 and on the engineer's website at <http://engineer.co.champaign.oh.us/>

The Champaign County Board of Commissioners reserves the right to reject any or all bids.

Board of Commissioners  
Champaign County

By: Stephen McCall, PE, PS  
County Engineer

**INTENT TO BID**

It is requested that all prospective bidders return this form upon receiving the project or equipment specifications.

Re: **Millerstown Eris Paving 2019**

We have received the specifications and intend to respond as follows:

- We are interested and intend to bid on this project.
- We do not intend to bid on this project, but would like to receive invitations on similar future projects.
- We would like to be removed from your bidders list.

Company: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Contact: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax \_\_\_\_\_

Email: \_\_\_\_\_

*Please return this completed form to us by fax or email:*

**FAX:** (937)653-3172  
**EMAIL:** [engineer@co.champaign.oh.us](mailto:engineer@co.champaign.oh.us)

**Specifications for Widening and Surface Improvements of  
Millerstown Eris road in Johnson and Concord Townships in Champaign County, Ohio.**

General Conditions

Scope: It is the intent of these specifications to describe the materials and methods required to resurface Millerstown Eris road from Heck Hill to State Route 560. The extent of the project will correspond with the limits as provided with the plan schematic included with this project.

The work consists of, and the contractor will be paid for: planing pavement at intersecting roadways including butt joints, applying an asphaltic concrete base and surface course as directed by the County, placing stabilized crushed aggregate berm, paint striping, and traffic control.

Supervision: Work shall be performed under the supervision of the County Engineer or his designated representative. Determination of the methods to be used to obtain the specified results, direction of the contractor's employees and operation of equipment shall rest with the contractor.

Safety: The contractor shall operate in a safe manner at all times. Equipment shall be in good operating condition with all guards and protective devices in place and in working condition. Items such as steps, walkways and railings shall be in good condition. Personal safety equipment shall be furnished and issued by the contractor as required. He shall further see to it that this equipment is used and that his employees work in a safe manner. The Champaign County Engineer's Safety Policy Manual shall apply to this project. The Contractor will be required to sign the provided Acknowledgment/agreement form.

Liability: The Contractor shall carry Workman's Compensation, public liability, personal liability, and property damage insurance. The Contractor shall furnish satisfactory evidence of insurance coverage to the maximum extent of \$5,500,000.00 bodily injury and \$5,100,000.00 property damage to insure adequate payment for any damage caused by their operations.

Tax payment: The Contractor shall furnish a statement regarding personal property tax, on the provided form, in accordance with section 5719.042 O.R.C.

Bid and Performance Bonds: Bids shall be accompanied by a bid guaranty bond in the amount of 100% of the bid or a certified check, cashier's check, or letter of credit in the amount of 10% of the bid in accordance with section 153.54 O.R.C. If a certified check, cashier's check or letter of credit is submitted with the bid, then the successful bidder will be required to provide a performance bond in the amount of 100% of the bid at the time the contract is signed. The address and telephone number of the bonding company and agent must be included with all bid guaranty bonds and performance bonds.

Wages: This job is subject to Ohio prevailing wage rates which are part of these specifications. Wage rates can be viewed at the State of Ohio Department of Commerce web site.

Contractor Qualifications: Bids are solicited only from contractors qualified to perform this type of work and who have successfully complete similar work. The successful bidder shall furnish evidence of his ability to perform this type of work. The contractor awarded the contract will have to submit an approved ODOT job mix formula for the specified asphalt.

Materials Testing: All materials used in this work are subject to testing for compliance with the specifications. Tests will be performed at the County's option and expense. The contractor will cooperate to the extent necessary in supplying the requested samples or making the material available.

Asphalt Binder Price Adjustment: Section 401.20 will not apply to these specifications. No placing index factor will be applied to adjust the price for asphalt binders.

Sub-contracting: The contractor shall not sub-contract more than 40% of the dollar value of the project. If the contractor intends to use sub-contractors, they shall be named on the bid along with the work it is intended for them to perform. They shall be subject to the same qualification requirements as the contractor. The contractor shall be responsible for all actions and performance by his sub-contractors including the payment of prevailing wages and the submission of payrolls.

Work Dates: Work shall be completed and the road opened to traffic by **November 1, 2019**. In accordance with Sections 108.06, 108.07, 108.08, 108.09 and 108.10 liquidated damages in the amount of \$500.00 per day will be assessed for each calendar day the project is not completed. However, all asphalt must be placed in conformance with weather limitations of 401.05.

Termination of Contract: The County Engineer may terminate the contract for the convenience of the County at any time. The Engineer may, by written instruction to the contractor, decrease or increase the quantity of any item or portions of a contract, and the Engineer shall authorize payment to the contractor for the reasonable cost incurred, in connection with such item or portions, prior to the date of such decrease or cancellation made by order of the Engineer.

Finding for Recovery: An award will not be made to any bidder, including the lowest and best bidder or the lowest responsive and responsible bidder against whom a finding for recovery has been issued by the Ohio Auditor of State, if the finding for recovery is unresolved, as provided in Section 9.24 of the Ohio Revised Code, whether or not it is clear that any funds used in this project could be deemed to be "state funds". A bidder with an unresolved finding for recovery shall be deemed not a best bid or not a responsible bid.

Affidavit of Compliance with O.R.C. 3517.13: Ohio Revised Code Section 3517.13(I)(3) and (J)(3) requires that no agency or department of this state or any political subdivision shall enter into any contract for the purchase of goods costing more than five hundred dollars or services costing more than five hundred dollars with a corporation, individual, partnership or other association organized under Chapter 1785 of the Revised Code, estate, or trust unless the contract includes a certification that the individuals named in Revised Code Sections 3517.13(I)(1) and (J)(1) are in compliance with the aforementioned provisions. The offeror is required to complete the attached AFFIDAVIT OF COMPLIANCE WITH OHIO REVISED CODE SECTION 3517.13. Failure to submit the required affidavit with the proposal/bid pack will deem the offeror's response to be non-responsive and disqualified from receiving further consideration.

### Specifications

Item numbers refer to ODOT Construction and Material Specifications dated January 1, 2016. These specifications will cover the work unless otherwise noted.

1. ITEM 202 - WEARING COURSE REMOVED, ASPHALT CONCRETE: Consists of planing existing asphalt to a depth of approximately 1-1/2" to match existing pavement for butt joints per the schematic details included with the plans. All planed cuttings shall become the property of the contractor and shall be removed from the limits of the project. Payment will be for square yard of pavement planed. Limits for pavement planning are included per the plan details and quantities.
2. ITEM 411 STABILIZED CRUSHED AGGREGATE, AS PER PLAN - This item shall consist of stabilized crushed aggregate placed 24" wide and 1-1/2" deep adjacent to the finished pavement elevation. Material shall be placed and compacted along the edge of pavement, including any transitions required at driveways/approaches. Payment shall be made per cubic yard. Totals include additional quantities for 2' driveway flare, mailbox approaches, and a 50' intersections radius.
3. ITEM 404LVT WITH FIBER - ASPHALT CONCRETE SURFACE COURSE, TYPE 404LV PG58-28, AS PER PLAN: Consists of placing and compacting 1 1/2" of asphaltic concrete reinforced with high tensile strength aramid fibers on Millerstown Eris as shown within these specifications. The job mix formula shall be in accordance with 404LVT Table 1. The provisions of 404LVT.20 Asphalt Binder Price Adjustment will not be applied to these specifications.

Asphalt samples from each 1000 ton batch shall be taken throughout the application of the project. The Contractor will supply the necessary size plates (to be laid on the surface of the highway and paved over) for the samples and the Contractor will be responsible to take the sample and coordinate the collection of the samples with the County. All cost of testing shall be the responsibility of the County. All batch slips from the plant shall show the percent of AC asphalt contained in said load with all weight to be in "English" units (tons).

All butt joints will be required to be sealed with AC20. Only County and State roadways shall be utilized as haul roads unless otherwise approved by the Engineer in writing.

Payment shall be based upon unit quantities applied as detailed in these specifications. The Contractor shall be paid 100% of all work performed, after test results of the asphalt samples have been determined to be in conformance.

4. ITEM 642 – CENTER LINE: Consists of water based traffic paint in accordance with ITEM 642. County will furnish logs and no passing zone surveys from previous work. Pre-marking, layout, and any no passing zone surveys necessary shall be included in this item. Payment will be per mile of line, regardless of type.
5. ITEM 642 – EDGE LINE: Consists of water based traffic paint in accordance with ITEM 642. Payment will be per mile of line.

6. ITEM 614 MAINTAINING TRAFFIC, AS PER PLAN: Consists of furnishing and placing necessary signs at all intersecting roads and furnishing necessary flag men, signs or other traffic control devices to handle traffic in the work zone. DO NOT PASS signs and pavement markings shall be in place in accordance with 614.04 Temporary markings shall be installed as per 614.11 the same day of paving. Local traffic will be maintained throughout the entire project at all times. Payment will be for lump sum bid.
7. ITEM 407 TACK COAT: Consist of applying tack coat at a rate of 0.05 gallon per square yard over existing bituminous surface. Prior to application of tack coat, the surface shall be thoroughly cleaned, swept and dry. Payment will be for gallons of tack coat applied.

NOTES:

EXISTING DRIVEWAYS: The contractor shall transition the finished pavement elevation to best fit existing driveways. All concrete drive approaches shall be graded to not disturb the apron. Any damage to concrete approaches will be at the contractor's expense.

PAVEMENT MARKINGS: Pavement markings shall be completed after the application of an asphalt rejuvenator by others. This work shall be coordinated through the County. The County will provide pavement striping logs to the contractor at the preconstruction meeting. The striping logs provided by the County shall govern final pavement marking placement.

UTILITY COORDINATION: At the time of plan preparation, OUPS markings or record plans were not available. Based on the scope of work for this project, utility interference or disruption is not anticipated. Prior to construction, the contractor shall contact OUPS and have all existing utilities marked in the field.

**Bid Form**  
**2019 Millerstown-Eris Road Paving**  
**Champaign County, Ohio**

Item	Quantity	Unit	Description	Unit Price	Extension
1	418	Sq. Yd	Item 202- Wearing Course Removed		
2	621	Cu. Yd.	Item 411 – Stabilized Crushed Aggregate		
3	2249	Cu. Yd.	Item 404LVT WITH FIBER PG58-28, 1-1/2” SURFACE		
4	4.18	Mile	Item 642 - Center Line		
5	8.37	Mile	Item 642 - Edge Line 4”		
6	1	L.S.	Item 614 - Maintaining Traffic		
7	2699	Gal	Item 407 - Tack Coat		
				Total	

I certify that I have inspected the job and have read and understand the plans and specifications, including the required completion date. Any questions or concerns about any quantities should be directed to the office of the Champaign County Engineer prior to submitting any bid.

By: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_



## Operating Conditions

A Pre-Construction meeting shall be scheduled prior to start of work. The contractor shall notify the Engineer (937-653-4848) 48 hours prior to the initial start of work.

There will be no work performed from 6 P.M. on Saturday until 6 A.M. on Monday without the approval of the Engineer.

Work shall be conducted in such a manner as to cause minimum inconvenience to the public and the residents along the project.

Once the contractor commences work, it shall be carried out in a continuous manner and in accordance with the job schedule until completion. If the work is interrupted, the contractor shall notify the Engineer of the cause. If the Engineer agrees that the cause is valid, he will give the Contractor written permission to restart the work. The Contractor shall notify the Engineer the day prior to restarting.

The contractor will have a qualified representative, capable of making decisions on the contractor's behalf at all times the contractor or sub-contractor is working.

A copy of the plans and specifications shall be at the job site while any work is being completed.

Any changes in quantities or work must be authorized by written change orders, signed by the Contractor and the Engineer on the provided form. A change order must be secured before any additional work or additional quantities are used. Approved changes in work or quantities shall be paid at the bid unit price. A change order issued for an item for which there is no unit bid price will be paid according to the average bid price for that item as established in the latest available edition of the Ohio Department of Transportation Summary of Contracts Awarded. In the event that either of the above methods is not applicable, the approved change order will be paid in accordance with ORC Section 153.62

**AFFIDAVIT**  
**OF COMPLIANCE WITH OHIO REVISED CODE SECTION 3517.13**

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_ SS:

I \_\_\_\_\_, being duly sworn, depose and state as follows:  
(Name)

1. I am duly authorized to make the statements contained herein on behalf of \_\_\_\_\_ ("The Contracting Party").
2. The Contracting Party is a/an (select one):
  - Individual, partnership, or other unincorporated business association (including, without limitation, a professional association organized under Ohio Revised Code Chapter 1785), estate, or trust.
  - Corporation organized and existing under the laws of the State of \_\_\_\_\_.
  - Labor organization
3. I hereby affirm that the Contracting Party and each of the individuals specified in **R.C. 3517.13(I)(3)** (with respect to non-corporate entities and labor organizations) or **R.C. 3517.13(J)(3)** (with respect to corporations) are in full compliance with the political contribution limitations set forth in R.C. 3517.13(I) and (J), as applicable.
4. I understand that a false representation on this certification constitutes a felony of the fifth degree pursuant to R.C. 3517.13(AA) and 3517.992(R)(3).

Affiant further sayeth naught.

By \_\_\_\_\_  
(Signature)

Title \_\_\_\_\_

SWORN TO BEFORE ME and subscribed in my presence this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Notary Public

SEAL

My Commission Expires \_\_\_\_\_

**ITEM 404LVT (Low Volume Traffic) ASPHALT CONCRETE**  
**Revised June 5, 2015**

**Notes to Designers:**

**Here's what's new in this latest revision of 404LVT**

This revised specification includes the following changes: Higher asphalt binder contents for both gravel and limestone mixture formulations; adjusted minimum virgin binder contents; a single level of reclaimed asphalt pavement (20% max.); incorporation of binder type PG58-28; binder adjustment when aggregate absorption is 4 percent or greater.

**Select binder grade based on the following considerations.**

Use PG58-28 binder to improve resistance to paving aging and cracking. Otherwise, use binder grade 64-22.

**Why 404LVT was developed**

404LVT was developed for use in low volume traffic applications as an alternative to chip sealing and microsurfacing to provide longer service life between treatments, better economy, and motorist satisfaction. It is a 1-inch thick asphalt overlay that corrects minor surface distresses, provides increase to pavement strength, enhances ride comfort, and improves road profile and driver safety. (Note: A variable-depth intermediate course is recommended where profile or crown are excessive.) 404LVT can be furnished as either a hot mix asphalt or warm mix asphalt product. A 404LVT pavement surface is smooth, eliminates dust, is free of loose stone chips, and is quiet and completely reusable into new asphalt pavement.

404LVT has been designed to be rich in asphalt binder, fine-textured, and includes a minimum of 50% of the virgin fine aggregate to be natural sand to facilitate mix density, flexibility, and resilience. These are necessary properties for ensuring longevity and successful mix performance on low volume roadways where oxidation and cracking are the primary pavement distresses. Since 404LVT is a recipe mix it should only be used for roads and parking facilities where heavy, slow moving trucks do not frequent. Do not use in conditions known to be "high stress" pavement areas.

Owners are provided a mechanism (in Table 1, Note 2) to increase (or decrease) binder content if mix appearance deems such necessary. Compensation for binder increases and decreases is provided in Section .22, Acceptance and Basis of Payment. Section .22 includes a pay adjustment mechanism to encourage the contractor to furnish mix having a binder content that closely matches the job mix formula. Mix having binder content below the job mix formula, but within specification tolerances, will receive a pay adjustment commensurate to the deviation from the mix formulation in Table 1. No adjustment is made for binder content in excess of the job mix formula so as to not create an incentive for over-asphalting.

Agencies are requested to contact Flexible Pavements of Ohio for additional guidance and to obtain the most current specification in an MSWord file. Contact Flexible Pavements of Ohio at 1888-4HOT MIX (446-8649) or [info@flexiblepavements.org](mailto:info@flexiblepavements.org)

**ITEM 404LVT (Low Volume Traffic) ASPHALT CONCRETE**  
**Revised June 5, 2015**

- 404LVT.01 Description**
- 404LVT.02 Composition**
- 404LVT.021 Quality Control**
- 404LVT.03 Materials**
- 404LVT.04 Use of Reclaimed Pavement**
- 404LVT.05 Mixing Plants**
- 404LVT.06 Weather Limitations**
- 404LVT.07 Notification**
- 404LVT.08 Asphalt Binder Preparation**
- 404LVT.09 Aggregate Preparation**
- 404LVT.10 Mixing**
- 404LVT.11 Hauling**
- 404LVT.12 Spreading Equipment**
- 404LVT.13 Rollers**
- 404LVT.14 Conditioning Existing Surface**
- 404LVT.15 Spreading and Finishing**
- 404LVT.16 Compaction**
- 404LVT.17 Joints**
- 404LVT.18 Asphalt Binder Compatibility**
- 404LVT.19 Spreading and Surface Tolerances**
- 404LVT.20 Asphalt Binder Price Adjustment**
- 404LVT.21 Method of Measurement**
- 404LVT.22 Acceptance and Basis of Payment**

**404LVT.01 Description.**

This work consists of constructing a 1-inch thick surface course or variable depth intermediate course of aggregate and asphalt binder for use in low volume traffic applications.

Mix aggregate and asphalt binder in a central plant and spread and compact on a prepared surface according to these specifications and in reasonably close conformity with the lines, grades and typical sections shown on the plans or established by the Engineer. All specification references herein are to the Ohio Department of Transportation, 2013 Construction & Materials Specifications.

The requirements of specification 401 do not apply except where noted.

Asphalt concrete mix pavement thickness shown on the plans or stated in the proposal is for exclusive use in calculating the weight required to be placed per unit of surface area.

Section .22 includes a pay adjustment mechanism for mix that deviates from the job mix formula. Mix having binder content below the job mix formula, but within specification tolerances, will receive an adjustment commensurate to the amount of lacking binder. No payment is made for binder content in excess of the job mix formula. **404LVT.02 Composition.**

Establish a Job Mix Formula (JMF) by combining coarse aggregate, fine aggregate, reclaimed asphalt pavement (RAP) and asphalt binder in proportions that result in an asphalt mixture meeting the blend limits in Table 1. Note: a minimum of 50% of the virgin fine aggregate must be natural sand, 703.05

**Table 1**

<b>Mixture Proportions</b>		
Sieve	Total Percent Passing	
1/2 inch	100	
3/8 inch	90 to 100	
No. 4	72	
No. 8	42 to 60	
No. 16	27 to 45	
No. 50	10 to 22	
No. 200	0 to 8	
Total binder content (% by weight of mix):	Gravel coarse aggregate: 6.6 <sup>1,2</sup> Limestone coarse aggregate: 6.8 <sup>1,2</sup> Gravel/Limestone coarse aggregate blends: 6.7 <sub>1,2</sub> Slag aggregate blends: as determined by Marshall mix design process; medium traffic; binder content selection at 2.5% air voids. <b>Note 1:</b> Increase binder content 0.2% for coarse aggregate having absorption $\geq 4.0$ <b>Note 2:</b> The engineer may adjust binder content. Compensation will be made according to 404LVT.22	
Virgin binder min. (% by weight of mix):	Gravel coarse aggregate: 5.6 Limestone coarse aggregate: 5.8	
Traffic volume (ADT):	2500 max.	
Binder Grades:	PG58-28	PG64-22
Limits for Reclaimed Asphalt Pavement (% by weight of mix):	20 max.	10 max.

**404LVT.021 Quality Control**

Ensure quality control personnel, testing devices, and facilities meet the requirements of Supplement 1041. Meet the requirements of Item 403 except 403.04 and 403.05.

Calibrate asphalt content nuclear gauges according to Supplement 1043.

Perform quality control testing according to the frequency provided in Table 2. Obtain mix samples at the mixing plant.

**Table 2**

<b>Quality Control Testing Schedule</b>		
<b>Daily Frequency</b>	<b>Tests</b>	<b>Sample Type</b>
Within first 100 tons	binder content, gradation	completed mix
Each 400 tons thereafter	binder content, gradation	completed mix

During production investigate and correct variation from the JMF, as shown by the quality control analysis, of plus or minus 4 percent passing the No. 4 sieve or plus or minus 0.3 percent binder.

If variation exceeds the limits in Table 3 immediately cease production until the cause for variation is determined and corrections made. Notify the Engineer.

**Table 3**

<b>Deviation from the Design</b>		
<b>Mix Characteristic</b>	<b>From the Design</b>	<b>Range</b>
Binder Content	± 0.5 percent	1.0
No. 4 Sieve	± 6 percent	12

**404LVT.03 Materials.** Furnish materials conforming to Table 4.

**Table 4**

<b>Material</b>	<b>Specification</b>
Asphalt binder	702.01
Aggregate	703.05 <sup>3</sup>
Mineral filler	703.07
Polymer	702.14

**Note 3:** Do not apply the gradation requirements for fine aggregate.

**404LVT.04 Use of Reclaimed Asphalt Pavement**

Process recycled asphalt pavement such that it passes a 9/16-inch sieve and when incorporated ensures a one-half inch maximum aggregate size.

**404LVT.05 Mixing Plants.** Apply the requirements of 401.05

**404LVT.06 Weather Limitations.** Apply the requirements of 401.06

**404LVT.07 Notification.** Apply the requirements of 401.07

**404LVT.08 Asphalt Binder Preparation.** Apply the requirements of 401.08

**404LVT.09 Aggregate Preparation.** Apply the requirements of 401.09

**404LVT.10 Mixing.** Apply the requirements of 401.10 Asphalt mixtures may be produced using the warm mix asphalt method according to 402.09

**404LVT.11 Hauling.** Apply the requirements of 401.11

**404LVT.12 Spreading Equipment.** Apply the requirements of 401.12

**404LVT.13 Rollers.** Apply the requirements of 401.13

**404LVT.14 Conditioning Existing Surface.** Apply the requirements of 401.14

**404LVT.15 Spreading and Finishing.**

Ensure spreading operations result in a mat texture that is uniform and free of deficiencies such as tears, drags or other blemishes. Remove and replace areas of deficient mat texture.

Apply the requirements of 401.15

**404LVT.16 Compaction.** Apply the requirements of 401.16

**404LVT.17 Joints.** Apply the requirements of 401.17

**404LVT.18 Asphalt Binder Compatibility.** Apply the requirements of 401.18

**404LVT.19 Spreading and Surface Tolerances.** Apply the requirements of 401.19

**404LVT.20 Asphalt Binder Price Adjustment.** Apply the requirements of ODOT proposal note 534

**404LVT.21 Method of Measurement.** Apply the requirements of 401.21

**404LVT.22 Acceptance and Basis of Payment.** Apply the requirements of 401.22

Acceptance for gradation and binder content will be based upon the mean of the results of all required quality control tests performed during a day's production.

The pavement owner is responsible for verification testing according to 403.06.

Production will be considered acceptable if the tolerances shown in Table 3 are not exceeded and the remaining sieves do not exceed the limits of the applicable specifications. In the event material does not meet these requirements but that reasonably acceptable material has been produced, the Engineer will make a determination if the deficient work will be accepted and remain in place. If accepted, payment will equal 90 percent of the bid item cost for deviations related to aggregate gradation; 70 percent for binder deviations.

Payment for accepted quantities, complete in place, will be based on the following formula:  $CY \times [Unit\ Price + 2BI(B_{ADJUST} - BC)]$

Where  $CY$  = cubic yards of asphalt concrete

Unit Price = unit price bid for the item

$BC$  = Binder Correction factor.

$BC = B_{JMF} - B_{ACTUAL}$  if  $B_{JMF} > B_{ACTUAL}$

$BC = 0$  if  $B_{JMF} < B_{ACTUAL}$

$B_{ACTUAL}$  = Mean binder content of material placed, excluding deficient material removed or accepted at reduced pay

$B_{ADJUST} = (\%) \text{ binder adjustment (Table 1, Note 2)}$

$B_{BID} = \text{specified binder content (\%)} + (\%) \text{ binder added for absorptive aggregate (Table 1, Note 1)}$

$B_{JMF} = B_{BID} + B_{ADJUST}$

BI = Bidding Index

<b>Pay Items</b>	<b>Unit</b>	<b>Description</b>
404LVT	Cubic Yard	404LVT, Asphalt Concrete, PG 58-28
404LVT	Cubic Yard	404LVT, Asphalt Concrete, PG 64-22



## **REINFORCING FIBERS FOR ASPHALT**

### **Material and Mixing Specifications**

#### **A. DEFINITIONS**

1. Reinforcing Fibers: High tensile strength aramid fiber blend specially formulated to reinforce hot mix asphalt.
2. Fiber reinforced asphalt concrete (FRAC): A mixture of hot or warm mix asphalt and reinforcing fibers that has greater resistance to rutting, thermal cracking, fatigue cracking, and reflective cracking as compared to conventional non-fiber asphalt mixes.
3. Aramid Dispersion State Ratio (ADSR): The mass of aramid in the individual state compared to the total mass of extracted aramid fibers, expressed as a percentage.

#### **B. REFERENCES**

1. ASTM D2172, Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
2. ASTM D6931, Standard Test Method for Indirect Tensile (IDT) Strength of Bituminous Mixtures.
3. AASHTO T322, Determining the Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device.
4. Zeiada, W., Underwood, S., Stempihar, J., "Extraction of Aramid Fibers from Fiber Reinforced Asphalt Concrete – Special Test Method", Arizona State University, May 11, 2016.

#### **C. SUBMITTALS**

1. Submit the following as part of the bid package:
  - a. Representative fiber product sample.
  - b. Fiber product data sheet and certification from the Manufacturer that the fiber product supplied meets the requirements of this specification.
  - c. Manufacturer's instructions and general recommendations.
  - d. Performance test results of IDT testing from a minimum of three separate laboratory trials.
  - e. Performance test results of ADSR testing from a minimum of two tests.
2. Submit a minimum of two unique project examples and references where the reinforcing fiber product was used within 500 miles of the project location.

D. MATERIALS

1. Reinforcing fiber properties

- a. Provide a reinforcing fiber blend of virgin polyolefins and virgin aramids that meets the requirements in Table 1 and Table 2 below.

Table 1

<b>Reinforcing Fiber Material Properties</b>			
<b>Property</b>	<b>Test Method</b>	<b>Polyolefin</b>	<b>Aramid</b>
Form	Manufacturer Certification	Serrated	Monofilament
Nominal Specific Gravity	ASTM D276	0.91	1.44
Tensile Strength (psi)	ASTM D7269	NA <sup>1</sup>	400,000
Length (in)	Manufacturer Certification	0.75	0.75

1. Polyolefin fibers will melt or become plastically deformed during production

Table 2

<b>Reinforcing Fiber Performance Properties</b>		
<b>Performance Test</b>	<b>Test Method</b>	<b>Requirement</b>
Indirect Tensile Strength (IDT)	AASHTO T322 or ASTM D6931	≥ 20% increase
Aramid Dispersion State Ratio (ADSR)	Modified ASTM D2172	≥ 85%

- b. Forta-Fi<sup>®</sup>, provided by the Forta Corporation, is an acceptable product and meets the performance and material properties outlined in this section.
- c. ACE Fiber, fiber type C, is an acceptable product for this project approved by the engineer.
- d. If a different aramid-based fiber blend is proposed, performance test results complying with Section D-2 below must be submitted at least two weeks prior to bid date for approval by engineer.
- e. Non-aramid fiber blends will not be considered as acceptable alternatives to this specification.

2. Performance testing requirements

Testing shall be from previously completed laboratory trials performed on plant mixed FRAC. Testing is not required on samples from the job mix.

Performance testing must be from laboratory trials at a fiber dosage rate equal

to the rate proposed for the project. Tests must be performed by an AASHTO accredited laboratory or nationally recognized university testing lab and must be reviewed and approved by the project engineer.

- a. Indirect Tensile (IDT) Strength Tests from a minimum of three (3) separate laboratory trials.
  1. Perform indirect tensile tests using the protocol from AASHTO T322 or ASTM D6931
  2. Tests results shall include a control and a fiber reinforced mix. FRAC mix shall be identical to control mix except for the inclusion of fibers added at the same dosage as proposed on the project.
  3. Indirect tensile test results from fiber specimens shall show an average tensile strength increase of 20 percent over control specimen with no less than 15 percent increase of average tensile strength.
  
- b. Aramid Dispersion State Ratio (ADSR) Tests from a minimum of two (2) separate laboratory trials.
  1. Perform ADSR test based on modified ASTM D2172 procedures as provided in the document entitled “Extraction of Aramid Fibers from Fiber Reinforced Asphalt Concrete – Special Test Method”. A copy of the modified extraction methodology can be obtained by making an inquiry to the Pavement and Materials Laboratory at Arizona State University at NCE@asu.edu.
  2. To validate ADSR results, average extracted aramid fiber quantity must equal 0.007 percent by total sample weight with no individual result less than 0.005 percent of the total sample weight.
  3. All tested fiber mixes must achieve a minimum ADSR of 85%.

#### E. DELIVERY, STORAGE, AND HANDLING

1. Deliver fiber-reinforcement in sealed, undamaged containers with labels intact and legible, indicating material name and lot number.
2. Deliver fiber-reinforcement to location where it will be added to each batch or loaded into the mixer.
3. Store materials covered and off the ground. Keep sand and dust out of boxes and do not allow boxes to become wet.

## F. MIXING AND PRODUCTION

1. Add aramid and polyolefin reinforcing fiber blends at a dosage rate of one (1) pound fiber per one (1) ton of asphalt.
2. Add alternative aramid fiber blends at a rate proposed by the manufacturer that achieves the IDT and ADSR results required by Section D.
3. Have a fiber manufacturer's representative on site during mixing and production. This requirement can be waived if fiber manufacturer and asphalt producer can supply evidence of manufacturer's brand of fiber being successfully produced a minimum of three times at the asphalt plant to be used for the project.
4. Batch Plant. When a batch plant is used, add fiber to the aggregate in the weigh hopper and increase both dry and wet mixing times. Ensure that the fiber is uniformly distributed before the injection of asphalt cement into the mixture.
5. Drum Plant:
  - a. Inject fibers through the RAP collar by placing fibers on the RAP belt for by feeding them with a blower tube system. Rate the feeding of fibers with the rate the plant is producing asphalt mix. If there is any evidence of fiber balls at the discharge chute, increase the mixing time and/or temperature or change the angle of the fiber feeder line to increase dry mixing time.
  - b. For manual feeding, place fibers on the RAP belt at intervals based on the plant production rate.
  - c. When using a blower tube system, add fibers continuously and in a steady uniform manner. Provide automated proportioning devices and control delivery within  $\pm 10\%$  of the mass of the fibers required. Perform an equipment calibration to the satisfaction of the fiber manufacturer's representative to show that the fiber is being accurately metered and uniformly distributed into the mix.

Include the following with the blower tube system:

- Low level indicators
- No-flow indicators
- A printout of feed rate status in pounds/minute
- A section of transparent pipe in the fiber supply line for observing consistency of flow or feed.
- Manufacturer's representative's approval of fiber addition system

## G. PLACEMENT

1. Follow manufacturer's and engineer's recommendations for placement of FRAC.
2. Visually observe FRAC mix in the back of first three trucks and every tenth truck thereafter to confirm adequate blending of the fiber.
3. Remove any observed fiber balls from placed mixture and adjust operations per the manufacturer's recommendation to eliminate future fiber ball development.