

## 400 FLEXIBLE PAVEMENT

### ITEM 401 ASPHALT CONCRETE PAVEMENTS—GENERAL

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**401.01 Description.** This specification is applicable to all types of asphalt concrete pavements irrespective of gradation of aggregate, kind, and amount of asphalt binder, or pavement use. Deviations from these general requirements are covered in the specific requirements for each type according to the appropriate contract item or items.

Work consists of one or more courses of asphalt concrete constructed on a prepared foundation. The asphalt concrete consists of a mixture of uniformly graded aggregate and specified type and grade of asphalt binder.

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

**401.02 Mix Design and Quality Control.** The quality control and acceptance requirements of Item 403 apply.

### 401.03

If required to perform the mix design or quality control, provide a laboratory and personnel meeting the requirements of ODOT Supplement 1041 to perform mix design and quality control tests.

Calibrate asphalt content nuclear gauges according to ODOT Supplement 1043 using personnel with a Level 1 rating according to ODOT Supplement 1041. Mix and test the calibration verification sample with a Department employee present.

Provide and dispose of the solvent used for cleaning the asphalt content nuclear gauge pans.

#### **401.03 Materials. Furnish materials conforming to:**

Asphalt binder (asphalt concrete, 401.14, 401.15).....	702.01
Asphalt material (401.14, 401.18).....	702.01, 702.04, or 702.13
Aggregates (base courses).....	703.04
Aggregates (intermediate and surface courses).....	703.05
Mineral filler .....	703.07

Sample aggregate, asphalt binder, asphalt material, and mineral filler according to 106.01.

Use of steel slag for coarse or fine aggregate will not be permitted.

**401.04 Reclaimed Asphalt Concrete Pavement.** The Contractor may use a blend of new materials in combination with reclaimed asphalt concrete pavement obtained from either a City of Akron, Department of Transportation or Ohio Turnpike Commission project for base and intermediate course only. The Contractor may use a maximum of 10 percent of reclaimed asphalt concrete pavement without adjusting the Job Mix Formula (JMF). This percentage is based on the dry weight of all the materials used. Ensure that the combined mixture falls within the gradation limits of the contract item specified.

Use of reclaimed asphalt pavement for surface courses will not be permitted.

Identify the reclaimed asphalt concrete pavement as to type, source, gradation, and asphalt binder content. Ensure that the stockpile is free of contamination and uniform in composition. Before stockpiling, clean, grade, and compact the proposed sites for storing the reclaimed asphalt concrete pavement to produce a firm, level base. Stockpiles are subject to approval by the Engineer before use. Do not add additional reclaimed asphalt concrete pavement to an approved stockpile, except if it is being reclaimed concurrently with the production of the asphalt concrete incorporating it.

Ensure that the reclaimed asphalt concrete pavement is the proper size to allow for complete breakdown in the plant. During production, place a 2-inch (50 mm) screen on the cold feed. If mixing is incomplete, place a smaller screen on the cold feed. Due to variations in the reclaimed asphalt concrete pavement gradation, the City of

Akron will tolerate a maximum of 5 percent oversize material in the completed mix, provided the Contractor can incorporate it into the work with satisfactory results.

**401.05 Mixing Plants.** The City of Akron will approve mixing plants before preparation of the mixtures. General requirements for asphalt concrete mixing plants are specified in Item 402.

All mixing plants shall maintain a current, valid certification to provide Bituminous Asphalt Concrete by the Ohio Department of Transportation.

Set the asphalt binder controls for the computerized plant at the virgin asphalt binder content of the JMF at all times unless change is authorized by the Laboratory.

**401.06 Weather Limitations.** Place asphalt concrete only if the surface is dry and if weather conditions are such that proper handling, finishing, and compaction can be accomplished. Never place asphalt concrete if the surface temperature is below the minimum established in Table 401.06-1.

<b>Table 401.06-1</b>		
Course Thickness	Minimum Surface Temperature	
3.0 inches (75 mm) and over	36° F <sup>[1]</sup>	(2° C) <sup>[1]</sup>
1.0 to 2.9 inches (38 to 74 mm)	40° F	(5° C)
Less than 1.0 inch (25 mm)	50° F	(10° C)
Variable Intermediate, 0 to 3.0 inches (0 to 75 mm)	40° F	(5° C)
[1] Instead of 36° F (2° C), use a minimum air temperature of 40° F (5° C) if paving on an aggregate base or subgrade.		

In addition to the above surface temperature requirements, do not place surface courses if the air temperature is less than 40° F (5° C).

For Type 1H asphalt concrete or any surface course with a polymer modified asphalt binder, ensure that the surface of the existing pavement is at least 50° F (10° C) and the air temperature is at least 50° F (10° C). Do not place any Type 1H asphalt concrete or any surface course with a polymer modified asphalt binder after November 1, regardless of pavement or air temperature.

**401.07 Notification.** Notify the Engineer at least 24 hours before starting paving on a project. After starting paving, if paving operations are stopped for 1 week or more, notify the Engineer at least 24 hours before resuming paving on a project.

**401.08 Asphalt Binder Preparation.** Heat the asphalt binder and deliver it to the mixer within the temperature range specified in Table 702.00-1. Do not use asphalt binder while it is foaming.

**401.09**

**401.09 Aggregate Preparation.** Feed aggregates in their proper proportions and at a rate to permit correct and uniform control of heating and drying. Remove all aggregates in the plant that will produce a mix outside the temperature limits or that contain excessive moisture or expanding gases causing foaming in the mixture, and return them to the proper stockpiles.

**401.10 Mixing.** Maintain the temperature of the mix at the plant within the range set by the Laboratory for the JMF. The Engineer will determine the required temperature of the mixture on arrival at the project site based on the temperature range set for the mix design and heat losses in transit.

The temperature of the asphalt concrete mixtures at the time of placement shall be as follows:

Minimum Laydown Temperature		
Surface Temperature (Degrees Fahrenheit)	Minimum Lift Thickness (inches)	
	1.25 to 2.99	3 or more
36 - 40°	305	280
40 - 50°	300	275
50 - 60°	295	270
60 - 70°	285	265
70 - 80°	280	265
80 - 90°	270	260
90° or higher	265	255

The Engineer may request an increase in the above minimum temperatures should high wind conditions prevail causing rapid heat dissipation.

At no time shall the temperature of the mixture upon arrival at the project site be above a maximum of 325° F (165° C).

For batch plants, after all of the aggregate is in the mixer, add the asphalt binder in an evenly spread sheet over the full length of the mixer. The mixing time is defined as the interval between the start of application of the asphalt binder and the opening of the mixer gate. Discharge all asphalt binder required for one batch in not more than 30 seconds. After the asphalt binder is added, the Laboratory will establish a minimum mixing time, which will not be less than 30 seconds.

**401.11 Hauling.** Use trucks for hauling asphalt concrete that have tight, clean, smooth metal beds from which the entire quantity of mixture is discharged smoothly into the spreading equipment.

Before loading, apply a thin coating of an approved release agent to the inside surfaces of the truck bed to prevent adhesion of mixture to the bed surfaces. The Ohio Department of Transportation maintains a list of approved release agents. Do not use fuel oil for this purpose. Drain truck beds before loading.

Provide a single place on the project for cleaning trucks when excessive sticking of material in truck beds occurs. If the Contractor does not resolve excessive sticking of material in truck beds in a reasonable time and the sticking is in areas of the truck that would indicate excessive cooling of the mix (front corners, bottom, etc.) due to a long haul, the Engineer will require an insulated bed. The Contractor may only make changes in policy regarding release agents for beds or other procedure changes for better mix handling at the discretion of the Laboratory.

Equip each truck with a securely fastened, waterproof cover of suitable material to adequately protect the mixture from wind and weather. At the request of the Engineer, remove covers before dumping into the paver.

If transporting hot asphalt concrete at prevailing air temperatures below 50° F (10° C) or if the length of haul exceeds 20 miles (32 km), insulate all truck beds to maintain mix temperature, at time of placement, within the range set forth in table 401.10-1, and ensure that all covers are fastened to exclude the wind. Do not exceed a distance of 50 miles (80 km) from the asphalt concrete plant to the paving site except by specific permission of the Engineer.

**401.12 Spreading Equipment.** Use self-contained spreading equipment of sufficient size, power, and stability to receive, distribute, and strike-off the asphalt concrete at rates and widths meeting the typical sections and other details shown on the plans. Use spreading equipment that has automatic control systems that maintain the screed in a constant position relative to profile and cross-slope references. These references shall be such that control of the screed position is reasonably independent of irregularities in the underlying surface and of the spreader operation. The Engineer will base approval of spreading equipment on the demonstrated capability of the equipment to place the mixture to the required cross-section, profile and alignment in an acceptable, finished condition ready for compaction.

Where the use of standard full-scale spreading equipment is impractical due to the size or irregularity of the area to be paved, use specialized equipment or hand methods approved by the Engineer to spread the asphalt concrete.

**401.13 Rollers.** Use only steel wheel and pneumatic tire types of rollers meeting the minimum requirements of the following tables. Conform to manufacturer's specifications for all ballasting.

**TABLE 401.13-1 ROLLER CAPACITY**

Roller Type	Maximum Capacity square yards per hour (m <sup>2</sup> /hr)
Tandem	700 (600)
Three-Wheel	700 (600)
Trench	15 per inch width (13 per 25 mm width)
Pneumatic Tire, Type 1	1000 (850)
Pneumatic Tire, Type 2	700 (600)
Vibratory, Vibrating Roll	15 per inch width (13 per 25 mm width)
Vibratory, Static Roll (not vibrating)	3 per inch width (3 per 25 mm width)

**TABLE 401.13-2 STEEL WHEEL ROLLERS**

Roller Type	Three- Wheel	Tandem	Vibratory Static	Trench
Total weight, tons (metric tons)	10 (9)	8 to 12 (7 to 11)	8 to 12 (7 to 11)	
Compression rolls, pounds per inch width (kN/m), minimum	300 (53)	200 (35)	120 (21)	300 (53)

**TABLE 401.13-3 PNEUMATIC TIRE ROLLERS**

Type I	
Tire size, minimum	9.00 x 20 in (229 x 508 mm)
Wheel load, minimum	5000 lb (2250 kg)
Average tire contact pressure, minimum	85 psi (590 kPa)
Type II	
Tire size, minimum	7.50 x 15 in (191 x 381 mm)
Wheel load, minimum	2000 lb (900 kg)
Average tire contact pressure, minimum	55 psi (380 kPa)

For pneumatic tire rollers, use self-propelled, reversible units with vertical oscillation on all wheels on at least one axle. Determine the tire inflation pressure necessary to meet the specified minimum contact area and contact pressure requirements. Furnish the tire manufacturer's charts or tabulations to the Engineer for verification of the required inflation pressure. Check tire inflation pressure as the Engineer directs and maintain it within 5 pounds per square inch (35 kPa) of the required pressure.

Provide rolls and wheels with the necessary accessories to prevent adhesion of the mixture, and keep them properly moistened with water, water containing a detergent, or water containing an approved additive. Do not use excess liquid.

**401.14 Conditioning Existing Surface.** Clean the surface on which the asphalt concrete is to be placed, and keep it free of accumulations of materials that

would, in the judgment of the Engineer, contaminate the mixture, prevent bonding, or interfere with spreading operations. Where approved subgrade or pavement courses previously constructed under the Contract become loosened, rutted, or otherwise defective, correct the deficiency according to the contract item or items involved before the spreading of a subsequent pavement course.

If a quantity of asphalt concrete is specified for use in spot leveling or patching an existing pavement surface, spread and compact the material needed to effect the corrections as directed by the Engineer.

Paint contact surfaces of curbing, gutters, manholes, and other structures with a thin, uniform coating of asphalt material before placing the asphalt concrete against them.

If placing asphalt concrete against the vertical face of an existing pavement structure, clean the vertical face of foreign material and apply asphalt material that results in a coating of approximately 0.25 gallon per square yard (1 L/m<sup>2</sup>).

Before placing a surface course onto an intermediate course, apply a tack coat to the intermediate course according to 407.06.

In areas where the surface is required to be feathered to meet an adjoining surface, coat the existing surface uniformly with a thin coat of asphalt binder.

**401.15 Spreading and Finishing.** Spread the mixture at a rate calculated using the specified thickness and the compacted width of the pavement course being placed, and the weight-to-volume conversion factors established in 401.21. Maintain the actual rate of spreading the mixture equal to the required calculated rate within the tolerance specified in 401.19. For pavement courses specified for leveling an existing pavement surface, the actual rate of spreading the mixture may vary from the required calculated rate as approved by the Engineer to accomplish the intended purpose.

For base and intermediate courses, make the maximum compacted depth of any one layer 4 inches (100 mm).

Spread and finish the mixture using approved equipment or methods such that compaction can follow immediately. Preheat screeds before placing any asphalt concrete. Use side plates sufficient to contain the mixture laterally during spreading. If paving in excess of the nominal paver width, use only a permanent extension or an adjustable extension with full auger extensions when matching a previously placed pavement course. Use extensions that have the ability to heat. The Contractor may use strike-off plates on adjacent berm areas. Perform supplemental hand forming and tamping where irregularities develop and where placing the mixture by hand methods.

#### 401.16

Ensure that the mixture as spread and finished is uniform in composition and surface texture. Correct conditions causing objectionable segregation of the mixture components or irregularities in surface texture in a manner satisfactory to the Engineer. Remove and replace, or otherwise correct, any portion of the pavement course found to be defective in surface texture or composition before or after compaction in a manner satisfactory to the Engineer. Coordinate the spreading operation with the rate of production and delivery of the mixture to attain uniform, continuous progress. Avoid erratic spreader operation due to irregular contact with the hauling vehicle, surging in the feed and distribution of the mixture, or other cause. Maintain sufficient control of the spreading equipment with regard to line and grade references so that the pavement course, when compacted as specified, is in reasonable conformance with the Contract Documents.

Do not displace or damage bridge deck waterproofing membranes during spreading operations on the membranes.

Do not allow traffic on the compacted mixture until it has cooled sufficiently to prevent glazing as determined by the Engineer.

After completion of the surface course, seal gutters with asphalt binder as directed by the Engineer. Apply the material at a uniform width of approximately 4 inches (100 mm) and at a rate just sufficient to fill surface voids.

**401.16 Compaction.** Immediately after spreading the asphalt concrete and adjusting any surface irregularities, compact the mixture uniformly using rollers conforming to 401.13. Do not use a spreading rate that exceeds the total of the specified capacities of the rollers in use; however, if compacting a mixture spread as an intermediate or pre-leveling course less than 1 inch (25 mm) thick, do not use a spreading rate that exceeds twice the total capacity of the rollers in use.

Coordinate the spreading of the mixture with the required roller coverage, considering the rate of cooling of the mixture as affected by lift thickness and environmental conditions. Complete the required roller coverage during the period of time in which the temperature of the mixture is sufficient for the roller coverage to be effective in compacting the mixture.

At no time shall the mixture temperature be allowed to cool below 185 degrees F prior to the completion of the roller coverage.

Compact base mixtures using a combination of both steel and Type I pneumatic tire rollers; however, in small areas, compact these mixtures as approved by the Engineer using any of the rollers specified in 401.13. Compact intermediate and surface mixtures using a three-wheel roller in the breakdown position (roller immediately behind the paver) of the roller train; however, in small areas, compact these mixtures as approved by the Engineer using any of the roller types specified in 401.13.

Compact variable depth courses using a combination of both steel and pneumatic tire rollers; however, in small areas, compact these mixtures as the Engineer approves using any of the roller types specified in 401.13.

For Type 1H asphalt concrete or mixes using a polymer modified asphalt binder, give a copy of the JMF approval letter containing the design compaction temperature to the Engineer before any mix is placed. Ensure that the mix temperature immediately before rolling is not less than 290 F (145 C). Pneumatic tire rollers are not recommended for polymer asphalt concrete because of excessive pick up.

Do not use vibratory rollers on courses with a thickness under 1 1/2 inches (38 mm).

If using vibratory rollers, supplement them with three-wheel or pneumatic tire rollers.

Unless otherwise directed, begin rolling at the sides and proceed longitudinally parallel to the centerline at a slow, uniform speed. After each coverage or complete round trip, move the roller towards the crown of the road to begin its next pass, overlapping the previous pass by at least one-half the width of the previous pass. On superelevated curves, begin rolling at the low side and progress toward the high side. Where a longitudinal joint is being made, roll the joint then follow the applicable rolling procedure.

Continue rolling until full coverage of the course is complete and all roller marks are eliminated. Take care to prevent displacement of the edgeline and grade. Where displacement occurs, correct the area immediately in a manner satisfactory to the Engineer.

Along curbs, headers, walls, and in other areas not accessible to rollers, thoroughly compact the mixture with hot, hand tampers or with mechanical tampers. On depressed areas, the Contractor may use trench rollers or rollers fitted with compression strips.

Replace mixture that becomes loose, broken, contaminated, or otherwise defective with fresh, hot mixture. Compact it to match with the surrounding area.

**401.17 Joints.** Place the asphalt concrete mixture as continuous as possible. Set up joints at the proper height above the adjacent construction to receive maximum compaction. Where the edge of the new surface has been significantly rounded by the action of traffic, trim it to a vertical face before placing the adjacent pavement. On projects where traffic is allowed to cross the edge of the new pavement lane, complete the longitudinal joint of the adjacent lane or berm within 24 hours.

Form hot longitudinal joints using pavers operating in contiguous lanes, one just ahead of the other. Maintain the distance between pavers in adjacent lanes such that

#### 401.18

it does not exceed the distance that a normal size load of mixture will cover. Alternate loads of mixture between the pavers. Do not allow rollers performing the initial rolling operation in one lane closer than 12 inches (0.3 m) to the longitudinal joint until the adjacent lane is placed.

Instead of hot joint construction using multiple pavers, the Contractor may use full width construction with a single unit paver.

Compact all cold longitudinal joints on intermediate and surface courses using a three-wheel roller.

For surface courses, form or cut all transverse construction joints to a vertical.

Seal all cold longitudinal and transverse construction joints on surface courses, and any asphalt concrete course that is open to traffic for more than 30 days, by coating the vertical face of the cold joint with asphalt material, applied at a rate of 0.25 gallon per square yard.

**401.18 Asphalt Binder Compatibility.** If excess fat spots, regular random areas of flushing, or excess drain down occur on a project that are not attributable to over rolling, plant operation, or mix quality compared to the JMF, the City of Akron will consider the asphalt binder incompatible. The City of Akron will reject any on-hand asphalt binder because of incompatibility. The City of Akron may use its discretion in determining if problem areas can be corrected, but if an unsafe condition exists, remove and replace the area in question. Demonstrate to the Laboratory through reporting actual testing analysis the compatibility of another asphalt binder and that proper equipment is in place in order to be allowed to resume.

**401.19 Spreading and Surface Tolerances.** If a uniform course is specified, make checks and adjustments to maintain the rate of spreading within a tolerance of  $\pm 5$  percent of the required calculated weight per unit of area.

If a variable depth course is specified, place the mixture as shown on the plans.

If a longitudinal profile is specified by elevations on the plans, the longitudinal profile of the completed pavement surface shall not deviate from parallel with the specified profile by more than 7/8 inch in 50 feet (21 mm in 15 m). Before placing the surface course, check the profile of the preceding course at 50-foot (15 m) intervals along the outside edge of each traffic lane and along any additional line described in superelevation tables, and submit a tabulation of the results to the Engineer for approval. Perform corrective work necessary for compliance with the profile tolerance before placing the surface course. The requirements of this paragraph do not apply to small incidental areas of pavement less than 500 feet (150 m) in length.

Do not vary the transverse slope of the surface of the completed course from the specified slope by more than 3/8 inch in 10 feet (10 mm in 3 m).

Do not vary the surface of each completed intermediate or surface course from the testing edge of a 10-foot (3 m) straightedge by more than 1/4 inch (6 mm). Furnish straightedges and straightedges equipped with levels or other devices satisfactory to the Engineer. The Engineer will check the surface course for variations in slope or surface.

Correct variations in excess of slope or surface tolerance by removing mixture to neat lines and replacing, or by surface grinding in a manner satisfactory to the Engineer.

**401.20 Asphalt Binder Price Adjustment.** No adjustment for asphalt binder price will be made.

**401.21 Method of Measurement.** The Contractor is responsible for recording the net weight of each truckload of mixture to the nearest 100 pounds (50 kg) in triplicate on plant ticket forms approved by the City of Akron. If the pay quantities are established by platform scales, the Contractor shall provide a tare weight for each truck at the beginning of each day's operation and a minimum of every 4 hours of operation each day. The Engineer may require additional tare weight measurements at any time. The Engineer will have the right to monitor all weighing operations and may require re-weighing trucks at any time or location. The Contractor shall correct any discrepancies immediately. Continued non-compliance will result in the City of Akron taking necessary and appropriate action, such as, but not limited to, assigning a City of Akron ticket writer to the plant. The Contractor shall send one copy of the plant ticket with each load delivered to the paver and shall present it to the Engineer.

The Engineer will convert the total of the weights recorded on the plant tickets representing mixture finished according to contract requirements to cubic yards (cubic meters) using a conversion factor established by the Laboratory. The Laboratory will establish this conversion factor from the approved JMF. However, if a mix design is not available, the Laboratory will use the conversion factors in Table 401.21. If a uniform course is specified, the City of Akron will not pay for a number of cubic yards (cubic meters) that exceeds the quantity calculated from plan lines and dimensions.

**Table 401.21**

Aggregate	lb/yd <sup>3</sup>	(kg/m <sup>3</sup> )
Gravel and stone	4000	(2370)

**401.22 Basis of Payment.** The City of Akron will pay for all work performed and measured as specified above according to the appropriate contract items for each type.

## 402.01

For asphalt material used to seal the cold longitudinal joint according to 401.17, the City of Akron will pay for accepted quantities at the unit bid price for Item 407 Tack Coat. If the Contract does not include the pay item 407 Tack Coat, the cost of sealing the joints is included in the unit price bid for the asphalt concrete.

The City of Akron will assess all costs against the Contractor that it incurs as a result of taking necessary and appropriate action due to the Contractor's continued non-compliance.

If an unsafe condition exists, the City of Akron will not pay for removing and replacing incompatible asphalt binder areas.

## ITEM 402 ASPHALT CONCRETE MIXING PLANTS

### 402.01 Description

### 402.02 General

### 402.03 Scales

### 402.04 Thermometers

### 402.05 Storage

### 402.06 Calibration

### 402.07 Computerized Plant System

### 402.08 Polymer Binders

**402.01 Description.** This specification consists of the minimum requirements for an asphalt concrete mixing plant to produce asphalt concrete mixes according to City of Akron specifications.

Conform asphalt concrete mixing plants to the requirements of ASTM D 995 in addition to the following.

All mixing plants shall maintain a valid, current certification to provide bituminous asphalt concrete by the Ohio Department of Transportation.

**402.02 General.** If more than one kind of asphalt binder is to be used concurrently, separately store each kind.

Ensure that the adjustments for total and proportional feed are continuously variable and capable of being locked at any position.

Use batch plant hot bins that have an oversized material discharge pipe of not less than 6 inches (150 mm) in diameter. The pipes shall discharge material at points outside the plant operation and shall not create a hazard or discomfort.

In batch plants, use a non-tilting asphalt binder bucket with a loose sheet metal cover. Ensure that the length of the discharge opening or spray bar is not less than three-fourths the length of the mixer and that it discharges directly into the mixer. Ensure that the asphalt binder bucket, its discharge valve or valves, and spray bar are fully jacketed or heated. Use jackets that drain efficiently and ensure that all connections are constructed to not interfere with the efficient operation of the asphalt binder scales. Use an asphalt binder bucket with a capacity of at least 10 percent greater than the weight of asphalt binder required in any batch. Ensure that the plant has an adequately heated, quick-acting, nondrip, charging valve directly over the asphalt binder bucket.

**402.03 Scales.** Use scales and test weights that conform to the regulations of the Ohio Department of Agriculture. Seal scales as often as the Laboratory directs to ensure their continued accuracy. Seal test weights at least every 3 years at places designated by the Ohio Department of Agriculture. Equip the plant with one 50-pound (20 kg) test weight for each 400 pounds (200 kg) of the maximum batch weight with a minimum of ten test weights.

Provide a truck scale or recording batch plant scales for the purpose of obtaining the net weight of each load of asphalt mixture as required in 401.21.

Use truck scales that indicate the total weight within 20-pound (10 kg) increments and have a rated capacity of at least 10 percent greater than the largest load weighed. Provide a platform large enough to receive the largest truck used for a single weighing.

Use batch plant scales that have a capacity of at least 10 percent greater than the largest weight required for any one batch.

**402.04 Thermometers.** Equip the plant with an adequate thermometric instrument, clearly legible from the mixer operator's station, to monitor the temperature of the asphalt binder. Locate the sensing element or unit in the feed line near the charging valve at the mixer. Where a pyrometer is used, connect the indicator to the thermocouple by a weatherproof extension wire.

Also, equip the plant with either an approved dial-scale, mercury-actuated thermometer; an electric pyrometer; or other approved thermometric instrument so placed at the discharge chute of the dryer as to register automatically or indicate the temperature of the heated aggregates.

**402.05 Storage.** Provide storage bins capable of storing hot asphalt concrete mixtures up to 24 hours. Insulate or heat storage bins if mixtures are stored for more than 8 hours. Ensure that the system is capable of maintaining the required

## 402.06

temperature without creating hot spots within the stored mixture. In addition, if hot asphalt mixtures are stored from 8 to 24 hours, then introduce a silicone admixture into the asphalt binder at the rate of 1 fluid ounce per 5000 gallons (1 mL/640 L).

**402.06 Calibration.** Calibrate the plant for each combination of aggregate, reclaimed asphalt concrete pavement, and asphalt binder type/content for the mixtures to be produced. Ensure that the calibration is accurate within 1.0 percent.

## 402.07 Computerized Plant System.

**A. General.** Produce all asphalt concrete in a plant with a computerized plant system approved by the Ohio Department of Transportation Laboratory. Ensure that the computerized plant system's device the asphalt binder content is capable of being locked or sealed. After initial calibration of the plant, the Ohio Department of Transportation may lock or seal the monitoring device.

Ensure that all printouts contain the following information:

1. Date.
2. Time.
3. Job Mix Formula (JMF) number.
4. Moisture content of the reclaimed pavement.
5. Percent asphalt binder in the reclaimed pavement to the nearest 0.1 percent.
6. Percent virgin asphalt binder to the nearest 0.1 percent.
7. Percent total asphalt binder calculated to the nearest 0.01 percent.

Ensure that all printouts are preapproved by the Ohio Department of Transportation Laboratory and are turned over to The City of Akron at the end of the project or the end of the production year.

Ensure that the computerized plant system prints "SIMULATE" on the ticket or printout whenever the computerized plant system is only simulating asphalt concrete production.

Ensure that the computerized plant system has an audible alarm system that notifies the plant operator when the amount of asphalt binder, aggregate, or reclaimed pavement being mixed into the asphalt concrete is outside the tolerances established by the Contractor's Quality Control Manager. The plant operator must make appropriate adjustments when production is outside the tolerances.

**B. Batch Plants.** In addition to the requirements of 402.07A, print the information on each weight ticket if the asphalt concrete is directly loaded into the truck or on a separate printout for every 16 tons (15 metric tons) or less of production if the asphalt concrete is loaded into a storage silo. Ensure printouts contain the following additional information:

1. Tare weight of the asphalt binder scale.
2. Tare weight of the aggregate scale.

3. Pounds (kilograms) of virgin asphalt binder.
4. Pounds (kilograms) of virgin aggregate.
5. Pounds (kilograms) of reclaimed pavement measured by a batch scale.
6. Tons per hour (metric tons per hour) of reclaimed pavement measured by a belt scale.

**C. Drum Mix Plants.** In addition to the requirements of 402.07A, print the information every 5 minutes during production. Ensure printouts contain the following additional information:

1. Tons per hour (metric tons per hour) of virgin asphalt binder.
2. Tons per hour (metric tons per hour) of virgin aggregate.
3. Tons per hour (metric tons per hour) of reclaimed pavement.
4. Moisture content of the virgin aggregate.

**402.08 Polymer Binders.** If a binder is modified by SBR polymer at an asphalt concrete mixing plant, equip the plant with an SBR polymer flow meter and monitoring system. Obtain the City of Akron Laboratory's approval of the system before operating. Demonstrate the system calibration to the Engineer. If the Engineer waives the demonstration, provide a letter documenting calibration data for the flow system to the City of Akron for each project.

For drum mix plants, introduce the SBR polymer directly into the asphalt binder line through means of an in-line motionless blender able to provide a homogeneous blend. Locate a sampling valve between the in-line blender and the plant drum.

For batch plants, add the SBR polymer after the aggregate has been completely coated with asphalt binder. Continue mixing for a minimum of 20 seconds after SBR polymer is added and long enough to provide a uniform mixture.

Use a 1-inch (25 mm) magnetic flow meter that employs balanced electrode plane technology. Ensure that the flow meter has two grounding electrodes located in the same measurement plane as the sensing electrodes. The flow meter does not require grounding rings if installed in nonmetallic piping. No straight run is required in piping before or after the flow meter to maintain accuracy, except if located downstream of a pump or modulating valve. Ensure that the totalizer displays a total volume measured and rate indication in any standard engineering units. Ensure that accuracy is  $\pm 2.0$  percent over flow range from 0.8 to 47.5 gallons per minute (3 to 180 L/min). Install the flow meter in the piping downstream of all recirculation lines. Provide a lockable sample valve downstream of the flow meter for calibration purposes. Interface the flow meter with a data logging flow computer. The flow computer shall produce printouts of the logged data every 5 minutes for a drum mix plant or every batch for a batch plant. Include time, date, flow rate, and flow total in the logged data. Flow rate is not necessary for batch plant production.

## 403.01

Balling or wadding of SBR polymer or uncoated aggregate indicates improper mixing. Cease production immediately and until corrected to the City of Akron satisfaction.

### ITEM 403 ASPHALT CONCRETE QUALITY CONTROL AND ACCEPTANCE

- 403.01 Description**
- 403.02 General**
- 403.03 Quality Control Program (QCP)**
- 403.04 Plant Calibration**
- 403.05 Quality Control Tests**
- 403.06 Verification Acceptance (VA)**
- 403.07 Unconditional Acceptance**
- 403.08 Acceptance Tables for 448 Mixes**

**403.01 Description.** This specification outlines the Contractor requirements for controlling asphalt concrete, asphalt concrete base, or other asphalt mixtures as specified.

**403.02 General.** The Contractor will maintain Verification Acceptance (VA) approval, in accordance with item 403 of the 2002 Ohio Department of Transportation “Construction and Materials Specification”, to provide bituminous asphalt concrete for the Ohio Department of Transportation. If the Contractor fails to maintain VA, the City of Akron will accept asphalt mixtures by Unconditional Acceptance in accordance with item 403.07.

Acceptance does not relieve the Contractor of responsibility for supplying and installing a finished product conforming to all requirements of the Contract.

**403.03 Quality Control Program (QCP).** Create and implement a Quality Control Program (QCP) for each paving season in accordance with item 403.03 of the 2002 Ohio Department of Transportation “Construction and Materials Specification”.

Provide a copy of the current JMF, the Ohio Department of Transportation VA approval letter, and a copy of the ODOT approved QCP for each paving season to the City of Akron, Materials Testing Laboratory no later than April 1.

**403.04 Plant Calibration.** Conform to the requirements of Item 402.

Maintain plant calibrations in accordance with Item 403.04 of the 2002 Ohio Department of Transportation “Construction and Material Specifications”.

**403.05 Quality Control Tests.** Perform quality control tests to control the asphalt concrete mix within the appropriate specifications.

Perform all Item 446 and 448 mix testing and quality control according to 441.09. The Contractor may test a 448 Sublot sample instead of the required quality control test provided the sample is tested in the half day in which the Sublot sample mix was produced and is tested for all required quality control properties.

For mixes that do not use Item 446 or 448 acceptance (e.g. Items 301 and 302), test the mix according to 441.09 for asphalt binder content and gradation (Basic). Other requirements of 441.09 and 441.10 do not apply. Control the Basic mixes as follows:

A. If a single asphalt binder content is more than 0.5 percent beyond the JMF, immediately take and test an additional sample.

B. If two consecutive asphalt binder content tests are more than 0.5 percent beyond the JMF, notify the Monitoring Team and cease production until the problem is corrected.

C. If the Range difference in any three consecutive asphalt binder content tests is greater 0.6 percent for basic mix (301 and 302) immediately notify the Monitoring Team.

D. If the Range difference in any three consecutive gradation tests for the No. 4 (4.75 mm) sieve is greater than 10.0 percent, immediately notify the Monitoring Team.

E. If Range deviations as specified continue, cease production.

Range is defined as the difference between the largest and the smallest acceptance test result within an acceptance period (production day or Lot).

**403.06 Verification Acceptance (VA).** The City of Akron will perform VA. If the random City of Akron sampling and testing verifies the accompanying Contractor tests, the results of all the Contractor's quality control tests for each day (for Basic mix) or the Contractor's tests for each Lot (for 446 or 448 mix) will determine acceptance.

**A. Sampling.** The City of Akron will perform the VA by testing split (for Basic or 448 mix) or core (for 446 mix) samples.

For plant sampling for Basic acceptance or 441 quality control testing, the Contractor's technician shall randomly select the truck in which to take a sample by using a random number procedure as outlined in the QCP. The Contractor's technician shall give no indication to anyone of the time that the sample is to be taken. For other than job start, previous mix production problems, low production tonnage, or as requested by the Monitoring Team, exclude the first three trucks from sampling. Include the random number and sample tonnage location and time of taking on the daily Quality Control Report (ODOT Form TE-199) with each test. Tests, other than the required random sample tests, are at the Contractor's discretion according to the QCP.

## 403.06

Provide a clean area of sufficient size to perform sample splitting. Split samples by quartering according to AASHTO T 248, Method B and recombining for the City of Akron and Contractor's sample. The City of Akron split sample size is generally 22 to 27 pounds (10,000 to 12,000 g). Except for 446 mixes, ensure that every quality control or Item 448 Sublot sample taken by the technician has a labeled split for the City of Akron. Wrap and label the City of Akron split samples as to Lot or Sublot, time, location (tonnage), and accompanying Contractor test identification. Label all cores with a Contractor identifier such that all Contractor cores may be correlated with Monitoring Team VA cores and core data on the Core Reports (ODOT Form TE-217). The Monitoring Team will pick up all City of Akron split samples within 4 workdays. Sample mishandling (careless identification, changing sample size, consistency, or pre-testing) will result in a change to Unconditional Acceptance.

For Item 446 mixes, obtain two acceptance cores at each location according to 446.05. Take the two cores longitudinally from each other rather than transversely. Send one set to the City of Akron following current procedures. Test one set of cores at the plant laboratory no later than the following production day. If necessary in a Monitoring Team review of a comparison problem, the City of Akron may request the Contractor to not destroy cores during testing. Trim cores by sawing such that tack coat and other pavement courses are removed.

For Item 448 mixes, conform to the procedures of ODOT Supplements 1035, 1038, 1039, and 1043 except take samples from a truck at the plant. If workmanship problems continue on the project (segregation, etc.) or if quality control problems persist, the Monitoring Team may require sampling on the road according to ODOT Supplement 1035. Lots will be 3000 tons (3000 metric tons), and Sublots will be 750 tons (750 metric tons). However, when production is limited to less than 3000 tons (3000 metric tons), consider the quantity produced as a partial Lot. Split and test all Sublot acceptance sample locations, as selected by the Monitoring Team and taken by the Contractor. The Contractor may test a Sublot sample instead of the required random quality control test provided the sample is tested in the half day in which the Sublot sample mix was produced and is tested for all required quality control properties. Label City of Akron split samples as Sublot or quality control samples.

**B. Reporting.** Report all testing performed and sample identification on a Quality Control Report (ODOT Form TE-199). Deliver (fax, e-mail, hand) completed Quality Control Reports and Core Reports (ODOT Form TE-217) by the end of each day in which testing is conducted, but not more than 1 day after cores are cut. If desired by the Monitoring Team and always for unsigned E-mail versions, mail the originals. After startup adjustments, report any plant operation changes on the Quality Control Report. Ensure that each Quality Control Report contains technician comments as to production quality, input materials received, and condition and includes any other quality control activities as specified in the QCP.

Ongoing problems with inadequate, incomplete, or illegible reporting will result in a change to Unconditional Acceptance. The Contractor's technician shall sign each Quality Control Report.

Report test results to the accuracy of the following decimal places. When the figures to be dropped in rounding off are exactly one-half of unity in the decimal place to be retained, the value shall be rounded up or down to the nearest even number in the decimal place to be retained.

	<b>Single Test</b>	<b>Mean</b>
Asphalt Binder Content	0.1	0.01
No. 200 (75 µm) sieve	0.1	0.01
Other sieves	1.0	0.1
Core (BSG)	0.001	0.001

For Item 446 mixes, in addition to quality control results on the Quality Control Report, fill out the Core Report in its entirety and include the bulk specific gravity (BSG) for each core.

For Item 448 mixes, track the Item 448 Sublot and Lot tonnages through the project and identify on the Quality Control Report each random Sublot test as to Lot number and Sublot tonnage location. Ensure that a copy of the technician's gradation worksheets with actual sieve weights for each Sublot sample has the Sublot/Lot identification and is submitted with each day's Quality Control Report. Attach computerized plant printouts representing samples tested to that day's report, if desired by the Monitoring Team, or otherwise keep it with the quality control records. Ensure that the technician notes on the accompanying printout in which tonnage the quality control sample was taken with accompanying test results for AC content and percent passing the No. 4 (4.75 mm) sieve. Keep remaining printouts in the plant laboratory for the duration of the project. Keep a copy of all quality control reports for a project in the Contractor's plant laboratory.

**C. Verification Testing and Monitoring.** For Basic and Item 448 mixes, the Monitoring Team will randomly choose one City of Akron split sample in every four production days for VA testing to confirm Contractor testing and mix control. In addition, the Monitoring Team will sample and split, or witness sampling and splitting of one random Contractor sample in every 4 production days. This provides two City of Akron tests in four production days. On larger production projects, if mix production is proven consistently acceptable by City of Akron VA testing and the Engineer concurs, the City of Akron may not test the additional random sample taken or witnessed by the City of Akron monitor. However, the City of Akron monitor must witness the Contractor split sample test to completion.

For Item 446 mixes, the City of Akron must test a minimum of five random cores in every 2 production days for City of Akron VA testing. The number of cores may be reduced at the Engineers discretion.

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For Basic and Item 448 mixes, the Monitoring Team may opt to test the City of Akron split sample in the plant laboratory with the Contractor’s permission, according to the Contractor’s safety practices, and with the restriction of only the Contractor’s technician placing a sample in the AC Gauge. Record the results in the City of Akron project record.

One day may be added to the above City of Akron sample testing frequency for each day production is less than 500 tons (450 metric tons).

For all mixes, the City of Akron may increase the VA testing frequency if desired.

All City of Akron VA test results will be given to the Contractor by a reasonable arrangement acceptable to both.

<b>Table 403.06-1 City of Akron Verification Comparison</b>			
	Percent Asphalt Binder	Percent Passing No. 4 (4.75mm)	BSG
Basic, (301 and 302)	±0.3	±4.0	--
448[1]	±0.3	±4.0	--
446[2]	--	--	0.010
[1]COA mix test deviation from Contractor split.			
[2]COA core test deviation from Contractor result.			

If the City of Akron VA tests confirm Contractor testing is within the verification tolerances, but a pattern of high or low results exist that suggests mix control is not at the JMF or field densities are inaccurately determined, then investigate with the Monitoring Team’s assistance to correct the problem to the Monitoring Team’s satisfaction. Direct questions regarding interpretation of circumstances to the Laboratory.

**D. Contractor Tests are Verified.** Production is acceptable if:

1. The Monitoring Team verifies the Contractor’s QCP is being fully followed; and
2. The Department VA tests are within the limits specified in 403.06.C; and
3. For Basic mixes, the remaining sieves do not exceed the limits of the applicable specification.

Failure on the Contractor’s part to respond and resolve Monitoring Team concerns may result in a change to Unconditional Acceptance.

Acceptance is based on Table 403.06-2.

Mix Type	Acceptance Tolerances or Method		
Basic Mixes		Deviation from JMF	Range
	Asphalt Binder Content	$\pm 0.5\%$	1.0
	No. 4 (4.75 mm) sieve	$\pm 6\%$	12
Basic Mixes (acceptance limits stated in appropriate specification)	Use acceptance limits in appropriate specification		
446 Mixes	Calculate pay factor according to 446.05		
448 Mixes	Calculate pay factor according to 403.08		

**E. Contractor Tests not Verified .** If the City of Akron VA test does not verify the accompanying Contractor test within the verification tolerances, then the Monitoring Team will investigate by notifying the Contractor immediately and by testing one additional mix sample or the remaining cores from the days or Lot in question and comparing to the accompanying Contractor test.

If the deviation between the City of Akron and Contractor test is greater than the limits in Table 403.06-3 immediately cease production until resolved. If the deviation is less than the above limits and discrepancies continue, performs additional tests.

Property	Mix	Limits
Asphalt Binder Content	All	$\pm 0.5\%$
No. 4 (4.75 mm) sieve	All	$\pm 6.0\%$
BSG	446	$\pm 0.015$

Additional tests may include any testing necessary to resolve the problem. If the additional testing does not resolve the problem by one-half production day or 1000 tons (1000 metric tons), whichever occurs first, to the Monitoring Team's satisfaction, stop production, if not already, until problems are resolved. If the City of Akron testing program is confirmed by the additional tests and Monitoring Team investigation and no reason to question the original test exists, then the original City of Akron tests will stand.

After the above investigation, one of the three following actions will occur:

**1. Mix Production Compares Well to the JMF.** If the City of Akron test and investigation shows mix is actually controlled well compared to the JMF or field density is accurate in spite of the Contractor test, the City of Akron does not have to test additional samples if the Contractor testing problem is corrected.

**2. Mix Production Does Not Compare Well.** If the City of Akron tests and investigation shows lack of Contractor mix control compared to the JMF or

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incorrect field density, the City of Akron will test the remaining City of Akron samples for the days or Lots represented by the original tests. The City of Akron will use the test results to calculate the acceptance. While working with the City of Akron, immediately take steps to correct the problem according to the QCP. Failure to achieve a quick resolution will result in a change to Unconditional Acceptance.

**3. COA Testing Problem.** If the City of Akron testing program has a problem as confirmed by the additional testing and City of Akron review, the City of Akron will correct the problem, throw out the original test results, and take new City of Akron samples from the samples representing the days or Lots in question for the VA tests.

**F. Contractor Removal, Restoration.** If repeated problems with poor comparison of tests are not the City of Akron fault; or poor comparison of Contractor tests to the JMF; or with plant operation, input materials, or any of the other requirements of City of Akron specifications occur in a single project or successive projects, the City of Akron will request an opinion from the Engineer before notifying the Contractor of removal from City of Akron VA. The Engineer will immediately notify the Contractor of the removal with a follow up letter by the Construction Division Manager. Once notified, acceptance of asphalt mixtures is by Unconditional Acceptance. Restoration of the VA procedures may occur on a future project with a Laboratory recommendation to the Engineer based on consistent improved plant operation and mix control, a review of the Contractor problems and resolutions, and a review of the QCP by the Engineer.

**403.07 Unconditional Acceptance.** If the Contractor is removed from Department VA, the following will occur.

The Contractor must bring its QCP and operation to a level acceptable to the City of Akron before production continues. The City of Akron will accept all material for City of Akron projects from the facility under Unconditional Acceptance. While the facility is under Unconditional Acceptance, acceptance of small quantities under the small quantities policy will not apply.

Quality control testing requirements specified in 403.05 are modified as follows:

A. The required number of test series is a minimum of three each per production day or night. If a production day is less than 6 hours, the City of Akron may reduce the frequency but not less than one test series per every 3 production hours.

B. For Basic mixes, if the variation from the JMF for one test is 8 percent passing the No. 4 (4.75 mm) sieve or 0.3 percent asphalt binder content, investigate and correct the problem, then resample and test. Maintain the moving average of three tests within 4 percent passing the No. 4 (4.75 mm) sieve and 0.2 percent asphalt binder content. In addition to the Quality Control Report, maintain control charts according to 441.10 for asphalt binder content and the No. 4 (4.75 mm) sieve. If the Range difference in any three consecutive tests is greater than 0.6 percent for asphalt binder content or 10.0 percent passing the No. 4 (4.75 mm) sieve, notify the Monitoring Team. If Range deviations as specified continue, cease production.

C. Report each day's testing on a Quality Control Report, according to 446.04. The Contractor shall report all testing performed by the Contractor's technician on the Quality Control Report. After startup adjustments, report any plant operation changes on the Quality Control Report. Ensure that each Quality Control Report contains technician comments as to production quality, input materials received, and condition and includes any other quality control activities required in the QCP. The Contractor's technician shall sign each Quality Control Report. Attach each day's computerized plant printouts to that day's report. The technician shall note on the accompanying printout in which tonnage the quality control sample was taken with accompanying test results for asphalt binder content and percent passing the No. 4 (4.75 mm) sieve. Keep a copy of all Quality Control Reports for a project in the Contractor's plant laboratory.

The City of Akron will monitor according to 441.06, except notification for ceasing production does not have to be in writing. Additional samples may be obtained for City of Akron test at any time.

For Basic mixes, if the mean of the Lot or partial Lot acceptance tests for any sieve other than the No. 4 (4.75 mm) sieve exceeds the specification limits, the pay factor is determined as follows:

Number of Tests	1	2	3	4
Pay Factor	0.98	0.97	0.96	0.95

For Item 446 mixes, the City of Akron will test all acceptance cores. City of Akron core testing under Unconditional Acceptance will receive a lower testing priority than other VA projects.

For Item 448 mixes, the City of Akron will perform acceptance sampling and testing according to 403.06 and 403.08. Sublots and acceptance samples may be taken from the roadway or plant at the Engineers discretion. City of Akron testing under Unconditional Acceptance will receive a lower testing priority than other VA projects.

**403.08 Acceptance Tables for 448 Mixes.** A Lot is considered acceptable for gradation and asphalt binder content if the deviation of the mean from the JMF and the Range is no more than the tolerances shown in Table 403.08-1.

**Table 403.08-1 Deviation from the JMF and Range Tolerances[1]**

Mix Property	Deviation from JMF (Percent)	Range (Percent)
Asphalt Binder Content	0.4	1.0
1/2 inch (12.5 mm) sieve	6	15
No. 4 (4.75 mm) sieve	5	15
No. 8 (2.36 mm) sieve	4	15
[1]Based on mean of four Lot Acceptance tests.		

If the mean of the Lot acceptance tests for a particular sieve or sieves, or for asphalt binder content deviates from the JMF by more than the tolerances shown in Table 403.08-1, but falls within the tolerances shown in Table 403.08-2, then the Lot is considered reasonably acceptable and may remain in place with payment at a reduced pay factor as show in Table 403.08-2.

If the Range of the Lot acceptance tests for asphalt binder content or for any particular sieve, or sieves, exceeds the tolerance shown in Table 403.08-1, the City of Akron will apply a pay factor of 0.95.

**Table 403.08-2 448 Acceptance Schedule[1]**

Mix Property	Pay Factor	1Test	2Tests	3Tests	4Tests
<b>Asphalt Binder Content</b>	1.00	0 to 0.80	0 to 0.57	0 to 0.46	0 to 0.40
	0.98	0.81 to 0.90	0.58 to 0.64	0.47 to 0.52	0.41 to 0.45
	0.94	0.91 to 1.00	0.65 to 0.71	0.53 to 0.58	0.46 to 0.50
	0.85	1.01 to 1.10	0.72 to 0.78	0.59 to 0.64	0.51 to 0.55
	0.70	1.11 to 1.20	0.79 to 0.85	0.65 to 0.69	0.56 to 0.60
	[2]	> 1.20	> 0.85	> 0.69	> 0.60
<b>1/2 inch (12.5 mm) sieve</b>	1.00	0 to 12	0 to 8.5	0 to 6.9	0 to 6.0
	0.99	13 to 14	8.6 to 9.9	7.0 to 8.1	6.1 to 7.0
	0.97	15 to 16	10.0 to 11.3	8.2 to 9.2	7.1 to 8.0
	0.94	17 to 18	11.4 to 12.7	9.3 to 10.4	8.1 to 9.0
	0.90	19 to 20	12.8 to 14.1	10.5 to 11.5	9.1 to 10.0
	[3]	> 20	> 14.1	> 11.5	> 10.0
<b>No. 4 (4.75 mm) sieve</b>	1.00	0 to 10	0 to 7.1	0 to 5.8	0 to 5.0
	0.99	11 to 12	7.2 to 8.5	5.9 to 6.9	5.1 to 6.0
	0.97	13 to 14	8.6 to 9.9	7.0 to 8.1	6.1 to 7.0
	0.94	15 to 16	10.0 to 11.3	8.2 to 9.2	7.1 to 8.0
	0.90	17 to 18	11.4 to 12.7	9.3 to 10.4	8.1 to 9.0
	[3]	> 18	> 12.7	> 10.4	> 9.0
<b>No. 8 (2.36 mm) sieve</b>	1.00	0 to 8	0 to 5.7	0 to 4.6	0 to 4.0
	0.99	9 to 10	5.8 to 7.1	4.7 to 5.8	4.1 to 5.0
	0.97	11 to 12	7.2 to 8.5	5.9 to 6.9	5.1 to 6.0
	0.94	13 to 14	8.6 to 9.9	7.0 to 8.1	6.1 to 7.0
	0.90	15 to 16	10.0 to 11.3	8.2 to 9.2	7.1 to 8.0
	[3]	> 16	> 11.3	> 9.2	> 8.0

[1]Based on mean of Lot Acceptance tests from the JMF.

[2]Remove and replace material.

[3]Engineer will determine if the material may remain in place. Pay factor for material allowed to remain in place is 0.70.

The City of Akron will determine payment for the Lot by multiplying the contract unit price by the pay factor. When two or more pay factors for a specific Lot are less than 1.00, use lowest pay factor to calculate the payment.

The City of Akron will base acceptance of partial Lots on the mean and the Range of the results of tests on the number of samples obtained.

## **ITEM 406 BITUMINOUS ROAD MIX**

- 406.01 Description**
- 406.02 Aggregate**
- 406.03 Bituminous Material**
- 406.04 Weather Limitations**
- 406.05 Equipment**
- 406.06 Preparation of Base**
- 406.07 Spreading Coarse Aggregate**
- 406.08 Applying Bituminous Material, Mixing and Spreading**
- 406.09 Compacting and Finishing**
- 406.10 Surface Requirements**
- 406.11 Method of Measurement**
- 406.12 Basis of Payment**

**406.01 Description.** This work shall consist of constructing one or more courses of road mix bituminous pavement on a prepared base or road surface in reasonably close conformity with the lines, grades, quantity per square yard and typical cross sections shown on the plans or established by the Engineer.

**406.02 Aggregate.** Aggregate used in the mix shall conform to 703.05 and shall be Nos. 6, 7, 8, 67 or 57. Aggregate used in the choke shall conform to 703.05 and shall be Nos. 7, 8 or 9 as specified.

Coarse aggregates for the mix, except where asphalt emulsions are used, shall be surface dry before the application of bituminous material. When asphalt emulsions are used in the mixture, a uniform control over the moisture content of the aggregate shall be maintained within such limits that a proper coating of bituminous material may be obtained.

In lieu of the requirements for dry aggregate, the bituminous material shall be treated with an agent that will permit the coating of wet aggregate within the normal mixing period, provided such treatment is approved by the Engineer.

When a Contractor uses treated bituminous material, the agent shall comply with 712.08.

**406.03 Bituminous Material.** Bituminous material of the type and grade specified shall meet the applicable requirements of 702. When two or more grades

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of one type of bituminous material are specified in the contract, the grade to be used shall be determined by the Engineer.

**406.04 Weather Limitations.** The construction of road mix shall be carried on only when the existing surface is dry, the atmospheric temperature is above 50°F and has not been below 40°F during the preceding 24 hours. Road mix shall not be placed between October 1st and May 15th of the succeeding year except by permission of the Engineer; nor shall bituminous road mix be placed when impending weather conditions are such that proper spreading, finishing and ample curing may not be obtained.

**406.05 Equipment.** Mixing and spreading equipment shall consist of two or more motor graders. Motor graders shall be rubber-tired and be constructed rigidly, and shall be free from worn parts, so that no jumping or chattering of the blades occurs. The weight of the grader shall be such that it will cut through hard surfaces without skidding over the surface. Moldboards shall be 12 to 14 feet in length and not less than 20 inches in height and curved sufficiently to cascade coated aggregate in front of it.

Motor graders shall have a wheel base of not less than 17 feet. The moldboards shall be equipped with two aprons, adjustable to width and grade. The aprons shall be securely fastened to the moldboard and shall be of sufficient height and length to form a pocket of material and be adjusted to secure a straight edge.

Bituminous distributors shall be designed, equipped, maintained and operated so that bituminous material is applied at the specified rate per square yard with uniform pressure over the required width of application. The distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank. An accurate thermometer with a range covering the specified application temperature for the bituminous material shall be mounted at approximately center height of the tank with the stem extending into the bituminous material. The distributor shall have a full circulating system with a spray bar, adjustable laterally and vertically. The spray bar shall be maintained at a constant height above the pavement under variable load conditions. Each distributor shall have suitable charts showing truck and pump speeds and other pertinent application data necessary to obtain the required results.

Distributors shall meet the following requirements: The actual application in gallons per square yard shall be determined by a check on the project. The application shall be considered satisfactory when the actual rate is within plus or minus 10 percent of the required rate and the material is applied uniformly with no visible evidence of streaking or ridging.

Rollers shall conform to 401.11.

**406.06 Preparation of Base.** The base or old pavement shall be cleaned in accordance with 407.04.

**406.07 Spreading Coarse Aggregate.** Coarse aggregate shall be evenly spread, with approved spreader boxes, upon the surface to a uniform depth in the specified quantity and to a width approximately 2 feet less than the overall width of the gathering blades of the mixing unit. Aggregate shall not be spread in advance of the mixing operation more than the length of the section which the Contractor can mix and roll in a day's operation.

Coarse aggregate shall have a uniform distribution of size, and all patches or areas of fine or undersized material shall be immediately removed and replaced with suitable material.

The Contractor shall arrange operations to avoid hauling over the work.

**406.08 Applying Bituminous Material, Mixing and Spreading.** After aggregate has been spread as specified and when in a warm, dry condition, bituminous material heated to the specified temperature shall be uniformly applied at the rate per square yard specified or directed by the Engineer, in one or more applications. The rate will vary within the limits specified, depending upon the weight of aggregate applied. The bituminous material shall be applied at a rate that will not result in flow off the road material.

Immediately after each application of bituminous material, the aggregate and bituminous material shall be thoroughly mixed until all particles of aggregate are coated and the whole mass has a uniform color free from fat or lean spots, balls or uncoated particles.

Should the mixture show an excess, or deficiency, or uneven distribution of bituminous material, the condition shall be corrected by the addition of aggregate or bituminous material, as required, and remixing. The mixture shall be bladed until the moisture and volatile content are satisfactory. When mixing operations have been satisfactorily completed, the mixture shall be formed into a windrow of uneven cross section and spread to the specified thickness.

**406.09 Compacting and Finishing.** At least two rollers shall be operated throughout construction of the pavement except that when less than 150 tons of aggregate are mixed and placed per 8 hour day, one steel wheel roller may be used. Rollers may be used in any combination except that when a pneumatic tire roller is used it shall be used in combination with one of the other steel wheel rollers specified. Capacity of the rollers shall be considered to be 30 tons of aggregate mixed and placed per hour except that capacity of the pneumatic tire roller shall be considered 60 tons per hour.

After the initial rolling, choke aggregate of the size and quantity specified shall be uniformly spread over the entire surface through an approved spreader, and the rolling completed as described above. Choke aggregate shall be broom-dragged if required by the Engineer.

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The rolling shall proceed continuously at such a rate that thorough compaction of the surface may be obtained at approximately the same rate that the mixing and spreading operation proceeds.

All courses shall be rolled when the course spread has set sufficiently to be rolled, and when the rolling does not cause undue displacement or shoving.

The rollers shall operate approximately together on each side of the section being treated. Rollers shall operate forward and backward over the section overlapping the portions as required. No turning of rollers on the finished work will be permitted.

Rollers on initial trips shall operate so that the 18 inches at the outside edges of the treatment will not be rolled. The second trips of the rollers, or when the edges are sufficiently cured to support the weight of the rollers without appreciable lateral displacement, shall begin at the outside edges and progress toward the center. The surface shall then be rolled until thoroughly compacted and free from roller marks. The edges of the surface course shall be maintained to a straight line or regular curves.

**406.10 Surface Requirements.** When the surface course is placed on a newly constructed base course or is one inch or more in thickness, the surface, both before and after the application of the seal coat, shall be such that it will not vary more than 1/2 inch from a template cut to the cross section of the road nor more than 3/8 inch from a 10 foot straightedge applied parallel to the centerline of the pavement. Depressions which may develop after the initial rolling shall be remedied by loosening the surface mixture laid, and adding new material to bring such depressions to the specified surface. Portions of the pavement defective in composition or compression, that show surface variations in excess of those given above, or that do not in all other respects comply with requirements, shall be replaced or readjusted with suitable material in a manner satisfactory to the Engineer.

**406.11 Method of Measurement.** Quantities measured shall be the number of cubic yards of aggregate and the actual number of gallons of bituminous material, all in place, completed and accepted.

Measurements of bituminous material shall be in accordance with 109.

Aggregate shall be measured by weight in accordance with 109 and converted to cubic yards in accordance with the following for 703.05 aggregate:

<b>Aggregate</b>	<b>Pounds Per Cubic Yard</b>
Crushed gravel	2600
Stone and heavy slag	2400
Slag	2000

\*Slag with an average dry rodded weight on record at the Laboratory of 90 pounds per cubic foot or more.

When the moisture content of the aggregate at the time of weighing does not exceed 3 percent by weight, no deduction will be made from the scale weights for moisture. When the moisture content exceeds 3 percent by weights, deductions will be made from the total weight of the aggregate for the weight of moisture in excess of 2 percent.

**406.12 Basis of Payment.** Payment for accepted quantities, complete in place, will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
406	Cubic Yards	Aggregate for road mix
406	Cubic Yards	Aggregate for choke
406	Gallon	Bituminous material for road mix

## ITEM 407 TACK COAT

### 407.01 Description

### 407.02 Materials

### 407.03 Equipment

### 407.04 Weather Limitations

### 407.05 Preparation of Surface

### 407.06 Application of Asphalt Material

### 407.07 Application of Cover Aggregate

### 407.08 Method of Measurement

### 407.09 Basis of Payment

**407.01 Description.** This work consists of preparing and treating a paved surface with asphalt material, and cover aggregate if required.

**407.02 Materials.** Conform to the applicable requirements of 702 for the asphalt material and use one of the following types: 702.04 RS-1, SS-1, SS-1h, CRS-1, CSS-1, or CSS-1h; or 702.13. Conform to 703.06 for cover aggregate.

**407.03 Equipment.** Provide adequate cleaning equipment, spreader boxes, and distributors.

Use distributors designed, equipped, maintained, and operated to apply asphalt material at the specified rate per square yard (square meter) with uniform pressure over the required width of application. Ensure that the distributor includes a tachometer, pressure gauges, accurate volume measuring devices, or a calibrated tank. Mount an accurate thermometer with a range covering the specified application temperature for asphalt material at approximately center height of the tank with the stem extending into the asphalt material. Ensure that the distributor

#### 407.04

has a full-circulating system with a spray bar that is adjustable laterally and vertically. Ensure that the spray bar will maintain a constant height above the pavement under variable load conditions. Supply each distributor with suitable charts showing truck and pump speeds and other pertinent application data necessary to obtain the required results.

**407.04 Weather Limitations.** Do not apply the asphalt material if the surface temperature is below the minimum placement temperature for the pavement course to be placed, as specified in 401.06.

**407.05 Preparation of Surface.** Ensure that the surface is thoroughly clean and dry when the asphalt material is applied. Remove material cleaned from the surface and dispose of it as the Engineer directs.

**407.06 Application of Asphalt Material.** Uniformly apply the asphalt material with a distributor. Emulsions may be diluted with water to achieve a more uniform application.

For irregular areas such as driveways and intersections, apply the asphalt material using a method the Engineer approves.

If paving asphalt concrete directly onto portland cement concrete or brick pavement, tack the pavement with rubberized asphalt emulsion conforming to 702.13.

Before placing a surface course onto an intermediate course, apply a tack coat on the intermediate course.

Apply the tack coat in a manner that offers the least inconvenience to traffic and that allows one-way traffic without pickup or tracking. Only apply the tack coat to areas that will be covered by a pavement course during the same day.

The Engineer will approve the quantity, rate of application, temperature, and areas to be treated before application of the tack coat. The Engineer will determine the actual application in gallons per square yard (Liters per square meter) by a check on the project. At no time will the application rate be less than 0.1gallon/square yard on new base courses, and 0.20 gallon/square yard on courses being resurfaced. The application is considered satisfactory when the actual rate is within 10 percent of the required rate and the material is applied uniformly with no visible evidence of streaking or ridging.

**407.07 Application of Cover Aggregate.** Immediately following the application of the asphalt material in areas that will be exposed to traffic, uniformly apply sufficiently dry cover aggregate to form a bonded layer that, after curing, will not be picked up by traffic. The Engineer will not accept excessive application resulting in an unbonded layer of cover aggregate.

**407.08 Method of Measurement.** The City of Akron will measure Tack Coat and Tack Coat for Intermediate Course by the number of gallons (liters) of undiluted asphalt material applied for each according to Item 109.

**407.09 Basis of Payment.** The cost of cover aggregate and water to dilute an emulsion is incidental to Tack Coat.

The City of Akron will pay for accepted quantities at the contract prices as follows:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
407	Gallon (Liter)	Tack Coat
407	Gallon (Liter)	Tack Coat for Intermediate Course

## ITEM 408 PRIME COAT

### 408.01 Description

### 408.02 Asphalt Material

### 408.03 Cover Aggregate

### 408.04 Weather Limitations

### 408.05 Equipment

### 408.06 Preparation of Surface

### 408.07 Application of Asphalt Material

### 408.08 Application of Cover Aggregate

### 408.09 Method of Measurement

### 408.10 Basis of Payment

**408.01 Description.** This work consists of preparing and treating an existing surface with asphalt material, and cover aggregate if required.

**408.02 Asphalt Material.** Conform to the applicable requirements of 702 for asphalt material and use one of the following types: 702.02 RC-70, RC-250, MC-30, MC-70, or MC-250; or 702.03 Primer 20.

**408.03 Cover Aggregate.** Use cover aggregate conforming to No. 9 size or gradation requirements of 703.05 or 703.06.

**408.04 Weather Limitations.** Do not apply asphalt material on a wet surface. Do not apply prime coats for asphalt concrete or surface treatment work when the atmospheric temperature is below 50° F (10° C) or when the air temperature within the preceding 24 hours has been 40° F (5° C) or lower. The Contractor may apply prime coats on stabilized and granular base courses, when the atmospheric temperature is 40° F (5° C) or higher.

**408.05 Equipment.** Use equipment conforming to 407.03.

**408.06 Preparation of Surface.** Shape the surface to be primed to the required grade and section. Ensure the surface is free from all ruts, corrugations, segregated material or other irregularities and is smooth and uniformly compacted at the time of application of the asphalt material. Clean the surface in a manner that will thoroughly remove all mud, earth, and other foreign material. Take care to clean the edges of road to be primed to ensure uniform application of the asphalt material directly onto the existing base or pavement surface. Remove material cleaned from the surface and dispose of it as the Engineer directs.

**408.07 Application of Asphalt Material.** Apply asphalt material in a uniform continuous spread to the width of the section to be primed by means of a distributor conforming to 407.03. When traffic is maintained, do not treat more than one-half of the width of the section in one application. Take care that the application of asphalt material at the junction of spreads is not in excess of the specified amount. Squeegee excess asphalt material from the surface. Correct skipped areas or deficiencies.

When traffic is maintained, allow one-way traffic on the untreated portion of the road bed. As soon as the asphalt material has been absorbed by the surface and will not be picked up, transfer traffic to the treated portion and prime the remaining width of the section. The Engineer will approve the quantity, rate of application, temperatures and areas to be treated before application of the prime coat.

**408.08 Application of Cover Aggregate.** If, after applying the prime coat, the asphalt material fails to penetrate and traffic must use the roadway, spread cover aggregate in the amount required to absorb any excess asphalt material.

**408.09 Method of Measurement.** The City of Akron will measure Prime Coat by the number of gallons according to 109.

**408.10 Basis of Payment.** The cost of cover aggregate is included under Prime Coat.

The City of Akron will pay for accepted quantities, complete in place, at the contract price as follows:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
408	Gallon	Prime Coat

**ITEM 409 CHIP AND SEAL**

**409.01 Description**

- 409.02 Bituminous Material**
- 409.03 Cover Aggregate Material**
- 409.04 Weather Limitations**
- 409.05 Equipment**
- 409.06 Preparation of Surface**
- 409.07 Applying Bituminous Material**
- 409.08 Cover Aggregate**
- 409.09 Method of Measurement**
- 409.10 Basis of Payment**

**409.01 Description.** This work shall consist of the construction of a wearing surface composed of one or more applications of bituminous material and cover aggregate, in place and compacted, in accordance with these specifications and in reasonably close conformity with the lines shown on the plans or established by the Engineer.

**409.02 Bituminous Material.** The bituminous material shall meet the applicable requirements of 702 and shall be one of the following: 702.02 RC-250, RC-800, RC-3000, MC-800 or MC-3000; or 702.03 CBAE-800; or 702.04 RS-1, RS-2, CRS-1 or CRS-2. Cut-back asphalts 702.02 and cut-back asphalt emulsions 702.03 may only be used after September 15 and before May 15.

**409.03 Cover Aggregate Material.** The cover aggregate shall conform to 703.05. The sizes of aggregate shall be No. 6, No. 67, No. 8 or No. 9 as specified. The surface moisture of the cover aggregate shall not exceed that which will permit the proper coating and adhesion of the type of bituminous material specified, except that the bituminous material may be treated with some agent that will assist in obtaining sufficient coating to hold the aggregate in place, provided such treatment is approved by the Engineer. When a Contractor desires to use treated material, the agent shall comply with 712.08.

**409.04 Weather Limitations.** No bituminous material shall be applied unless the temperature is 50°F and rising or when the temperature has been below 40°F in the preceding 24 hours, except as provided for seal coat application on shoulders. No bituminous material shall be applied while the surface is wet or when impending weather conditions are such that proper curing may not be obtained.

For chip and seal application on shoulders, cutback asphalt, cutback asphalt emulsion, or tar may be applied when the air temperature is between 40°F and 50°F, providing the cover aggregate is heated and is free of surface moisture at the time of application. The temperature of the aggregate shall be 150°F or higher if necessary to produce coated, bonded particles on completion of construction operations.

**409.05 Equipment.** Bituminous distributors shall conform to 407.03. Rollers shall be pneumatic tire conforming to 401.11 with the following exceptions: the minimum tire size shall be 7.50 x 15; the minimum wheel load shall be 2,000 pounds and the contact area pressure requirements and maximum capacity shall not

#### **409.06**

apply. Tires shall be inflated to a pressure producing a minimum average contact pressure of 55 psi.

Aggregate spreaders may be self-propelled or truck mounted and shall be equipped with hoppers, revolving cylinders and adjustments necessary to produce a uniform distribution of particles at the specified rate.

**409.06 Preparation of Surface.** The pavement shall be cleaned in accordance with 407.04.

**409.07 Applying Bituminous Material.** The bituminous material, heated to a temperature within the specified range, shall be applied by means of a pressure distributor. The material shall be applied with sufficient uniformity to prevent ridging or streaking in the completed surface. The rate of application specified in the contract may be adjusted with the approval of the Engineer when necessary to result in satisfactory embedment and retention of the cover aggregate.

At the beginning and at the end of the contract section, the application shall be started and stopped on paper or other suitable material sufficiently wide to permit full application on the surface being treated. Transverse and longitudinal laps shall be made in such manner that the texture of the finished surface will be uniform and continuous.

Prior to starting the application of bituminous material, sufficient cover aggregate shall be available for immediate application.

**409.08 Cover Aggregate.** Immediately following the application of the bituminous material, cover aggregate shall be applied uniformly without ridges or laps at the specified rate adjusted as directed by the Engineer to produce a minimum of excess loose particles. Spreading shall be accomplished in such manner that the tires of the truck or aggregate spreader at no time contact the uncovered and newly applied bituminous material. Deficiencies in the application of cover aggregate shall be corrected prior to rolling in a manner satisfactory to the Engineer.

Rolling shall begin immediately behind the spreader and shall consist of four complete coverages. When three-wheeled rollers are required they shall be used for at least the initial coverage. A roller coverage shall consist of two trips or passes over the same area. Rollers shall not be operated at speeds which cause pick up or dislodging of aggregate particles.

Following the completion of rolling, the Contractor shall protect the surface from traffic damage during the period of time required for the bituminous material to cure sufficiently to prevent dislodging of the aggregate particles by normal traffic. During this period, deficiencies in cover aggregate shall be corrected by spreading additional aggregate or by light brooming as directed by the Engineer.

Excess cover aggregate shall be swept from the surface by means of rotary brooms as soon after the bituminous material has cured sufficiently to prevent dislodging of the embedded aggregate particles.

**409.09 Method of Measurement.** Quantities measured shall be the number of cubic yards of aggregate and the actual number of gallons of bituminous material, all in place, completed and accepted.

Measurements of bituminous material shall be in accordance with 109.

Aggregate shall be measured by weight in accordance with 109 and converted to cubic yards in accordance with the following for 703.05 aggregate:

<u>Aggregate</u>	<u>Pounds Per Cubic Yard</u>
Crushed gravel	2600
Stone and heavy slag*	2400
Slag	2000

\*Slag with an average dry rodded weight on record at the Laboratory of 90 pounds per cubic foot or more.

When the moisture content of the aggregate at the time of weighing does not exceed 3 percent by weight, no deduction will be made from the scale weights for moisture. When the moisture content exceeds 3 percent by weight, deductions will be made from the total weight of the aggregate for the weight of moisture in excess of 2 percent.

**409.10 Basis of Payment.** The quantities measured as above provided will be paid for at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
409	Gallon	Chip and seal bituminous material
409	Cubic Yard	Chip and seal cover aggregate No.

**ITEM 410 DRIVE AND WALKWAY SEALCOAT**

- 410.01 Description**
- 410.02 Materials**
- 410.03 Composition**
- 410.04 Surface Preparation**
- 410.05 Application**
- 410.06 Method of Measurement**
- 410.07 Basis of Payment**

**410.01**

**410.01 Description.** This work shall consist of the surface preparation and furnishing and applying a coal tar pitch emulsion sealcoat to designated asphaltic parking lots, walkways, driveways, play areas, etc. indicated on the plans or as directed by the Engineer.

**410.02 Materials.** Bituminous Material - The bituminous material shall be a coal tar pitch emulsion prepared from a high temperature coal tar pitch conforming to the requirement of Federal Specification R-T-143. Oil and water gas tar shall not be used even though they comply with R-T-143. The coal tar pitch emulsion shall conform to all requirements of Federal Specification R-P-355d, except the water content shall not exceed 50 percent.

Samples of the emulsion that the Contractor proposes to use, together with a statement as to its source, must be submitted to the Engineer and approval obtained before use of such material begins. The Contractor shall furnish manufacturer's certification that each consignment of the emulsion shipped for this project meets the requirements of Federal Specification R-P-355d with the exception that the water content shall not exceed 50 percent. The manufacturer's certification shall be subject to verification by testing samples of the emulsion received for use on the project.

Aggregate - The aggregate shall be a natural product composed of clean, hard, durable, uncoated particles, free from clay and all organic matter. The aggregate shall meet the gradation shown below:

<b>Sieve Size</b>	<b>% Passing by Weight</b>
No. 16	100
No. 20	85 -100
No. 30	5 - 15
No. 40	2 - 5
No. 100	0 - 2

The gradation test shall be made as per ASTM C136.

Water - The water used in mix design shall be clear, fresh, potable water having a temperature of 50°F or higher.

**410.03 Composition.** The coal tar pitch emulsion sealcoat shall consist of a mixture of coal tar pitch emulsion, water and aggregate in the proportions shown below:

	Coal Tar Pitch Emulsion (Gal.)	Water (Gal. Per Gal. Of Emulsion)	Minimum Sand (Lbs. Per Gal. Of Emulsion)	Application Rate (Gal. Per Sq. Yd.)
1st Coat	1.0	0.8 (max.)	10	0.35
2nd Coat	1.0	0.8 (max.)	5	0.25

The coal tar pitch emulsion sealcoat shall be applied in two coats at rates specified above.

**410.04 Surface Preparation.** Prior to placing the sealcoat, the pavement surface shall be cleaned by power blowers, power brooms and other appropriate methods to leave the surface clean and free from dust, dirt and other loose foreign matter, vegetation, oil, grease or any type of film that may be detrimental to bonding of the sealcoat.

All cracks 1/4 inch and wider are to be sealed in accordance with Item 414. Cracks less than 1/4 inch wide shall be cleaned with high pressure water and/or compressed air of no less than 90 psi pressure.

All methods employed in performing the work and all equipment, tools and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer before the work is started.

**410.05 Application.** The materials shall be proportioned accurately and mixed by suitable mixing equipment. The mixing shall produce a smooth, free flowing homogenous mixture of uniform consistency. During the entire mixing process, no breaking, segregating or hardening of the emulsion, nor balling, lumping or swellings of the aggregate shall be permitted. The emulsion shall be continuously agitated from the time it has been mixed until its application to the surface.

Immediately prior to application of the sealcoat, the pavement surface shall be dampened.

The application of the slurry shall be either by hand methods using rubber squeegees for spreading, by spreader boxes or distributor equipment or by any other suitable method approved by the Engineer. The application of the first coat shall be by hand methods only using rubber squeegees for spreading. The slurry shall be applied at a uniform rate to provide the specified amount. The slurry shall be worked into the cracks carefully in order to fill the entire crack with the slurry. The first coat shall be allowed to dry and cure sufficiently to drive over without pick up or damage before the second coat is applied. In no case shall the cure time be less than four hours. The second coat shall be applied uniformly at the specified rate and allowed to dry and cure a minimum of 24 hours before permitting any traffic on the sealed surfaces. During the application, surface of adjacent structures shall be protected to prevent them from being spattered or marred.

The sealcoat shall not be applied when rain is imminent within 24 hours of application, nor when the ambient or pavement surface temperature is below 50°F (10°C), unless otherwise approved by the Engineer.

**410.06 Method of Measurement.** The quantity to be paid for under this item shall be the number of square yards of surfaces sealed, complete and accepted.

**Basis of Payment**

**410.07 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
410	Square Yards	Drive and Walkway Sealcoat

The above price shall constitute full compensation for furnishing all labor, materials, equipment, tools and incidentals necessary to complete the work as specified herein.

**ITEM 411 ATHLETIC COURT SEALCOAT**

**411.01 Description**

**411.02 Materials**

**411.03 Surface Preparation**

**411.04 Application**

**411.05 Method of Measurement**

**411.06 Basis of Payment**

**411.01 Description.** This work shall consist of the surface preparation, and furnishing and applying crack filler (if required), and seal and color coats to designated athletic courts indicated on the plans, or as directed by the Engineer.

**411.02 Materials.** Crack filler, seal and color coat materials for athletic courts shall be:

Crack filler            "Plexipave" crack filler  
First application:    "Acrylic Resurfacer"  
Second application: "Fortified Plexipave" as manufactured by  
                                 California Products Corp.,  
                                 P.O. Box 569, 169 Waverly St.  
                                 Cambridge, Mass. 02139  
                                 Telephone 1-800-225-1141

Or:

Crack filler            "Court Flex"  
First Application    "Acrylic Resurfacer"  
Second Application "Color Concentrate" as manufactured by SealMaster Industries,  
                                 Inc.  
                                 P.O. Box 2277  
                                 Sandusky, Ohio 44870  
                                 1-800-395-7325

All color coats shall be light green, unless otherwise specified on the plan.

All coating applications must be of compatible materials from the same manufacturer. For sealcoat renew, a 3 foot square test patch area shall be performed by the Contractor on the existing court prior to approval of the sealcoat material.

Manufacturer's printed specifications shall be submitted to the Engineer prior to beginning any work on the courts.

Sand to be used shall be of the gradation recommended by the sealcoat manufacturer.

Water to be used shall be clear, fresh and potable having a temperature of 50°F (10°C) or higher.

Cracks less than ½ inch wide shall be filled in accordance with manufacturer's recommendations and 414.03. Cracks between ½ and 1-½ inches shall be filled in accordance with 416.

**411.03 Surface Preparation.** All surfaces to be coated shall be thoroughly cleaned by the use of power brooms, compressed air and/or washing with water to remove all dust, dirt, debris and other foreign matter. If fungus is present, use a two percent sodium hypochlorite solution to clean the affected area. Once the fungus is removed, rinse the court thoroughly. Concrete renew courts shall then be cleaned with a solution of muriatic acid and water at a rate of 1.5 gallons of muriatic acid per 800 square yards of court. The muriatic acid shall then be thoroughly rinsed off with clean water. Oil and grease spots, if any, shall be removed by methods approved of by the Engineer.

**411.04 Application.** On new courts, apply two coats of the first application and two coats of the second application, per manufacturer's specifications. On renew courts, apply crack filler (if required), one coat of the first application and two coats of the second application per manufacturer's specifications.

**411.05 Method of Measurement.** The quantity to be paid for under this item shall be the number of square yards of sealcoat applied, complete and accepted.

**411.06 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
411	Square Yards	___ Athletic Court Sealcoat (New)
411	Square Yards	___ Athletic Court Sealcoat (Renew)
411	Gallon	Athletic Court Crack Filler

The above price shall constitute full compensation for furnishing all labor, materials, equipment, tools and incidentals necessary to complete the work as specified herein.

**ITEM 412 SAND ASPHALT****412.01 Description****412.02 Composition****412.03 Basis of Payment**

**412.01 Description.** This work shall consist of constructing a surface course of aggregate and asphalt cement mixed in a central plant and spread and compacted on a prepared surface in accordance with these specifications and in reasonable conformity with the lines, grades and typical sections shown on the plans or established by the Engineer.

This item shall be in accordance with 401 except for composition.

**412.02 Composition.** Aggregate shall be 703.05. Coarse aggregate and fine aggregate shall be combined in such proportions that the resulting blend shall be as directed by the Engineer but within the following limits.

<b>Sieve</b>	<b>Total Passing, % by wt.</b>
3/8 inch	100
1/4 inch	90 - 100
No. 4	50 - 95
No. 8	15 - 70
No. 16	10 - 50
No. 50	5 - 20
No. 200	0 - 8

Bitumen content shall be as approved by the Engineer and within the following limits:

Bitumen (Percent of total mix)      5.0% to 10%

**412.03 Basis of Payment.** Payment for accepted quantities, complete in place, will be made at the contract price for:

<b><u>Item</u></b>	<b><u>Unit</u></b>	<b><u>Description</u></b>
412	Square Yard	Sand Asphalt, ____ inches thick
412	Ton	Sand Asphalt, variable thickness

**ITEM 413 ASPHALT CONCRETE CURBING****413.01 Description****413.02 Materials****413.03 Construction Methods****413.04 Method of Measurement**

### 413.05 Basis of Payment

**413.01 Description.** This work shall consist of furnishing and constructing asphalt concrete curb, in reasonably close conformity with the lines, grades and cross sections shown on the plans or established by the Engineer. This item shall also include necessary excavation and backfill and the disposal of surplus excavation and discarded materials in accordance with 203.

**413.02 Materials.** Asphalt concrete shall meet the composition requirements of 448 with the fine aggregate content set at the maximum permitted under this composition. Mineral filler meeting the requirements of 703.07 may be added provided the composition requirements of 448 are met. The method of introducing mineral filler shall be approved by the Engineer.

**413.03 Construction Methods.** The specified asphalt concrete material shall be furnished and placed to form a curb of the cross section shown on City of Akron Standard Drawing A-5430-P, by the following method or by any other method approved by the Engineer.

After completion of the surface course, the area to be occupied by the curb shall be painted or sprayed with bituminous material meeting the requirements of 407.02 and applied at the rate of 0.15 gallons per square yard. Only the area to be occupied by the curb shall be so treated. The curb shall then be placed with a hand-operated or self-propelled machine consisting of a hopper and power-driven screw which forces the material through a tube by an extrusion method. The proper density and cross section of the curb shall be obtained by forcing the material through a die attached to the end of the extrusion tube.

The top of the curb shall be depressed for driveways to two inches above the surface of the pavement or gutter and shall be sloped as directed.

**413.04 Method of Measurement.** The footage measured will be the actual number of linear feet of curb complete in place, measured along the front face of the curb section.

**413.05 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
413	Linear Foot	Asphalt Concrete Curb

The above price shall constitute full compensation for furnishing all labor, materials, equipment, tools and incidentals necessary to complete the item as specified.

**ITEM 414 CRACK SEALING FILLER****414.01 Description****414.02 Materials****414.03 Construction Methods****414.04 Method of Measurement****414.05 Basis of Payment**

**414.01 Description.** This item shall consist of furnishing and installing a resilient and adhesive crack sealing filler capable of effectively sealing cracks ½ inch and smaller in asphalt or concrete pavements.

**414.02 Materials.** Crack sealers: Crack sealing materials shall meet the requirements of ASTM D3405 - Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements. Material for Item 414 shall be “Court Flex”, as manufactured by SealMaster Industries, Inc., P.O. Box 2277, Sandusky, Ohio, 1-800-395-7325.

Each lot or batch of sealing compound shall be delivered to the job site in the manufacturer’s original sealed container. Each container shall be marked with the manufacturer’s name, batch or lot number and the safe heating temperature, and shall be accompanied by the manufacturer’s certification stating that the compound meets the requirements of this specification.

**414.03 Construction Methods.** Cracks shall be sealed before any sealcoat, fabric sealant or fabric is placed. The pavement temperature shall be above 50°F (10°C) at the time of installation of the poured crack sealing material.

Immediately before sealing, the cracks shall be thoroughly cleaned of all laitance, dirt, debris and other foreign material. Cleaning shall be accomplished by routing, sandblasting, or other approved method. Upon completion of cleaning, the cracks shall be blown out with compressed air. The crack faces shall be surface dry when the seal is applied.

Air compressors shall be portable and furnish not less than 90 psi air pressure at the nozzle.

Cracks shall be inspected for proper preparation, and shall be approved by the Engineer before sealing is allowed. Sealant shall be installed in accordance with the following requirements.

The crack sealant shall be applied uniformly solid from bottom to top in all cracks ½ inch and smaller and without formation of entrapped air or voids. The heating kettle shall be indirect heating type, constructed as a double boiler. A

positive temperature control and mechanical agitation shall be provided. The sealant shall not be heated higher than 20°F (11°C) less than the safe heating temperature. A direct connecting pressure type extruding device with nozzles shaped for insertion into the crack shall be provided. Any sealant spilled on the surface of the pavement shall be removed immediately.

**414.04 Method of Measurement.** The quantity to be paid for under this item shall be the actual number of pounds installed, complete and accepted.

**414.05 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
414	Pounds	Crack Sealing Filler

The above price shall constitute full compensation for furnishing all labor, materials, equipment, tools and incidentals necessary to complete the work as specified herein.

## ITEM 415 LINE MARKING

### 415.01 Description

### 415.02 Materials

### 415.03 Layout

### 415.04 Application

### 415.05 Method of Measurement

### 415.06 Basis of Payment

**415.01 Description.** This item shall consist of laying out and applying white painted lines for all playing courts as specified herein and as directed by the Engineer.

**415.02 Materials.** The paint shall be one of the following:

1. "Stripe-Kote" white line paint as manufactured by Tech Tone Products Division/Koch Materials Company, 4900 South Mason Avenue, Chicago, Illinois 60630, Telephone 312-458-4330,  
or
2. "Dynastripe" latex striping paint as manufactured by Neyra Industries, Inc., 10700 Evendale Drive, Cincinnati, Ohio 45241, Telephone 513-733-1000,  
or
3. "Plexicolor" line paint as manufactured by California Products Corporation, P. O. Box 569, 169 Waverly Street, Cambridge, Mass. 02139, Telephone 1-800-225-1141

**415.03**

or an approved equal.

**415.03 Layout.** Prior to applying sealcoat, the Contractor shall establish reference points to assure proper placement of restored markings in existing locations, where applicable. Otherwise, the playing areas shall be marked in accordance with United States Tennis Courts and Track Builders Association regulations. All lines shall be two inches wide.

**415.04 Application.** The Contractor shall clean all visible loose or foreign matter from the surface to be marked for painting. Masking tape or templates shall be used to insure a clean, sharp definition of the lines. The paint shall be applied by brush at a rate of 600 linear feet per gallon, or as required depending on surface porosity and application method. If spray equipment is used, paint may be diluted in accordance with the manufacturer's printed specifications. Paint shall be allowed to dry for twenty-four hours before allowing use of playing areas.

**415.05 Method of Measurement.** The quantity to be paid for under this item shall be the number of linear feet of line marking applied, complete and accepted.

**415.06 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
415	Linear Feet	Two inch Line Marking

The above price shall constitute full compensation for furnishing all labor, materials, equipment, tools and incidentals necessary to complete the work as specified herein.

**ITEM 416 CRACK SEALING FILLER FOR ATHLETIC COURTS**

**416.01 Description**

**416.02 Materials**

**416.03 Construction Methods**

**416.04 Method of Measurement**

**416.05 Basis of Payment**

**416.01 Description.** This item shall consist of furnishing and installing a resilient and adhesive crack sealing filler capable of effectively sealing cracks between ½ and 1 ½ inch and in asphalt or concrete pavements.

**416.02 Materials.** Crack sealers: Crack sealing materials shall meet the requirements of AASHTO-M173. Material for Item 416 shall be Product 9075 -

Flex-A-Fill, as manufactured by Koch Materials Company, 4<sup>th</sup> and Duke Streets, P. O. Box 191, Northumberland, PA, Phone (800) 521-9593, and distributed by K&L Sealers, 20819 Westwood Drive, Strongsville, OH 44136, Phone (440) 238-7920.

Each lot or batch of sealing compound shall be delivered to the job site in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number and the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this specification.

**416.03 Construction Methods.** Cracks shall be sealed before any sealcoat, fabric sealant or fabric is placed. The pavement temperature shall be above 50° F (10°C) at the time of installation of the poured crack sealing material.

Immediately before sealing, the cracks shall be thoroughly cleaned of all laitance, dirt, debris and other foreign material. Cleaning shall be accomplished by routing, sandblasting, or other approved method. Upon completion of cleaning, the cracks shall be blown out with compressed air. The crack faces shall be surface dry when the seal is applied.

Air compressors shall be portable and furnish not less than 90 psi air pressure at the nozzle.

Cracks shall be inspected for proper preparation, and shall be approved by the Engineer before sealing is allowed. Sealant shall be installed in accordance with the following requirements.

Sand should fill the crack to within 3/4 inch of the surface. The crack sealant shall be applied uniformly solid from bottom to top in all cracks and without formation of entrapped air or voids. The heating kettle shall be indirect heating type, constructed as a double boiler. A positive temperature control and mechanical agitation shall be provided. The sealant shall not be heated higher than 20°F (11°C) less than the safe heating temperature. A direct connecting pressure type extruding device with nozzles shaped for insertion into the crack shall be provided. Any sealant spilled on the surface of the pavement shall be removed immediately.

**416.04 Method of Measurement.** The quantity to be paid for under this item shall be the actual number of gallons installed, complete and accepted.

**416.05 Basis of Payment.** Payment for accepted quantities will be made at the contract price for:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
416	Gallon	Crack Sealing Filler For Athletic Courts

The above price shall constitute full compensation for furnishing all labor, materials, equipment, tools and incidentals necessary to complete the work as specified herein.

**ITEM 441 CONTRACTOR MIX DESIGN AND QUALITY CONTROL—  
GENERAL**

- 441.01 Description**
- 441.02 Composition**
- 441.03 Use of Reclaimed Pavement**
- 441.04 Antistrip Additive**
- 441.05 Job Mix Formula (JMF) Field Adjustment**
- 441.06 Monitoring**
- 441.07 Quality Control Program (QCP)**
- 441.08 Testing Facilities**
- 441.09 Quality Control Tests**
- 441.10 Control Charts**
- 441.11 Quality Control Reports**

**441.01 Description.** This specification includes general requirements applicable to all types of asphalt concrete pavements where the Contractor is responsible for performing the mix design or quality control. Deviations from these general requirements will be covered in the specific requirements for each type.

The requirements of Item 401 apply, except as follows.

Develop a Quality Control Program (QCP) for the purpose of design and control of the asphalt concrete according to this specification. Submit the QCP to the City of Akron for review and approval. The City of Akron will closely monitor this QCP.

Compose the asphalt concrete of aggregates and asphalt binder. Develop a JMF to comply with the specified composition limits and mix design criteria and submit it to the Laboratory for approval prior to the start of production.

During production of the mixture, perform quality control procedures adequate to furnish assurance to the Engineer that the mixture delivered to the paving site reasonably conforms to the specification requirements and can be incorporated in the work with satisfactory results.

The Contractor's control of the mixture is based on the composition of samples the Contractor takes and analyzes, according to the approved QCP.

**441.02 Composition.** Before producing asphalt concrete, submit a proposed JMF for each combination of aggregates in writing to the Laboratory. Base the optimum percentage of asphalt binder selected for each JMF on the results of the specified tests evaluated, insofar as practical, as recommended in Chapter 5 of the *Asphalt Institute Manual Series No. 2*. The optimum percentage of asphalt binder is

the percentage that yields the Design Air Voids, provided that the other requirements of Table 441.02-1 are met. Provide a mix design with at least four graph points, including a minimum of two graph points above and two graph points below the optimum asphalt binder content. For each JMF submitted, include test data to demonstrate that mixtures conforming to the proposed JMF will have properties as specified. Submit the proposed JMF and all supporting data on forms the Laboratory approves. In addition, submit the following samples of asphalt concrete conforming to the proposed JMF for Laboratory examination and evaluation:

- A. A 5-pound (2000 g) minimum uncompact sample (all mixes).
- B. A 10-pound (4000 g) minimum uncompact sample (Type IH only).
- C. A total of three Marshall specimens (Type IH only).

The Laboratory may require additional samples of individual materials or of asphalt concrete conforming to the proposed JMF.

As an alternative, the contractor may submit a job mix formula which has been approved within 12 months of the date of submission by the Ohio Department of Transportation.

The Laboratory may perform additional tests to ensure adequate mix performance.

The Laboratory may perform these tests on material conforming to a proposed JMF or on material obtained during production of an approved JMF. Based on the results of these tests, the Laboratory may require the Contractor to design a new JMF. Allow time for this additional testing.

The Contractor may begin asphalt concrete production after the Laboratory approves the JMF and the City of Akron is properly notified. This JMF approval by the Laboratory is subject to field verification. It is the intent of this specification that the materials used in the production of the asphalt concrete will result in a mixture that conforms to the JMF. If the produced asphalt concrete mixture fails to conform to the JMF, the Laboratory may reject the JMF and require the Contractor to establish a new JMF.

Do not apply the gradation requirements of 703.05 for fine aggregate.

In the JMF, propose definite single values for:

- A. The percentage (in units of one percent) of aggregate passing each specified sieve, except the No. 200 (75 m), based on the dry weight of aggregate.
- B. The percentage (in units of one-tenth of 1 percent) of aggregate passing the No. 200 (75 m) sieve, based on the dry weight of aggregate.
- C. The percentage (in units of one-tenth of 1 percent) of asphalt binder to be added, based on the total weight of mixture.
- D. The value (calculated to the nearest one-tenth) of the fines to asphalt (F/A) ratio, which is the percentage of aggregate passing the No. 200 (75 m) sieve divided by the percentage of asphalt binder. If the F/A ratio using total asphalt binder content is

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greater than 1.0, then recalculate it using the effective asphalt binder content. Calculate the effective asphalt binder content according to Chapter 4 of the *Asphalt Institute Manual Series No. 2*.

E. The value (calculated to the nearest percentage point) of the Fifty to Thirty (F-T) value, which is the percent of total aggregate retained between the No. 50 (300 m) and No. 30 (600 m) sieves, minus the percent of total aggregate retained between the No. 30 (600 m) and No. 16 (1.18 mm) sieves.

The composition limits and properties of Table 441.02-1 are extreme ranges within which the JMF must be established. Use the criteria for Medium Traffic Volumes unless otherwise specified.

Use a 2-hour cure for all mix samples used in the design process. Ensure that the cure temperature for all samples is the mix holding temperature used before specimen compaction.

For Type 1H mixes, ensure that the coarse aggregate retained on the No. 4 (4.75 mm) sieve has a minimum of 65 percent mechanically crushed particles. A mechanically crushed particle is a particle having rough angular edges. Count particles exhibiting mechanically crushed characteristics as mechanically crushed regardless of how the fracture occurred. Ensure that a minimum of 50 percent of the virgin fine aggregate is sand manufactured from stone, gravel or air-cooled slag. If the sand is manufactured from gravel, ensure that it is crushed from gravel material retained on the 3/8 inch (9.5 mm) sieve.

If a Type 1H asphalt concrete mix is used, use a PG 70-22M asphalt binder.

If a Type 2 asphalt concrete mix designed for a Heavy traffic volume is specified, use a PG 64-28 asphalt binder regardless of the amount of reclaimed asphalt concrete pavement used in the mix. Perform the analysis specified in 441.03.

For all driveways and all asphalt concrete used under guardrails, regardless of the PG binder specified use PG 64-22 asphalt binder and use a Type 1 medium gradation designed using either Medium or Heavy design requirements.

Table 441.02-1

Course	Type 1 Surface		
	Heavy	Medium	Light
<b>Traffic</b>			
1 inch (25.0 mm) <sup>[1]</sup>			
3/4 inch (19.0 mm) <sup>[1]</sup>	100		
1/2 inch (12.5 mm) <sup>[1]</sup>	95 to 100	100	100
3/8 inch (9.5 mm) <sup>[1]</sup>	70 to 85	90 to 100	90 to 100
No. 4 (4.75 mm) <sup>[1]</sup>	38 to 50	45 to 57	45 to 57
No. 8 (2.36 mm) <sup>[1]</sup>	20 to 37	30 to 45	30 to 45
No. 16 (1.18 mm) <sup>[1]</sup>	14 to 30	17 to 35	17 to 35
No. 30 (600 μm) <sup>[1]</sup>	10 to 22	12 to 25	12 to 25
No. 50 (300 μm) <sup>[1]</sup>	6 to 15	5 to 18	5 to 18
No. 100 (150 μm) <sup>[1]</sup>	4 to 10	2 to 10	2 to 10
No. 200 (75 μm) <sup>[1]</sup>	2-6		
Asphalt Binder <sup>[2]</sup>	5.6 to 10.0	5.8 to 10.0	6.0 to 10.0
Virgin Asphalt Binder (min.)		5.0	5.2
F/A Ratio, max. <sup>[3]</sup>	1.2	1.2	1.2
F-T Value <sup>[4]</sup>	+2	+2	+2
Blows <sup>[5]</sup>	75	50	35
Stability, min., pounds <sup>[5]</sup>	1800	1200	750
(N)	(8006)	(5338)	(3336)
Flow, 0.25 mm <sup>[5]</sup>	8 to 14	8 to 16	8 to 18
Design Air Voids <sup>[6]</sup>	3.5	3.5	3.5
VMA, min. <sup>[7]</sup>	14	16	16
Special Designation	1H		

[1] Sieve, percent passing

[2] Percent of total mix

[3] Using effective asphalt binder content

[4] Percentage points maximum

[5] AASHTO T 245

[6] Percent, Supplement 1036

[7] Percent, Supplement 1037

Table 441.02-1 (Continued)

Course	Type 1 Intermediate			
	Traffic	Heavy	Medium	Light
3/4 inch (19.0 mm) <sup>[1]</sup>				
1/2 inch (12.5 mm) <sup>[1]</sup>		100	100	100
3/8 inch (9.5 mm) <sup>[1]</sup>		90 to 100	90 to 100	90 to 100
No. 4 (4.75 mm) <sup>[1]</sup>		50 to 72	50 to 72	50 to 72
No. 8 (2.36 mm) <sup>[1]</sup>		30 to 55	30 to 55	30 to 55
No. 16 (1.18 mm) <sup>[1]</sup>		17 to 40	17 to 40	17 to 40
No. 30 (600 μm) <sup>[1]</sup>		12 to 30	12 to 30	12 to 30
No. 50 (300 μm) <sup>[1]</sup>		5 to 20	5 to 20	5 to 20
No. 100 (150 μm) <sup>[1]</sup>		2 to 12	2 to 12	2 to 12
No. 200 (75 μm) <sup>[1]</sup>				
Asphalt Binder <sup>[2]</sup>		5.0 to 10.0	5.0 to 10.0	5.0 to 10.0
F/A Ratio, max. <sup>[3]</sup>		1.2	1.2	1.2
F-T Value <sup>[4]</sup>		+2	+2	+2
Blows <sup>[5]</sup>		75	50	35
Stability, min., pounds <sup>[5]</sup>		1800	1200	750
(N)		(8006)	(5338)	(3336)
Flow, 0.25 mm <sup>[5]</sup>		8 to 14	8 to 16	8 to 18
Design Air Voids <sup>[6]</sup>		4	3.5	3.5
VMA, min. <sup>[7]</sup>		16	16	16
Special Designation				
[1]Sieve, percent passing				
[2]Percent of total mix				
[3]Using effective asphalt binder content				
[4]Percentage points maximum				
[5]AASHTO T 245				
[6]Percent, Supplement 1036				
[7]Percent, Supplement 1037				

Table 441.02-1 (Continued)

Course	Type 2 Surface			
	Traffic	Heavy	Medium	Light
1 1/2 inch (37.5 mm) <sup>[1]</sup>		100	100	100
1 inch (25.0 mm) <sup>[1]</sup>		95 to 100	95 to 100	95 to 100
3/4 inch (19.0 mm) <sup>[1]</sup>		85 to 100	85 to 100	85 to 100
1/2 inch (12.5 mm) <sup>[1]</sup>		65 to 85	65 to 85	65 to 85
3/8 inch (9.5 mm) <sup>[1]</sup>				
No. 4 (4.75 mm) <sup>[1]</sup>		35 to 60	35 to 60	35 to 60
No. 8 (2.36 mm) <sup>[1]</sup>		25 to 48	25 to 48	25 to 48
No. 16 (1.18 mm) <sup>[1]</sup>		16 to 36	16 to 36	16 to 36
No. 30 (600 μm) <sup>[1]</sup>		12 to 30	12 to 30	12 to 30
No. 50 (300 μm) <sup>[1]</sup>		5 to 18	5 to 18	5 to 18
No. 100 (150 μm) <sup>[1]</sup>		2 to 10	2 to 10	2 to 10
No. 200 (75 μm) <sup>[1]</sup>				
Asphalt Binder <sup>[2]</sup>		4.0 to 9.0	4.0 to 9.0	4.0 to 9.0
F/A Ratio, max. <sup>[3]</sup>		1.2	1.2	1.2
F-T Value <sup>[4]</sup>		+2		
Blows <sup>[5]</sup>		75	50	35
Stability, min., pounds <sup>[5]</sup>		1800	1200	750
(N)		(80 06)	(5338)	(3336)
Flow, 0.25 mm <sup>[5]</sup>		8 to 14	8 to 16	8 to 18
Design Air Voids <sup>[6]</sup>		4	4	4
VMA, min. <sup>[7]</sup>		13	13	13

## Special Designation

- [1] Sieve, percent passing  
 [2] Percent of total mix  
 [3] Using effective asphalt binder content  
 [4] Percentage points maximum  
 [5] AASHTO T 245  
 [6] Percent, Supplement 1036  
 [7] Percent, Supplement 1037

**Table 441.02-1 (Continued)**

<b>Course</b>	<b>Type 2 Intermediate</b>		
<b>Traffic</b>	<b>Heavy</b>	<b>Medium</b>	<b>Light</b>
1 1/2 inch (37.5 mm) <sup>[1]</sup>	100	100	100
1 inch (25.0 mm) <sup>[1]</sup>	95 to 100	95 to 100	95 to 100
3/4 inch (19.0 mm) <sup>[1]</sup>	85 to 100	85 to 100	85 to 100
1/2 inch (12.5 mm) <sup>[1]</sup>	65 to 85	65 to 85	65 to 85
3/8 inch (9.5 mm) <sup>[1]</sup>			
No. 4 (4.75 mm) <sup>[1]</sup>	35 to 60	35 to 60	35 to 60
No. 8 (2.36 mm) <sup>[1]</sup>	25 to 48	25 to 48	25 to 48
No. 16 (1.18 mm) <sup>[1]</sup>	16 to 36	16 to 36	16 to 36
No. 30 (600 μm) <sup>[1]</sup>	12 to 30	12 to 30	12 to 30
No. 50 (300 μm) <sup>[1]</sup>	5 to 18	5 to 18	5 to 18
No. 100 (150 μm) <sup>[1]</sup>	2 to 10	2 to 10	2 to 10
No. 200 (75 μm) <sup>[1]</sup>			
Asphalt Binder <sup>[2]</sup>	4.0 to 9.0	4.0 to 9.0	4.0 to 9.0
F/A Ratio, max. <sup>[3]</sup>	1.2	1.2	1.2
F-T Value <sup>[4]</sup>	+2		
Blows <sup>[5]</sup>	75	50	35
Stability, min., pounds <sup>[5]</sup>	1800	1200	750
(N)	(8006)	(5338)	(3336)
Flow, 0.25 mm <sup>[5]</sup>	8 to 14	8 to 16	8 to 18
Design Air Voids <sup>[6]</sup>	4	4	4
VMA, min. <sup>[7]</sup>	13	13	13
<b>Special Designation</b>			
[1]Sieve, percent passing			
[2]Percent of total mix			
[3]Using effective asphalt binder content			
[4]Percentage points maximum			
[5]AASHTO T 245			
[6]Percent, Supplement 1036			
[7]Percent, Supplement 1037			

**441.03 Use of Reclaimed Pavement.** In addition to the requirements of 401.04, the Contractor may use more than 10 percent of reclaimed asphalt concrete pavement for base coarse, provided the reclaimed asphalt concrete pavement is included in the mix design process to establish the Job Mix Formula in accordance with 441.02. Use of reclaimed asphalt concrete pavement for surface courses will not be permitted. For intermediate courses, the Contractor may use up to a maximum of 35 percent of reclaimed asphalt concrete pavement. These percentages are based on the dry weight of all the materials used.

Whenever more than 10 percent of reclaimed asphalt concrete pavement is used, conform to the requirements of the specified asphalt binder for the asphalt binder proposed for use in the mixture, by a combination of reclaimed asphalt binder, virgin asphalt binder, and rejuvenating agents. Specify the percentages of reclaimed

asphalt concrete pavement, virgin aggregates, virgin asphalt binder, and rejuvenating agents (if used) required to meet the JMF. Meet the quality and gradation requirements of this specification for all materials used.

Determine final reclaimed asphalt concrete pavement gradation and asphalt binder content on four separate stockpile (or roadway for concurrent grinding) samples all agreeing within 0.4 percent for asphalt binder content and 5 percent passing the No. 4 (4.75 mm) sieve. Report all 4 test results and an average in the JMF submittal.

If greater than 20 percent of reclaimed asphalt concrete pavement is used, then use the viscosity of the recovered asphalt binder from the reclaimed asphalt concrete pavement in the analysis and submit it to the Laboratory with the proposed JMF.

**441.04 Antistrip Additive.** If the proposed JMF meets any of the following requirements:

- A. Contains any gravel coarse aggregate, or
- B. Contains more than 25 percent natural sand, or
- C. Contains more than 20 percent reclaimed asphalt concrete pavement containing gravel coarse aggregate, or
- D. Designed according to Item 442,

Conduct the following tests:

- A. Moisture damage potential test according to ODOT Supplement 1051.
- B. Washed gradation according to AASHTO T 11 as modified by ODOT Supplement 1004.
- C. Adherent fines test for each component according to ASTM D 5711.

Modify the mix with one of the following antistrip additives, if the results of the moisture damage potential test show the Tensile Strength Ratio (TSR) of the asphalt concrete mix to be less than 0.80 for 442 mixes and 0.70 for all other mix types:

**A. Liquid Antistrip Material.** Include liquid antistrip material at a rate of 0.5 to 1.0 percent by weight of the asphalt binder. However, if 442 is specified, include liquid antistrip material at a rate of 0.50 to 1.25 percent by weight of the asphalt binder. The TSR of the asphalt concrete mix shall be greater than or equal to 0.80 after the addition of the liquid antistrip material.

**B. Hydrated Lime.** Include hydrated lime in the dry form at a rate of 1.0 percent by the dry weight of aggregate for asphalt concrete. Conform to AASHTO M 303, Type 1 for hydrated lime. The Laboratory will maintain a list of approved sources of hydrated lime. To become an approved source, a source shall submit certified test data to the Laboratory showing their hydrated lime conforms to AASHTO M 303, Type 1.

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Annual submittal of certified test data by January 1 each year will be necessary to maintain approval. Provide the Engineer the following information for each shipment of hydrated lime:

1. Letter of certification.
2. Production date.
3. Shipment date.
4. Shipment destination.
5. Batch or lot number.
6. Net weight.

Include the antistripping additive in the mix design. Submit the following to the Laboratory with the proposed JMF:

- A. All TSR data (before and after the addition of the antistripping additive).
- B. Rate of addition of the liquid antistripping material, if used.
- C. If using liquid antistripping material, product information, recent supplier State project information using the liquid antistripping material, and letter of certification.
- D. Results of the washed gradation test of the individual components of the mix used in determining the combined gradation.
- E. Results of the adherent fines testing for each component.

The Laboratory may perform additional tests according to ODOT Supplements 1004, 1051, and 1052. These tests may be performed on material conforming to a proposed JMF or on material obtained during production of an approved JMF. If a change in the aggregate production is suspected, the City of Akron may require the Contractor to perform washed gradations on components and calculate adherent fines to determine the need for additional TSR review. The Laboratory may obtain samples of the hydrated lime at any time to verify quality. If the quality of the hydrated lime is in question, the Laboratory may require independent laboratory testing for the hydrated lime supplier.

Store and introduce antistripping additives into the plant according to ODOT Supplement 1053. The Laboratory shall approve the antistripping additive storage and feed systems prior to the start of production. The Laboratory may require modifications in the method of introducing the antistripping additive into the mix, if the antistripping additive is not being properly dispersed into the mix.

Provide delivery tickets to the Engineer at the end of the project and at the end of each construction year on a multiple year project. The Engineer will verify the number of pounds of antistripping additive used is within 10 percent of the calculated amount of antistripping additive required for the total weight of asphalt binder, based on the JMF, used in the asphalt concrete.

**441.05 Job Mix Formula (JMF) Field Adjustments.** If, during production, the Contractor determines from the results of quality control tests that adjustments are necessary to the mix design to achieve the specified properties in

place, the Contractor may adjust the JMF gradation within the below limits without a redesign of the mixtures.

Limit adjustments of the JMF to conform to actual production, without a redesign of the mixture, to 3 percent passing the 1/2 inch (12.5 mm), No. 4 (4.75 mm), and No. 8 (2.36 mm) sieves and 1 percent passing the No. 200 (75m) sieve, except do not exceed the limits in Table 441.02-1 in the adjusted JMF. The adjustment on the 1/2 inch (12.5 mm) sieve applies only to Type 1H and Type 2 mixes. Determine the need for any JMF gradation adjustments in the time specified. Should no adjustments be made, the City of Akron will base acceptance on conformance to the original JMF. After the time period specified, the City of Akron will allow no further adjustment of the JMF.

Should a redesign of the mixture become necessary, submit a new JMF according to the requirements for the initial JMF. A new acceptance lot will begin when a new JMF established by a redesign of the mixture becomes effective. Make any adjustment of this new JMF as provided for the original JMF.

Record both the design JMF and the adjusted JMF in effect during production of an acceptance lot on the Quality Control Report for that lot. In the event that a new design JMF is proposed and approved, also make a notation on the ticket for the first load produced under the new design JMF.

**441.06 Monitoring.** The City of Akron will establish Monitoring Teams for the purpose of observing, testing and reviewing the Contractor's QCP for conformance with these Specifications. The Monitoring Team will include the Materials Lab Supervisor, Project RPR, Project Coordinator, Designer and the Construction Division Manager. The City of Akron may obtain comparison samples by split samples with the Contractor or independent samples from the plant or roadway. The City of Akron will test and analyze these samples according to the standard procedure for a comparison with the Contractor's quality control tests. If there is good comparison, production may continue. If there is poor comparison, the City of Akron will review the Contractor's program more closely. Based on their review, the Monitoring Team may at any time disallow production to continue. The City of Akron will notify the Contractor in writing to stop production.

**441.07 Quality Control Program (QCP).** The Contractor will maintain certification in good standing in accordance with Item 403 of the ODOT CMS to provide bituminous asphalt concrete for the Ohio Department of Transportation.

**441.08 Testing Facilities.** Provide testing facilities at the plant site conforming to ODOT Supplement 1041, with suitable space for Monitoring Team members to conduct a review of the work.

**441.09 Quality Control Tests.** Perform quality control tests to control the asphalt concrete mix within the specifications. Ensure that these quality control tests measure the asphalt binder content, gradation, air voids, and Maximum Specific Gravity (MSG) according to the Contractor's approved QCP. Perform each quality

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control test a minimum of one time each half of a production day or night (two tests per production day or night), or one each 1400 tons (1300 metric tons), whichever is less.

The City of Akron expects the Contractor to perform more sampling and testing than the minimum specified, especially at the start of production and during production when the quality control tests show the asphalt concrete being produced is near or outside the Warning Band Limits. The Contractor may determine the method of sampling and testing of the asphalt concrete beyond the minimum specified, and should detail the methods in the Contractor's approved QCP. Record all quality control testing on the Quality Control Report according to 441.11.

Perform the required quality control tests as follows:

**A. Asphalt Binder Content.** Determine the asphalt binder content of a sample of asphalt concrete by performing an Asphalt Content (AC) Gauge test according to ODOT Supplement 1043. Make all printouts available for review by the Monitoring Team at any time and turn them over to the City of Akron at the end of the project or the end of the production year.

Determine the moisture content of the asphalt concrete for each AC Gauge test. Maintain the moisture content at 0.8 percent or less.

**B. Gradation.** Perform at least one of the daily gradations on aggregate remaining after removing the asphalt binder with a solvent from an asphalt concrete sample used in an AC Gauge test (solvent sample); or on aggregate remaining after removing the asphalt binder with a preapproved asphalt ignition oven from an asphalt concrete sample used in an AC Gauge test (ignition oven sample). Correct each solvent sample for ash. Perform all other gradations on solvent samples, ignition oven samples, or on samples obtained according to the Contractor's approved QCP. Perform testing with an asphalt ignition oven according to ODOT Supplement 1054.

The gradation results of all the sieves must be representative of the JMF. If the Contractor fails to control the entire gradation, the Laboratory may require a redesign according to 441.02.

When the F-T value is specified for a mix in 441.02, calculate it for each gradation analysis. Maintain the F-T value at +4 percentage points or less for these mixes.

Calculate the F/A ratio for every solvent sample or ignition oven sample analysis. Maintain the F/A ratio so no F/A ratio is greater than 1.2 for all mixes. Use the asphalt binder content determined by the AC Gauge for calculating the F/A ratio. If the F/A ratio is greater than 1.0, recalculate the F/A ratio using the effective asphalt binder content.

Calculate the effective asphalt binder content on the calculation sheet using the asphalt binder content determined by the AC Gauge and attach it to the Quality Control Report. Use bulk and effective aggregate specific gravities and remaining values needed in the calculation from the approved JMF. Do not deviate from these

values without the Laboratory's approval. If the F/A ratio is greater than 1.0 for ignition oven samples, calculate the F/A ratio using the percent passing the No. 200 (75 m) sieve from a washed gradation of the ignition oven sample according to AASHTO T 30.

**C. Air Voids and MSG.** Determine the air voids of the asphalt concrete by analyzing a set of three compacted specimens and a corresponding MSG determination. Use the MSG to calculate the air voids of the compacted specimens. If a single air void test is less than 2 percent or greater than 6 percent, take and test a sample immediately. If two consecutive tests are outside this 2 to 6 percent range, cease production.

Use a 1-hour cure for all mix samples used in voids analysis. The Contractor may use a 2-hour cure time if voids are consistently near the low void warning band. In this case, use the 2-hour cure for all voids testing through the remainder of the project. Ensure that the cure temperature for all samples is the mix holding temperature used prior to specimen compaction.

Calculate the Voids in Mineral Aggregate (VMA) value for every set of compacted specimens according to ODOT Supplement 1037.

Calculate the average of all the MSG determinations performed each production day and report this average on the Quality Control Report. When the range of three consecutive daily average MSG determinations is equal to or less than 0.020, average these three average MSG determinations to determine the Maximum Theoretical Density (MTD). After the MTD is established, compare all individual MSG determinations to the MTD. The City of Akron will verify the MTD if the MSG determination has a deviation from the MTD of less than or equal to 0.020. If the MTD is not verified, establish a new MTD.

Whenever compacted specimens are to be made and an MSG determination is to be run, take a sample of sufficient size to run a corresponding AC Gauge test. When the air void and MSG test results are recorded, reference them to the AC Gauge test of the sample.

**D. Other Requirements.** Retain a split sample for each AC Gauge test and MSG test and all compacted specimens for monitoring by the City of Akron. Maintain MSG samples in the state described in ASTM D 2041, Section 7.1. The Contractor may dispose of the AC Gauge test samples after two days and all other split samples after seven days, if the City of Akron does not process the split samples.

After establishing the MTD, if the range difference in any three consecutive tests is greater than 2 percent for air voids or 8 percent for material passing the 4.75 mm (No. 4) sieve, notify the Monitoring Team. Continuing range deficiencies will be a reason for ceasing production.

Measure the temperature of the mixture and record and validate the results on the load tickets at least once during each hour of production.

The Contractor may conduct additional testing of any type. Record such additional testing along with all other quality control records and have these records readily available for the Engineer's review. The Laboratory may observe, review, and

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approve the procedures at any time. Retain copies of all records documenting the Contractor's additional quality control inspections and tests throughout the life of the Contract and furnish them to the Engineer on request.

Multiple random non-specification individual tests or multiple range deficiencies can be cause for redesign. When production problems exist beyond a production day, a Contractor's representative holding a Level 2 qualification is required to be at the asphalt plant until a full production day is achieved with results satisfactory to the Engineer. The Laboratory will not approve any redesign it determines is unsatisfactory to provide acceptable mix performance. Submit this new design for approval according to 441.02, and at no additional cost to the City of Akron.

**441.10 Control Charts.** Post control charts at all times showing each individual test result and the moving average of three tests, as follows:

- A. Plot tests showing the percent passing for the 1/2 inch (12.5 mm), No. 4 (4.75 mm), No. 8 (2.36 mm), and No. 200 (75 m) sieves as determined by a solvent sample or ignition oven sample analysis, the percent asphalt binder content as determined by the AC Gauge, the MSG and the percent air voids. Round all percentages to the nearest whole percent; however, round asphalt binder content, the No. 200 (75 m) sieve, and air voids to the nearest 0.1 percent.
- B. Plot the moving average in red starting with the third test.
- C. Show the Specification and Warning Band Limits on the control charts. These limits are specified in Table 441.10-1.
- D. Label each control chart to identify it and its producer. Include an example when submitting the QCP for approval.
- E. Record the range for three tests (moving range) under the appropriate running average point on the chart.

In the event two consecutive tests enter the Warning Band Limits, notify the Monitoring Team.

In the event the moving average falls outside the specification limits, cease operations. Do not resume production until corrective action has been taken and the Monitoring Team has approved.

**TABLE 441.10-1**

Mix Characteristic	Specification Limits	Warning Band Limits
Asphalt Binder Content <sup>[1]</sup>	-0.3% to 0.3%	-0.2% to 0.2%
1/2 inch (12.5 mm) sieve <sup>[1]</sup>	-6.0% to 6.0%	-5.0% to 5.0%
No. 4 (4.75 mm) sieve <sup>[1]</sup>	-5.0% to 5.0%	-4.0% to 4.0%
No. 8 (2.36 mm) sieve <sup>[1]</sup>	-4.0% to 4.0%	-3.0% to 3.0%
No. 200 (75 m) sieve <sup>[1]</sup>	-2.0% to 2.0%	-1.8% to 1.8%
Air Voids <sup>[2]</sup>	2.5 to 4.5	2.7 to 4.3
Air Voids <sup>[3]</sup>	3.0 to 5.0	3.2 to 4.8
MSG <sup>[4]</sup>	-0.012 to 0.012	

[1]deviation from the JMF

[2]for Design Air Voids of 3.5%

[3]for Design Air Voids of 4.0%

[4]deviation from the MTD

**441.11 Quality Control Reports.** Use Ohio Department of Transportation Form TE-199 for the Quality Control Report.

Record all test results on the Quality Control Report. Document all decisions regarding responses to test results on the Quality Control Report (referring to the particular test), including reasons why a particular problem may exist, how the problem was evaluated, what action was taken to correct the problem (plant operation or testing), and what communication with City of Akron personnel took place.

Submit one Quality Control Report to the City of Akron with all supporting documentation no later than specified. Ensure the report is complete with a concise statement of quality control activity related to the previously stated assurance purpose.

## **ITEM 446 ASPHALT CONCRETE**

### **446.01 Description**

### **446.02 JMF Field Adjustments**

### **446.03 Monitoring**

### **446.04 Reports**

### **446.05 Density Acceptance**

### **446.06 Joints**

### **446.07 Basis of Payment**

**446.01 Description.** This work consists of constructing a surface course or an intermediate course of aggregate and asphalt binder mixed in a central plant and spread and compacted on a prepared surface.

The requirements of Item 441 apply, except as modified by this specification.

## 446.02

The City of Akron will base acceptance of the compacted mixture in place on the level of density attained as sampled by the Contractor and analyzed by the City of Akron.

**446.02 JMF Field Adjustments.** Determine the need for any JMF gradation adjustments, provided for in 441.05, in the first 3 days or first 3000 tons (3000 metric tons) of production, whichever comes last. Give the Laboratory written notice of JMF adjustments no later than the end of the following day's production.

For projects smaller than the above JMF field adjustment period, give the Laboratory written notice of any JMF gradation adjustments within 1 workday following the last day of production.

**446.03 Monitoring.** If there is poor comparison between the City of Akron comparison samples and the Contractor's quality control tests, the Monitoring Team may at any time disallow production to continue under Item 446. In this case, conform to Items 448 and 446. The City of Akron will notify the Contractor in writing to stop production.

**446.04 Reports.** Submit the Quality Control Report according to 441.11 on the workday following the production day of the material represented by the report.

**446.05 Density Acceptance.** Use compaction equipment meeting the requirements of 401.13 or other types acceptable to the Engineer. A three-wheel roller and a vertical longitudinal joint is not required. If a wedge joint is used, construct it using a maximum slope of 3:1.

Obtain 10 cores for the City of Akron to test to determine the in-place density of the compacted mixture as a percentage of the average Maximum Specific Gravity (MSG) for the production day the material was placed. Compact shoulders using the same equipment and procedures as used on the mainline pavement. The requirements of 401.16, except for the last four paragraphs, are waived.

At the discretion of the Engineer the requirement of obtaining cores may be waived based upon density results obtained by the Nuclear Gauge method.

Payment for compaction of the completed mainline pavement and ramps is by Lot, based upon the degree to which density is attained. Payment for shoulders depends on the degree to which the density is obtained on the adjacent mainline pavement lane or ramp. However, when a cold longitudinal joint is made between a mainline pavement lane and an adjoining shoulder, payment for the shoulder will be based on the degree to which the density is obtained on the shoulder.

A Lot consists of an area of pavement placed during a production day, including the shoulders. If less than 400 tons (400 metric tons) is produced in a production day, then that production day is combined with the next production day into a single Lot. If greater than 250 tons (250 metric tons) and less than 400 tons (400 metric tons) is produced on the last day of production for the project, then the day's production is a separate Lot. If less than 250 tons (250 metric tons) is produced on

the last production day for the project, it is part of the previous Lot for acceptance, provided the previous Lot was placed within 3 days; otherwise, it is a separate Lot.

Within 48 hours after the pavement is placed, obtain ten cores for each Lot at random locations the Engineer determines. The Engineer will divide a Lot into five equal areas and calculate the two random core locations from the mainline pavement or ramps. Cores can be obtained anywhere in the pavement mat up to 3 inches (75 mm) between the pavement edge and core edge. For the first part of a wedge joint, the pavement edge is defined as the point where the Contractor starts decreasing the thickness. For the second part of a wedge joint, the pavement edge is defined as the line where the second part meets the first part (the visible joint). Obtain cores 3 inches (75 mm) from the edge of the pavement when random numbers locate a core closer to the pavement edge than 3 inches (75 mm). Locate cores for the Contractor's quality control (sister core) longitudinally from and within 4 inches (100 mm) of the random core. The number of cores may be increased or decreased at the Engineers discretion.

The City of Akron will determine the pay factor for each Lot cored by the pay schedule in Table 446.05-1. The City of Akron will verify the MTD if the MSG determination has a deviation from the MTD of less than or equal to 0.020. If the MTD is not verified, establish a new MTD according to the procedures established in 441.09. If less than 10 cores are available for determining the mean, the Laboratory will determine disposition of the Lot.

Fill core holes by the next workday. Before filling, ensure the holes are dry and tack them with asphalt material conforming to 407.02. Properly compact the asphalt concrete used for filling the hole and leave it flush with the pavement.

**TABLE 446.05-1**

Mean of Cores <sup>[1]</sup>	Pay Factor	
	Surface Course	Intermediate Course
98.0% or greater	[2]	[2]
97.0 to 97.9%	0.94	[2]
96.0 to 96.9%	1.00	0.94
94.0 to 95.9%	1.00	1.00
93.0 to 93.9%	1.00	1.00
92.0 to 92.9%	0.98	1.00
91.0 to 91.9%	0.90	0.94
90.0 to 90.9%	0.80	0.88
89.0 to 89.9%	[3]	[3]
Less than 89.0%	[2]	[2]

[1]Mean of cores as percent of average MSG for the production day.

[2]For surface courses, remove and replace. For other courses, the Engineer will determine whether the material may remain in place. If the Engineer determines the course should be removed and replaced, the Contractor shall remove and replace this course and all courses paved on this course. The pay factor for material allowed to remain in place is 0.60.

[3]The Engineer will determine whether the material may remain in place. If the Engineer determines the course should be removed and replaced, the Contractor shall remove and replace this course and all courses paved on this course. The pay factor for such material allowed to remain in place is 0.70.

**446.06 Joints.** Make a hot longitudinal joint between the mainline pavement lane and the adjoining shoulder and all ramps and the adjoining shoulders. If a hot longitudinal joint is specified between the mainline pavement lanes, the Engineer may allow the Contractor to construct a cold longitudinal joint between the mainline pavement lanes and the adjoining shoulders.

**446.07 Basis of Payment.** The City of Akron will pay for accepted quantities, completed in place, at the contract prices, as modified by 446.05, as follows:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
446	Cubic Yard	Asphalt Concrete Intermediate Course, Type _____
446	Cubic Yard	Asphalt Concrete Surface Course, Type_____

**ITEM 448 ASPHALT CONCRETE**

- 448.01 Description**
- 448.02 JMF Field Adjustments**
- 448.03 Reports**
- 448.04 Acceptance**
- 448.05 Basis of Payment**

**448.01 Description.** This work consists of constructing a surface course or an intermediate course of aggregate and asphalt binder mixed in a central plant and spread and compacted on a prepared surface.

The requirements of Item 441 apply, except as modified by this specification.

The City of Akron will determine acceptance of the mixture by Lot, based on the composition of random samples taken and tested by the Contractor and verified by the City of Akron.

**448.02 JMF Field Adjustments.** Determine the need for any JMF gradation adjustments, provided for in 441.05, from the results of quality control and City of Akron verification tests of the first two acceptance lots. Following adjustment, the City of Akron will apply the adjusted JMF, for acceptance purposes, to the entire production including the first two lots. Give the Laboratory written notice of JMF adjustments no later than the end of the first workday following the notification of verification test results of the second acceptance lot.

For projects with less than two acceptance lots or for any JMF that will no longer be used on a project, give the Laboratory written notice of any JMF gradation adjustments within 1 workday following the notification of acceptance test results.

**448.03 Reports.** Submit the Quality Control Report according to 441.11 on the workday following the completion of production of each acceptance lot.

**448.04 Acceptance.** Refer to Item 403 for acceptance requirements.

**448.05 Basis of Payment.** The City of Akron will pay for accepted quantities, completed in place, at the contract prices, or at the contract price as modified in 448.04, as follows:

<u>Item</u>	<u>Unit</u>	<u>Description</u>
448	Cubic Yard	Asphalt Concrete Intermediate Course, Type _____
448	Cubic Yard	Asphalt Concrete Surface Course, Type _____
448	Cubic Yard	Asphalt Concrete Surface Course, Type 1, __inches Thick, Driveway Reconstruction