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

FOR LOTS WITH 3 COLD JOINT CORES

Mean of Cores[1]	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
93.4 to 95.9%	1.04 [4]	1.00
92.4 to 93.3%	1.00	1.00
91.4 to 92.3%	0.98	1.00
90.4 to 91.3%	0.90	0.94
89.4 to 90.3%	0.80	0.88
88.4 to 89.3%	[3]	[3]
Less than 88.4%	[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 District will determine whether the material may remain in place. If the District determines the course should be removed and replaced, the Contractor will 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 District will determine whether the material may remain in place. If the District determines the course should be removed and replaced, the Contractor will 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.

[4] No incentive will be paid if any single cold joint core is less than 91.0%.

Source: Ohio Department of Transportation - Construction and Material Specifications, 2010

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

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

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 DET 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 DET 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 Department's 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 Department 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. The requirements of 401.13 do not apply. However, rollers must fully and satisfactorily provide the required compaction, be mechanically sound, and meet Hot Mix Asphalt industry standards. The Department retains the right to reject the use of rollers which are not in good repair, or are not designed to do the work required. A three-wheel roller per 401.17 is not required.

Obtain 10 cores for the Department 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.

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

Source: Ohio Department of Transportation - Construction and Material Specifications, 2010

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 sublots and calculate two random core locations in each sublot as described below using an acceptable random number selection method. Both mainline pavement and ramps will be included in Lot determinations. The Engineer will not give the Contractor random core locations early in the Lot placement. The Engineer will tell the Contractor the method used to determine random locations as noted below before project start and will use the same method for all Lots.

For each Lot three cores will be taken as follows from cold longitudinal joints and seven cores will be taken from the mat not including the joints. If locations not according to this specification are given, immediately inform the Engineer. Do not take cores from ramp joints. Take joint cores from the first, last and randomly from one of the three middle sublots. Determine the longitudinal location of the joint core within the sublot randomly and also randomly determine whether or not the cold longitudinal joint core is to be taken from a confined or unconfined joint if both exist in the mat to be cored. Do not take cores on the sloped face of a wedge before the adjoining lane is placed. Take joint cores such that the core's closest edge is six inches (150 mm) from the edge of the joint upper notch of a wedge joint or 4 inches (100 mm) from the vertical face of a confined vertical face joint. If a nine inch or wider wedge joint is used take the core three inches from the upper wedge joint notch. Take the seven random mat cores that are not for the joint coring such that the core's closest edge is at least twelve inches from the cold longitudinal joint wedge joint upper notch or vertical face edge. If taken, locate cores for the Contractor's quality control (sister core) longitudinally from and within four inches (100 mm) of the random core.

The Department will determine the pay factor for each Lot cored by the pay schedule in Table 446.05-1 for Lots with three cold longitudinal joint cores and Table 446.05-2 for Lots with less than three cold longitudinal joint cores. The Department 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.

446 Asphalt Concrete

Description (446.01)

This item includes placing a surface or intermediate course asphalt concrete that is accepted based on the level of density obtained. This type of specification is based on performance and not on method. Under this specification a Contractor can be rewarded for providing a better product than required by the minimum specification, or can be penalized for not meeting the minimum requirements. The requirements of 401 apply unless noted.

Density Acceptance (446.05)

Item 446 is accepted by density testing and the roller selection is at the discretion of the Contractor and not governed by 401.13. Additionally the requirements of 401.16 that detail compaction operations are waived except the last four paragraphs. These last four paragraphs describe how requirements for the rolling pattern to obtain compaction. The Inspector should observe the rolling pattern for conformance.

Density of the asphalt concrete is based on cores that are cut from the completed mat (asphalt pavement placed at the design thickness). The core locations are determined by the Engineer as detailed in 446.05. Ten cores are required to be cut per lot. A lot is considered one day of production with provisions for combining a small production day (<400 tons) with the next day. Each lot is divided into five equal sublots and 2 cores are cut from each sublot. Core locations are determined on a random basis using a random number selection process. That process will be used for all lots.

Core Procedure

Cores are required to be cut within 48 hours of placement. To allow the contractor to core the same day determine core locations prior to the end of work by estimating production based on production rate and contractor expectations. *However* these locations are not be given to the Contractor before the end of the day's production. The Department does not intend to bias the Contractor's operations by specifying where the cores will be taken.

If a cold longitudinal joint is made between the mainline and shoulder, include the shoulder in the lot for coring. If a hot joint is made, be sure the same equipment and rolling pattern is used on the shoulder. If the contractor does not adhere to this requirement, include the shoulder in the lot for coring.

There are additional specific requirements for cold longitudinal joint cores. In each lot three cores are to taken from the cold longitudinal joint in the first and last lots and randomly from one of the middle three lots. Joint cores are to be 3, 4 or 6

inches from the cold joint depending on its construction type. All other cores are to be located at least 12 inches from the edge of pavement.

Form TE-217 provides a standardized method for sublot lay out and random selection of core locations (transversely and longitudinally). The form is located on ODOT's Construction website and is available as either an Excel spreadsheet that automatically calculates core sample locations or as a manual-use (non-electronic) form.

If using the Electronic TE-217 form enter all required information as indicated by the yellow highlighting. After entering the beginning and ending stations for the lot, press key F9 and the computer automatically generates the random numbers. The form automatically calculates the core sample locations as shown in the orange highlighted boxes. Use these locations to lay out the cores on the completed asphalt mat.

For the Non-electronic TE-217 form all calculations are done manually. The selection of random numbers must come from a table. This table is included with the Non-electronic TE-217 on the ODOT website as well as instructions for selecting random numbers. The same method should be used consistently on the form. When this form is completed use the calculated locations to lay out the cores on the completed asphalt mat.

The Engineer will physically mark the core locations on the mat using aerosol paint. Be sure coring takes place where marked. This can be ensured by observing each coring operation or by painting the core location with a small diameter circle with an "X" or other marking. The Contractor must be instructed to cut the core within this circle. The cut core should be examined to verify there is paint on the surface which indicates the core was cut at the selected location. If the Contractor takes "sister" cores make sure they are cut within 4 inches longitudinally of the Department's cores. For joint cores, use a different paint color than for the mainline cores. This provides assurance that joint cores are cut from the locations selected by the project.

There have been isolated incidents where cut cores have been "switched out" with other cores that presumably would provide better density test values. Project personnel must provide thorough oversight of the core cutting operation such that the cores being testing for payment are from the locations selected by the project through the random selection process. Substitution of cores by cutting in other locations or by replacing cut cores with others is absolutely prohibited and cannot be tolerated.

Core holes are required to be filled by the next workday using the same asphalt mixture used to place the mat. The holes must be dry and coated with tack meeting the requirements of 707.02. The asphalt must be compacted adequately and finished flush with the completed asphalt mat.

After core samples are obtained, package and identify in accordance with current District or Laboratory policy. The District test lab may have specific requirements for labeling the core samples. The samples should be shipped to the District lab as soon as possible. Care should be taken not to damage the core by dropping it,

throwing it, or exposing it to excessive heat. Cores should not be stacked in any way.

Documentation Requirements - 446 Asphalt Concrete

1. Obtain JMF for the project.
2. Determine and document if paver is on approved list.
3. Document the number and types of rollers being used.
4. Document pavement surface condition, preparation, and surface and air temperatures.
5. Document tack or prime used along with source and quantity used versus required.
6. Document lift thickness, mat width, weather conditions, surface tolerance checks, equipment problems, mat problems (segregation, tearing, tenderness, etc), spreading rate, roller coverage, and any other issue or observations made during paving operations.
7. Observe and document trucks hauling material:
    a. Check for secured waterproof cover.
    b. Check for insulated truck beds for temperatures below 50° F (10° C) and/or if the haul exceeds 20 miles (32 km).
    c. Observe the asphalt mix in the truck and note any slumping, drain down, or blue smoke.
8. Determine compliance with compaction requirements as per 401.16.
9. Record asphalt mixture temperatures in the paver hopper and on the mat at the time of compaction.
10. Determine and record required and actual placement rates and variance.
11. Write location (station), date, and time on asphalt plant tickets. Tickets should be totaled daily, initialed, with the calculator tape attached.
12. Record luminance readings for night paving operations
13. Determine plan quantity for payment
14. Determine and mark core locations for each day of production using Form TE-217
15. Document on CA-FP-2 through 5 or other approved forms as needed.

ODOT Project #48-10 (US RT 422, Geauga County) Core Sample Density Comparisons								
Core	Lot 1	Lot 2	Lot 3	Lot 3A	Difference between 3 and 3A	Lot 4	Lot 4A	Difference between 4 and 4A
1	93.2%	92.2%	94.9%	91.9%	3.0%	94.7%	93.8%	0.9%
2	93.3%	92.1%	94.4%	92.0%	2.4%	93.3%	92.7%	0.6%
3	91.8%	91.6%	94.1%	95.6%	(-1.5%)	94.2%	91.1%	3.1%
4	89.0%	92.0%	94.3%	94.1%	0.2%	93.6%	92.3%	1.3%
5	89.0%	91.9%	93.5%	90.4%	3.1%	94.6%	88.2%	6.4%
6	88.0%	90.7%	94.5%	94.3%	0.2%	94.3%	92.7%	1.6%
7	92.8%	91.0%	93.5%	93.4%	0.1%	93.2%	90.7%	2.5%
8	91.6%	92.6%	94.4%	91.3%	3.1%	94.2%	91.5%	2.7%
9	90.2%	91.1%	94.5%	93.9%	0.6%	93.8%	94.3%	(-0.5%)
10	90.1%	91.7%	94.1%	94.4%	(-0.3%)	94.6%	89.3%	5.3%

Source: Ohio Department of Transportation - Materials Testing
Compiled: Office of the Ohio Inspector General

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DENSITY TEST
R E P O R T

Sample Id: 01017997 01
Proj/Item/Ref: 10 0048 442E10001 14
Sample Date: 08/17/10 PID Nbr: 83353
Cnty/Rt/Sect: D12 VA 0 000000
Matl Name: SUPERPAVE 12.5MM
Fed Aid Nbr: ----
P/S Name: SHELLY/ALLIED #72
Inspector Name: GOODWIN
Rep Qty: 1563.550 TON
Consign To:
Sampled From: LOT-3
Mfg Control Nbr:

JMF: B100532 Lot/Day: 3 Rep Qty: 1563.550
Test Spec Year: 05 Non Standard (Y/N): N

Core Nbr	Joint CrInd	Station	Distance & Lane	Thickness In Inches	Weight In Air	Sat Surf Dry Wt	Weight In Water	Corr Bulk SP GR	% Dnsty
01		10+80	5.4	1.413	434.50	434.90	247.90	2.324	94.9
02	J	10+100	4 INCH	1.413	438.50	439.30	249.60	2.312	94.4
03		17+55	5.3	1.476	459.90	460.70	261.10	2.304	94.1
04	J	22+02	4 INCH	1.449	450.40	451.00	255.90	2.309	94.3
05		29+10	18.2	1.415	440.00	440.80	248.60	2.289	93.5
06		32+19	10.1	1.428	441.10	442.00	251.50	2.315	94.5
07		46+18	20.2	1.371	425.70	426.40	240.40	2.289	93.5
08		46+95	22.7	1.475	455.10	455.90	259.00	2.311	94.4
09		65+08	17.8	1.446	444.80	445.70	253.60	2.315	94.5
10	J	67+76	4 INCH	1.464	453.50	454.50	257.70	2.304	94.1

Test Water Temp C: 25
Avg Bulk SP GR: 2.307
Max Theo SP GR: 2.449
Corrected Avg Bulk SP GR: 2.307
Avg % Density: 94.2
Pay Factor: 1.04

Test Remarks:

PO Number/Reference:
Requisition Number:
Waiver Number:
Invitation Number:

Signature: _____
Date: _____

Source: Ohio Department of Transportation - Materials Testing

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DENSITY TEST
R E P O R T

Sample Id: 01020209 01 Proj/Item/Ref:
Sample Date: 08/31/10 PID Nbr: Cnty/Rt/Sect:
Matl Name: SUPERPAVE 12.5MM Fed Aid Nbr:
P/S Name: SHELLY/ALLIED #72 Inspector Name: GOODWIN
Rep Qty: TON Consign To:
Sampled From: LOT-3A Mfg Control Nbr:

JMF: B100532 Lot/Day: 3 Rep Qty:
Test Spec Year: 05 Non Standard (Y/N): N

Core Nbr	Joint CrInd	Station	Distance & Lane	Thickness In Inches	Weight Sat Surf In Air	Dry Wt	Weight In Water	Corr Bulk SP GR	% Dnsty
01		10+78.8	0.8S	1.406	538.60	540.10	300.80	2.251	91.9
		10+98.1	0.6S	1.428	547.40	549.70	306.60	2.252	92.0
03		17+55.8	0.8S	1.417	575.40	576.30	330.60	2.342	95.6
04	J	22+02.7	1.0S	1.478	584.40	586.60	333.00	2.304	94.1
05		29+11.1	0.5S	1.434	529.90	531.30	292.10	2.215	90.4
06		32+20	0.3S	1.460	582.70	584.00	331.70	2.310	94.3
07		46+19.7	0.1S	1.394	548.40	549.40	309.60	2.287	93.4
08		46+94.2	0.2S	1.444	550.00	552.00	306.10	2.237	91.3
09		65+09	0.1N	1.466	582.60	583.60	330.20	2.299	93.9
10	J	67+76.8	0.6N	1.448	575.10	576.80	328.00	2.311	94.4

Test Water Temp C: 25 Avg Bulk SP GR: 2.281
Max Theo SP GR: 2.449 Corrected Avg Bulk SP GR: 2.281
Avg % Density: 93.1 Pay Factor: 1.00

Test Remarks: RE-CORE OF LOT-3
TESTED BY GOODWIN AND HEBEBRAND
STATIONS AND LOCATIONS SUMMITED BY PSI

PO Number/Reference:
Requisition Number:
Waiver Number: Signature: _____
Invitation Number: Date: _____

Source: Ohio Department of Transportation - Materials Testing

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DENSITY TEST
R E P O R T

Sample Id: 01018863 01
Proj/Item/Ref: 10 0048 442E10001 14
Sample Date: 08/19/10 PID Nbr: 83353
Cnty/Rt/Sect: D12 VA 0 000000
Matl Name: SUPERPAVE 12.5MM
Fed Aid Nbr: ----
P/S Name: SHELLY/ALLIED #72
Inspector Name: GOODWIN
Rep Qty: 1415.240 TON
Consign To:
Sampled From: LOT-4
Mfg Control Nbr:

JMF: B100532 Lot/Day: 4 Rep Qty: 1415.240
Test Spec Year: 05 Non Standard (Y/N): N

Core Nbr	Joint CrInd	Station	Distance & Lane	Thickness In Inches	Weight In Air	Sat Surf Dry Wt	Weight In Water	Corr Bulk SP GR	% Dnsty
01	J	13+83	4 INCH	1.421	447.10	447.60	255.00	2.321	94.7
02		21+89	6.0	1.490	461.40	462.20	260.30	2.285	93.3
03		39+97	3.9	1.393	425.80	426.50	242.10	2.309	94.2
04	J	50+35	4 INCH	1.406	436.60	437.50	247.00	2.292	93.6
05		57+41	2.0	1.470	463.70	464.30	264.20	2.317	94.6
06		57+65	4.5	1.476	455.40	456.10	259.00	2.311	94.3
07		19+67	0.8	1.377	429.90	430.60	242.40	2.284	93.2
08		40+47	2.0	1.422	446.70	447.30	253.70	2.307	94.2
09	J	44+61	4 INCH	1.428	444.00	444.70	251.50	2.298	93.8
10		57+71	3.7	1.449	452.30	453.10	258.00	2.318	94.6

Test Water Temp C: 25
Avg Bulk SP GR: 2.304
Max Theo SP GR: 2.450
Corrected Avg Bulk SP GR: 2.304
Avg % Density: 94.0
Pay Factor: 1.04

Test Remarks:

PO Number/Reference:
Requisition Number:
Waiver Number:
Signature: _____
Date: _____

Source: Ohio Department of Transportation - Materials Testing

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
DENSITY TEST
R E P O R T

Sample Id: 01019466 01 Proj/Item/Ref:
Sample Date: 08/19/10 PID Nbr: Cnty/Rt/Sect:
Matl Name: SUPERPAVE 12.5MM Fed Aid Nbr:
P/S Name: SHELLY/ALLIED #72 Inspector Name: GOODWIN
Rep Qty: TON Consign To:
Sampled From: LOT-4A Mfg Control Nbr:

JMF: B100532 Lot/Day: 4 Rep Qty:
Test Spec Year: 05 Non Standard (Y/N): N

Core Nbr	Joint CrInd	Station	Distance & Lane	Thickness In Inches	Weight In Air	Sat Surf Dry Wt	Weight In Water	Corr Bulk SP GR	% Dnsty
01	J	13+82.2	1.3S	1.394	545.90	547.10	309.50	2.298	93.8
02		21+88.4	0.7N	1.440	558.10	559.80	314.20	2.272	92.7
03		39+97.7	0.1N	1.337	506.10	512.90	286.10	2.231	91.1
04	J	50+34.2	1.4S	1.426	560.70	562.50	314.60	2.262	92.3
05		57+40.3	0.1S	1.473	536.50	542.60	294.30	2.161	88.2
06		57+63.1	0.3S	1.507	588.40	591.20	332.10	2.271	92.7
07		19+66.8	1.0N	1.409	540.50	544.00	300.70	2.222	90.7
08		40+47.2	0.8N	1.436	554.90	556.00	308.50	2.242	91.5
09	J	44+61.1	1.8N	1.400	565.80	566.60	321.80	2.311	94.3
10		57+73.5	0.3N	1.497	566.40	572.60	313.70	2.188	89.3

Test Water Temp C: 25 Avg Bulk SP GR: 2.246
Max Theo SP GR: 2.450 Corrected Avg Bulk SP GR: 2.246
Avg % Density: 91.7 Pay Factor: 0.98

Test Remarks: RE-CORE OF LOT #4
TESTED BY GOODWIN AND HEBEBRAND
STATIONS AND LOCATIONS SUBMITTED BY PSI

PO Number/Reference:
Requisition Number:
Waiver Number: Signature: _____
Invitation Number: Date: _____

Source: Ohio Department of Transportation - Materials Testing

Extraction / Gradation Data Summary

Project No.:	48-10
Date:	March 22, 2011
JMF No.:	B100532
Day No.:	4

Original Core Results:

	Core 4-3	Core 4-5	Core 4-10	Core Average	JMF	199 Test 4-1	199 Test 4-2
Pre Reflux AC (%)	7.1	6.1	6.4	6.5	-	-	-
Post Reflux AC (%)	7.2	6.2	6.5	6.63	-	-	-
AC (%)	7.2	6.2	6.5	6.6	5.80	6.00	5.71
% Pass (1/2 in)	100	100	100	100.0	100	100	100
% Pass (3/8 in)	95	95	96	95.3	95	94	94
% Pass (#4)	57	59	59	58.3	54	52	57
% Pass (#8)	39	39	40	39.3	40	36	38
% Pass (#16)	29	29	29	29.0	29	24	26
% Pass (#30)	22	22	21	21.7	20	17	18
% Pass (#50)	13	13	13	13.0	11	9	11
% Pass (#100)	7	8	8	7.7	5	5	6
% Pass (#200)	5.1	5.5	5.5	5.4	2.7	2.7	3.5

Re-core Results:

	Core 4-3a	Core 4-5a	Core 4-10a	Core Average	JMF	TE-199 Test 4-1	TE-199 Test 4-2
Pre Reflux AC (%)	5.2	5.5	6.0	5.6	-	-	-
Post Reflux AC (%)	5.3	5.6	6.0	5.63	-	-	-
AC (%)	5.3	5.6	6.0	5.6	5.80	6.00	5.71
% Pass (1/2 in)	100	100	100	100.0	100	100	100
% Pass (3/8 in)	95	96	97	96.0	95	94	94
% Pass (#4)	47	53	52	50.7	54	52	57
% Pass (#8)	32	36	37	35.0	40	36	38
% Pass (#16)	24	26	26	25.3	29	24	26
% Pass (#30)	18	19	19	18.7	20	17	18
% Pass (#50)	12	12	12	12.0	11	9	11
% Pass (#100)	8	8	7	7.7	5	5	6
% Pass (#200)	5.0	5.3	4.8	5.0	2.7	2.7	3.5

Source: Ohio Department of Transportation - Office of Materials Management