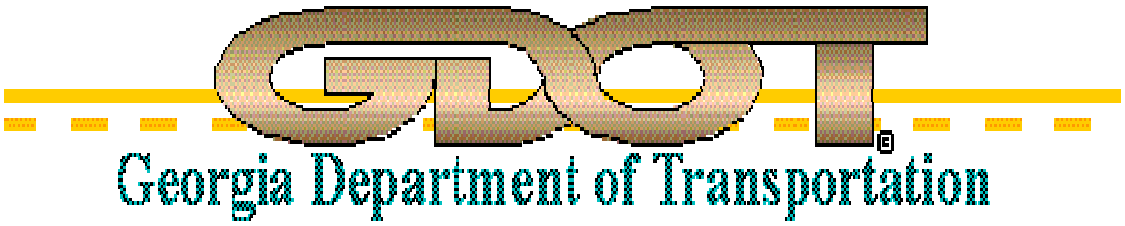
DOT TECHNICIANS & QCT LEVEL I

REFERENCE

AND

STUDY GUIDE



PREPARED

BY

OFFICE OF MATERIALS AND RESEARCH

TESTING MANAGEMENT

FEBRUARY 2005

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(Hyperlinked)

DOT/QCT CERTIFICATION PROCESS

The process for the Contractor's Quality Control Technician (QCT) to become certified through the department to perform Acceptance Test for Asphalt Concrete Mix is as follows:

LEVEL 1, QCT – The Level 1 QCT certification will be administered by the Office of Materials and Research. The observation of a candidates' proficiency in the performance of the required sampling and testing procedures and administration of a written examination will be done on a District-Wide Basis. The respective Testing Management Operations Supervisor (TMOS) will manage this level of certification; and, in addition will be available to provide training and assistance to the Level 1 QCT in attaining his or her certification. The following is a list of the districts and the respective TMOS and their telephone numbers.

District 1	Gainesville, GA	Bob Marrujo	770-535-5706
District 2	Tennille, GA	Wallace Reese	478-552-2287
District 3	Thomaston, GA	Mike Ellington	706-646-6614
District 4	Tifton, GA	Owen Stapleton	229-386-3073
District 5	Jesup, GA	Larry Johnson	912-427-5750
District 6	Cartersville, GA	Andy Gibson	770-387-3663
District 7	Forest Park, GA	Jay Hopson	404-363-7565

Level II, QCT - The Level II QCT must first satisfy the requirements for the Level 1 QCT; and, in addition, will be required to attend a seminar covering process control of asphalt plants and/or obtain a passing grade on a written examination. The contact persons for Level II QCT certification are:

Sheila Hines 404-363-7531

Tony Felix 404-363-7530

Questions in relation to the QCT certification process or re-certification of a technician should be directed to:

Peter Wu	404-363-7521	Sheila Hines	404-363-7531
Don Wishon	404-362-2545	Tony Felix	404-363-7530
Rick Douds	404-363-7621	Alfred Casteel	404-675-1557
Daniel Mann	404-363-7545		

DOT/QCT RE-CERTIFICATION PROCESS

The Process for DOT Technicians and Contractor QCT's to become certified through the Department to perform Acceptance Testing (Contractors) and Quality Assurance and Comparison (DOT) for Asphaltic Concrete Mix is as follows:

LEVEL I, QCT/DOT: The current Hot Mix Technician Qualification Program requires recertification of Level 1 and Level 2 Quality Control Technicians (QCT) and DOT Technicians every three years.

Starting **March 1, 2004**, written and performance testing requirements for re-certification will be waived if a QCT (Level 1 or 2) attends approved training between certification time periods. The requirements will be phased in over a three year period. A QCT will be eligible for re-certification without having to retake the written and/or performance exams after obtaining the credit hours of training, as noted below:

PHASED IN REQUIREMENTS

Date Quality Control Technician Certification Expires	**Credit Hours Required for Recertification**	**Level 1 QCT Required Classes**	**Level 2 QCT Required Classes**
Between March 1, 2004 and February 28, 2005	6	QCT Level 1 Joint Training Work Shop (6hrs)	QCT Level 2 Training Work Shop (6hrs)
Between March 1, 2005 and February 28, 2006	12	QCT Level 1 Joint Training Work Shop (6hrs) + 6 hrs additional training	QCT Level 2 Training Work Shop (6hrs) + 6 hrs Additional training
After March 1, 2006	18	QCT Level 1 Joint Training Work Shop (12 hrs) + 6 hrs Additional training	QCT Level 2 Training Work Shop (12 hrs) + 6 hrs Additional training

FUTURE RECERTIFICATION REQUIREMENTS (After March 1, 2006)

Quality Control Technician Certification	**Credit Hours Required for Recertification**	**Level 1QCT Required Classes**	**Level 2 QCT Required Classes Level 2**
Certification good fro 3 years	18 hrs require over the 3 year period	QCT Level 1 Joint Training Work Shop (12 hrs) + 6 hrs Additional training	QCT Level 2 Training Work Shop (12 hrs) + 6 hrs Additional training

Note: QCT's who have not worked in the capacity of a QCT for at least 6 months per year in the 3 year period will be required to retake the Level 1 or level 2 Exam, even if they have the required training.

The QCT Level 1 and Level 2 Training Workshops will be offered at a minimum on a yearly basis for 6 hours credit. Only 6 hours of Level 1 or Level 2 Training is eligible per year. Therefore, the complete 18 hours cannot be gathered in only one year. We encourage QCT's to attend the yearly workshops for their total 18 hours, but 6 hours of the training can be from a different source. The training eligible for the additional hours will be recognized as noted on the following page.

The table below list the additional training available and the credit hours assigned to each class or conference:

Training eligible for additional hours credit	Offered	Credit Hours
QCT Level 1 Joint Training Work Shop	Annually	6
Bituminous Construction Workshop	Annually	6
Annual Asphalt Quality Paving Conference	Annually	6
Field Data Collection System	Annually	4
Georgia Quality Initiative Conference	Annually	2

Starting **March 1, 2004**, Written and performance testing requirements for initial certification will be as noted in the table below; for initial certification, a written examination. Is given to ensure the applicants have a complete understanding of the materials and calculations as well as the ability to perform test procedures. A performance examination is also a part of the Level 14. FDCS training requirements have been added to the Level 1 QCT, FDCS training will be held in all Districts at least once per year and can be available more often if needed.

INITIALCERTIFICATION REQUIREMENTS

Quality Control Technician Certification	Written Exam Requirements	Performance Exam	Other Requirements
Level 1 QCT/DOT	4 hour test	Held at District Lab	4 hours of FDCS training must be taken within the first year of certification
Level 2 QCT/DOT	Level 2 QCT Training and 6 hours test	None	Must have a current QCT Level 1 Certification

DOT FIELD TECHNICIANS AND CONTRACTORS QCT'S PLANT EQUIPMENT LIST

PLANT EQUIPMENT (*)

WORK GLOVES *
SAFETY EQUIPMENT FOR IGNITION OVEN
FIRST AID KIT*
FIRE EXTINGUISHER*
LIGHTER, MATCHES*
CALCULATOR*
SPECIFICATIONS BOOK
QUICK GUIDE
SAMPLE TESTING INSPECTION MANUAL
TESTING & MGMT PROCEDURES
PROPOSAL OR CONTRACT*
CLIPBOARD*
STAPLER*
FILE FOLDERS*
ACCORDIAN FOLDERS
STROBE LIGHTS
TWO WAY RADIO
MARKING CRAYON
MARKING PAINT
NUCLEAR GAUGE
APPROVED TRANSPORT CASE
BILL OF LADING
STANDARD BLOCK
GAUGE BOOK
GAUGE CHARGER
SAMPLE BAGS (Cloth & Plastic)*
SOIL FERTILITY BAGS
SAMPLE CARD BAGS
HARD HAT
SAFETY VEST SAFETY FLAGS
FLASH LIGHT
RAIN SUIT
RUBBER BOOTS
HEAT GLOVES *
LONG STRAIGHT EDGE
1/30 CF MOLD
MOLD BLOCK
MOLD RAMMER
WIRE BRUSH*
SPATULA *
SPOONS*
CHISEL
THREE POUND HAMMER
TWELVE INCH RING
PIE PANS
MIXING BOWLS*
GAS STOVE'GAS BOTTLE*
GAS REGULATOR*
6000 GRAM SCALES*
SCALE LEVELING DEVICE*
PAINT BRUSH 3 INCH*
SQUARE SHOVEL
ROUND SHOVEL
POSTHOLE DIGGERS
PICK
6 FOOT FOLDING RULER
PIN
PLATE
T-HANDLE
LAPTOP / DESK TOP COMPUTER*
POWER CONVERTER
TOKENS*
THERMOMETER*
IGNITION OR CONVECTION OVENS*
HOT MELT BOXES*
QUARTERING TOOL*
12" TO 16" DIAMETER ROUND PAN*

Laboratory SOP 15
Revised: May 10, 1996
Reissued: December 6, 1996
Revised: February 21, 1997
Revised: June 28, 1999
Revised: July 1, 2003
Revised: November 29, 2004

Georgia Department of Transportation
Office of Materials and Research

Standard Operating Procedure (SOP) 15
Certified Public Weighers

I. General

In order to assure accurate weights of materials supplied for Department work, a program is utilized whereby Certified Public Weighers will oversee the weighing of highway construction materials when they are weighed prior to delivery. While the Specifications will require essentially all such materials to be weighed by a Certified Public Weigher, some provisions will be made so that State personnel can supervise the weighing of small quantities of materials when it is unreasonable to require a Certified Public Weigher. Further, it is the intent of this program to attain uniform compliance with the State Law governing load limits of trucks. Refer to Subsection 107.14 of the Specifications and the attached Bridge Formula Table.

The basic principles of the certification program will be as follows:

A. Certified Public Weigher

Certified Public Weighers will be provided by the materials producers or contractors to oversee the weighing of materials used in highway construction.

B. Rules and Regulations

Rules and Regulations for Georgia Certified Public Weighers are provided by Georgia Law under Official Code Georgia Annotated Section 10-2-5 of the Georgia Weights and Measures Act. This is administered by the Georgia Department of Agriculture.

Information about becoming a Certified Public Weigher in Georgia may be obtained from:

The Fuel and Measures Division
Georgia Department of Agriculture
Capitol Square
Atlanta, Georgia 30334
Telephone No. (404) 656-3704

C. Certified or Licensed Weighers from Other States

Requirements for certified or licensed weighers from other states shall be in accordance with applicable laws and regulations in those states. Documentation of weight tickets for materials shipped from other states shall be in accordance with Section IV of this Standard Operating Procedure.

Application to become a Certified or Licensed Weigher in Alabama, North Carolina, South Carolina, or Tennessee shall be made to:

Alabama Department of Agriculture
Division of Weights and Measures
P.O. Box 3336
Montgomery, Alabama 36109-0336
Attention: Sharon Boyd
Telephone: (334) 240-7171

North Carolina Department of Agriculture
Standards Division
P.O. Box 27647
Raleigh, North Carolina 27611
Telephone: (919) 733-3313

South Carolina Department of Agriculture
P.O. Box 11280
Columbia, South Carolina 29211
Telephone: (803) 734-2210

Tennessee Department of Agriculture
Office of Weights and Measures
P.O. Box 40627
Melrose Station
Nashville, Tennessee 37204
Telephone: (615) 360-0159

When materials are paid for based on weight and originate from a state which has no certified weigher program, such as Florida, the materials shall be weighed on approved scales located in the State of Georgia by a Certified Public Weigher.

D. License and Seal Required

Each Certified or Licensed Weigher must have a license and seal in accordance with applicable laws and regulations of the state in which they are located.

E. Certified Scales

All materials must be weighed on scales which have been approved for accuracy by the Fuel and Measures Division of the Georgia Department of Agriculture for materials weighed in Georgia and by the appropriate officials as required by laws and regulations in other states.

F. Tare Weights

It will be the responsibility of the producer or supplier to establish tare weights of all haul vehicles at random times during the day. A copy of the list of these weights will be provided to the Engineer when requested. Suppliers of materials weighed by approved net weight devices shall record the stored tare weights for the haul vehicles on a tare weight sheet with the date that tare weights were obtained. Also, the supplier shall include a comment that the material is being weighed on an approved net weight device. Suppliers of materials that obtain tare weights of individual loads will record the tare weight of the first load for each haul vehicle on a tare weight sheet. In this case, a comment that each load is to be individually tared shall be included on the tare weight list.

G. Certified Weights

The weighing of each load shall be observed by the Certified Public Weighers. The certified weights shall represent materials actually delivered to a project and used in the work. A material which is stockpiled must be weighed by a Certified Public Weigher when it is hauled from the stockpile and placed in the work. Unless notified in writing by the Office of Materials and Research, the acceptable procedure for documenting the scale ticket on State projects shall be in accordance with Section IV of this Standard Operating Procedure.

H. Random Reweighing of Loads

At random times a Department of Transportation representative shall direct one or more loaded and/or unloaded vehicles to be reweighed. This requirement will be performed by Testing Management personnel at asphalt plants, and by Pit and Quarry Control personnel at aggregate sources or Contract Administration personnel at either source. The vehicle may be reweighed either on the scales on which the original weight was made or on another set of approved scales.

I. Posting of Certified Public Weigher's Certificate

The Certified Public Weigher's certificate shall be posted near the weigh indicator in full view.

J. Approved List of Certified Public Weighers

Approved lists of Certified Public Weighers will be maintained by the Fuel and Measures Division of the Department of Agriculture.

K. Exceptions

The requirements of Paragraph H above concerning weight checks of trucks is not applicable to the items of Portland cement, bituminous materials, and fertilizer mixed grade when these items are paid for separately by weight.

II. Invalid Weights

In the event a significant difference is discovered in weights recorded by the Certified Public Weigher and the checks made by the Department personnel, a full investigation will be made to determine if any significant shortages of material have occurred. If it is found that the Certified Public Weigher recorded an invalid weight, that person will not be allowed to certify further weights pending an investigation. In addition, the appropriate officials who administer the Certified Public Weigher Program in the state where the violation occurred will be notified so they can take any action they deem necessary.

III. Surveillance of Truck Weights for Legality

The Certified Public Weigher shall maintain sufficient checks on all vehicle weights to assure that trucks exceeding the gross weight limits are not dispatched; however, the Certified Public Weigher will not be required to assure compliance with axle and tandem limits. Issuance of a weight ticket by a Certified Public Weigher will not relieve the owner or operator of a truck from the responsibility of knowing and complying with maximum axle, maximum tandem, maximum gross, and applicable bridge formula limits.

Trucks traveling on the Interstate system will be limited to the maximum loads shown in the attached Bridge Formula Table. The Certified Public Weigher will be responsible for ascertaining from the driver whether a truck will be operating on the Interstate System, as well as its length from front to rear axle, so the maximum load can be determined from the Bridge Formula Table.

IV. Weight Ticket Requirements

The Department of Transportation will accept only the original copy of a weight ticket as the "copy of record" for payment except when a producer can demonstrate a compelling reason to retain the original copy, arrangements may be made to designate a certain copy as the "copy of record" for the producer.

The Office of Materials and Research will maintain a list of exceptions to the requirement for the original copy of the weight ticket. Other exceptions, if necessary, will be approved through the Office of Contract Administration.

One copy of each weight ticket shall be retained by the Engineer as the "copy of record." The Certified Public Weigher will sign his or her official registered signature and place his or her seal number on each "copy of record" ticket.

If another Certified Public Weigher weighs and processes tickets during the day, he or she must use his or her official signature and seal number on each ticket.

The Certified Public Weigher must be the person actually operating the scale and weight recording equipment. Under no circumstances may a Certified Public Weigher place his or her seal and signature on a ticket for which he or she has not actually operated the scale and weight recording equipment.

Each ticket must be legibly marked by printer with the following:

1. Gross, Tare, and Net Weight
2. Date
3. Time of batch or loading
4. Preprinted sequential ticket number (for Auto Ticketing Systems, computer generated sequential ticket number may be accepted when approved by the Office of Materials and Research)

Each ticket must also be legibly marked, either by imprint, printer, or by hand, with all of the following information:

1. Load number
2. Truck number
3. Certified Public Weigher seal number
4. Certified Public Weigher signature (by hand or electronically affixed)
5. Project number
6. Description of material including mix type, mix design level and inclusion of hydrated lime/anti-stripping additives and asphalt grade. For example: 12.5 mm SP (C) W/HL & PG 76-22. This designation indicates that a 12.5 mm Superpave level C mix with hydrated lime and polymer modified asphalt PG 76-22 is being used.

Payment will not be made for tickets lacking the information specified above. With response to the requirement for preprinted sequential ticket numbers, it is not a requirement that every ticket be in strict, unbroken sequence; however, tickets must be in reasonable sequence. The Department reserves the right not to accept tickets grossly out of sequence. Strikeovers by plant or contractor personnel of the above required information are generally not acceptable; however, isolated instances of Strikeovers initialed by the person making the correction, may be accepted at the Department's discretion.

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Georgene M. Geary, P.E.
State Materials and Research Engineer

_____

Glenn W. Durrence, P.E.
Director of Construction

Bridge Formula Table

Permissible gross loads for vehicles in regular operation
Based on weight formula W = 500(LN/N-1 + 12N + 36)

Where:
W = the maximum weight in pounds that can be carried on a group of two or more axles to the nearest 500 pounds
L = the distance in feet between the outer axles of any two or more consecutive axles
N = the number of axles being considered

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum load in pounds carried on any group of 2 or more consecutive axles							
	2 axles	3 axles	4 axles	5 axles	6 axles	7 axles	8 axles	9 axles
4	34,000	-	-	-	-	-	-	-
5	34,000	-	-	-	-	-	-	-
6	34,000	-	-	-	-	-	-	-
7	34,000	-	-	-	-	-	-	-
8 and less	34,000	34,000	-	-	-	-	-	-
More than 8	38,000	42,000	-	-	-	-	-	-
9	39,000	42,500	-	-	-	-	-	-
10	40,000	43,500	-	-	-	-	-	-
11	-	44,000	-	-	-	-	-	-
12	-	45,000	50,000	-	-	-	-	-
13	-	45,500	50,500	-	-	-	-	-
14	-	46,500	51,500	-	-	-	-	-
15	-	47000	52,000	-	-	-	-	-
16	-	48,000	52,500	58,000	-	-	-	-
17	-	48,500	53,500	58,000	-	-	-	-
18	-	49,500	54,000	59,000	-	-	-	-
19	-	50,000	54,500	60,000	-	-	-	-
20	-	51,000	55,500	60,500	66,000	-	-	-
21	-	51,500	56,000	61,000	66,500	-	-	-

22	52,500	56,500	61,500	67,000				
23	53,000	57,500	62,500	68,000				
24	54,000	58,000	63,000	68,500	74,000			
25	54,500	58,500	63,500	69,000	74,500			
26	55,500	59,500	64,000	69,500	75,000			
27	56,000	60,000	65,000	70,000	75,500			
28	57,000	60,500	65,500	71,000	76,500	82,000		
29	57,500	61,500	66,000	71,500	77,000	82,500		
30	58,500	62,000	66,500	72,000	77,500	83,000		
31	59,000	62,500	67,500	72,500	78,000	83,500		
32	60,000	63,500	68,000	73,000	78,500	84,500	90,000	
33		64,000	68,500	74,000	79,000	85,000	90,500	
34		64,500	69,000	74,500	80,000	85,500	91,000	
35		65,500	70,000	75,000	80,500	86,000	91,500	
36		66,000	70,500	75,500	81,000	86,500	92,000	
37		66,500	71,000	76,000	81,500	87,000	93,000	
38		67,500	71,500	77,000	82,000	87,500	93,500	
39		68,000	72,500	77,500	82,500	88,500	94,000	
40		68,500	73,000	78,000	83,500	89,000	94,500	
41		69,500	73,500	78,500	84,000	89,500	95,000	
42		70,000	74,000	79,000	84,500	90,000	95,500	
43		70,500	75,000	80,000	85,000	90,500	96,000	
44		71,500	75,500	80,500	85,500	91,000	96,500	
45		72,000	76,000	81,000	86,000	91,500	97,500	
46		72,500	76,500	81,500	87,000	92,500	98,000	

47----------	----------	----------	73,500	77,500	82,000	87,500	93,000	98,500
48----------	----------	----------	74,000	78,000	83,000	88,000	93,500	99,000
49----------	----------	----------	74,500	78,500	83,500	88,500	94,000	99,500
50----------	----------	----------	75,500	79,000	84,000	89,000	94,500	100,000
51----------	----------	----------	76,000	80,000	84,500	89,500	95,000	100,500
52----------	----------	----------	76,500	80,500	85,000	90,500	95,500	101,000
53----------	----------	----------	77,500	81,000	86,000	91,000	96,500	102,000
54----------	----------	----------	78,000	81,500	86,500	91,500	97,000	102,500
55----------	----------	----------	78,500	82,500	87,000	92,000	97,500	103,000
56----------	----------	Gross }	79,500	83,000	87,500	92,500	98,000	103,500
57----------	----------	Weight Limit}	80,000	83,500	88,000	93,000	98,500	104,000
58----------	----------	----------	----------	84,000	89,000	94,000	99,000	104,500
59----------	----------	----------	----------	85,000	89,500	94,500	99,500	105,000
60----------	----------	----------	----------	85,500	90,000	95,000	100,500	105,500

Georgia Department of Transportation
Office of Materials and Research

Standard Operating Procedure (SOP) 27
Quality Assurance for Asphaltic Concrete Plants in Georgia

I. General

The Office of Materials and Research and the Districts are responsible for verifying that Hot Mix Asphaltic Concrete produced for the Department's use meets the applicable Specifications. Asphaltic concrete plants will be inspected and each plant that meets specified minimum requirements will be shown in the Department's Qualified Products Manual, List of Approved Hot Mix Asphaltic Concrete Plants, (QPL 45).

II. Prerequisite for Plant Approval

A. Inspection of Equipment

The plant owner or manager shall schedule an inspection of the plant facilities with the Office of Materials and Research. All equipment for the production and the facilities and equipment for testing the materials shall meet the minimum requirements set forth in Subsection 400.3 and Subsection 400.4 of the Specifications and shall be approved by the Engineer. The equipment shall be maintained in a satisfactory operating condition and be capable of its intended function at all times during production.

B. Quality Control Program

Each plant on the QPL 45 shall have an approved quality control program and have a designated person to administer the program as set forth in the Specifications. This program shall include the testing and control of materials used and the final product produced at the plant. This shall be done in such a manner as to produce a uniform product, which meets Specification requirements.

C. Certified Public Weighers

At each plant producing asphaltic concrete for projects of the Department, at least one employee shall be a Certified Public Weigher. All asphaltic concrete mix to be used in projects of the Department shall be weighed in accordance with Laboratory SOP 15.

D. Statement of Certification

Owners of plants with facilities that are found to meet the Department's requirements shall provide the State Materials and Research Engineer with a statement that certifies that all asphaltic concrete supplied for Department work shall meet a design mix formula approved by the Office of Materials and Research and that all materials used in the production of the asphaltic concrete for the Department work are from approved sources. This statement should be signed by a responsible officer of the company who has authority to bind the company and shall be notarized.

III. List of Approved Hot Mix Asphaltic Concrete Plants

The Office of Materials and Research will publish a list of approved Hot Mix Asphaltic Concrete Plants. The list will be published periodically, and as plants are added or taken from the list, notice will be given by letter. The list will designate the name of the company, contractor number, location of the plant, type of plant, plant code and plant restrictions where applicable.

A. New Sources

Any producer of hot mix asphaltic concrete desiring a plant be added to the list of approved plants should send an application in writing to State Materials and Research Engineer. The request should include the following items:

1. The Plant location and telephone number, plant manger, superintendent, type and size of capacity of plant.

2. A list of certified public weighers showing their signatures and seal imprints.

Upon receipt of the Producer's application, the Office of Materials and Research will schedule an inspection of the plant. At the time of the inspection, the facilities of the plant and the quality control facilities will be reviewed.

B. Restrictions

5. At times due to \ the occurrence of unacceptable segregation, restrictions are placed on asphalt plants approved to produce mix for state funded construction projects. Once an asphalt plant is restricted, its restriction code and explanation will be listed in the QPL 45, "Georgia's List of Approved Hot Mix Asphaltic Concrete Producers". In order to assure that all asphalt plants are evaluated in a consistent and uniform manner, the following restriction evaluation procedure is provided.
6. In accordance with Subsection 400.3.06.E of the Specifications, whenever unquestionable unacceptable segregation is observed, the work shall automatically be suspended until positive corrective action is taken by the contractor. At this time 6 in (150 mm) cores will be obtained and evaluated for compliance with tolerances established in Section 828. Once an approved written plan of corrective measures or actions is submitted, the work will be allowed to continue. When work resumes, the Contractor will be allowed to place a test section not to exceed 500 tons (454 Mg) of the affected mixture. This mixture will be evaluated using core results. However, if it is apparent that the corrective measures were not effective, the work again will be suspended until a revised written plan of corrective measure or action is submitted for approval. In addition, the Office of Materials and Research will notify the hot mix producer that the asphalt plant is being evaluated for possible restrictions on the QPL 45.
7. Once the revised plan of correction is approved, the work will be allowed to resume with the placement of a test section not to exceed 500 tons (454 Mg). Should these corrections prove ineffective, the plant will be restricted on the QPL 45.
8. In accordance with Subsection 400.3.06.E, whenever unacceptable segregation is suspected, the Contractor may elect to continue work at his own risk until six-inch cores are obtained and evaluated for compliance with Section 828. If it is determined that the mixture is outside tolerances established in Section 828, the work will immediately be suspended for corrective action as outlined previously in the procedure established in the preceding steps 2 and 3. Failure to eliminate the segregation will be grounds for the asphalt plant's restriction in the QPL 45, "Georgia's List of Approved Hot Mix Asphaltic Concrete Plants".
9. Once an asphalt plant is restricted, a request for reevaluation may be submitted provided that extensive related modifications to the asphalt plant or plant operation is verified. If this request is approved, the reevaluation shall consist of several test sections on the placement of the restricted mixture(s) on multiple projects. This placement will be closely monitored and evaluated by the District Technical Services Engineer (TSE). If these evaluations determine that the restricted mixes are currently being placed in compliance with Sections 400 and 828, then the asphalt plant's restriction code will be revised to reflect a restriction code 13, which states that "although this plant has a history of segregation, the use of a Material Transfer Vehicle (MTV) may be waived due to plant modifications that contributed to non-segregated mixes, on a project to project basis with approval from the Office of Materials and Research." This revised restriction does not override the necessity of a MTV as required in Subsection 400.3.02.C of the Specifications. If it is observed at any time that the in-place mixture is not in compliance with Sections 400 and 828, then the asphalt plant's restriction will be revised to the original plant restriction and strictly enforced.

C. Removal from the Approved List

Failure to adhere to Specification requirements as set forth in Subsection 400.3.06 as related to quality control, Quality Control Manager and Quality Control Technician requirements may subject the producer to immediately be placed in a "probationary period." If this happens, the Producer may be notified that he is in a "probationary period." At this time he has ten working days (10) to respond in writing to the State Materials and Research Engineer, and explain why the Specification requirements were not met and what steps will be taken to prevent a similar occurrence in the future. Any future occurrence of failure to adhere to Subsection 400.3.06 shall subject the Producer to immediate removal from QPL 45, Georgia's "List of Approved Hot Mix Asphaltic Concrete Plants." The Producer may be subject to removal from the Qualified Products List (QPL 45) for any first offense deemed serious enough by the State Materials and Research Engineer.

Should an asphalt plant be identified as having recurring procedure problems, a 10-day "special control" will apply. During this 10- ay period, a Georgia Department of Transportation Representative will be present at the plant fulltime and a fee will be charged to the producer.

The Department reserves the right to remove any plant from the Approved list at any time confidence is lost in the Producer's ability or intention to produce material of uniform characteristics complying with the Specifications.

An asphaltic concrete plant rating system has been developed based on the degree of quality control at each plant. From the extraction and gradation information, each plant will be rated on the following scale:

Rating	Quality Control Level
90 – 100	Good
80 - 89	Fair
70 - 79	Marginal
Below 70	Unacceptable

The asphalt plant rating system for quality control at the plants was developed using the Mixture Control Tolerances established in Section 828 of Georgia's Specifications. This system is designed to provide Industry and the Department with a management tool for measuring the success of the Producer Certification Program and to promote consistency of products. The extraction and gradation test data is stored in the computer. The overall Quality Control Level Rating assigned to each plant will be based on the summary of all the test data from that particular plant and published semi-annually. The end of year rating will be based on Quality Control Level Ratings throughout the calendar year for plants with at least 10,000 tons (9070 Mg) produced.

Actual participation in the Quality Control Level Rating will be based on monthly evaluations. The Producers Quality Control Level Rating will be determined from the extraction and gradation data at the plant. An "Unacceptable" rating will immediately place the Producer in an "improvement period." If this happens, the Producer will be notified that he is in an improvement period and that he has fifteen (15) production days in which to upgrade his quality control procedures. During this period, the Producer will report all Quality Acceptance samples to the respective Testing Management Supervisor. At the end of the improvement period, the Producer's Quality Control will be re-evaluated using these tests results and he will either be removed from the approved list or reinstated to normal status.

An acceptable Quality Control Level Rating does not preclude the requirement for the mixture produced on a daily basis to meet the Specifications. Acceptance of the work is based on a Lot to Lot basis in accordance with Section 106 and the requirements specified in the Acceptance Plans in Section 400 of the Specifications.

D. Reinstatement to the Approved List

Once removed from the approved list, a Producer may gain reinstatement in the following manner:

1. The Producer shall make a written request to the State Materials and Research Engineer asking to be reinstated to the approved list. The request should address the causes, which affected removal from the approved list. The Producer should state measures taken to upgrade his quality control in the production of the material. A detailed quality control program must be submitted listing the type and frequency of test proposed to control the plant and the name of the certified testing technician responsible for the program.
2. If the submitted quality control program is approved, the Producer will be placed on "Special Control". He will be carried on special control for a period of ten (10) production days. During this period, the Producer will report his quality control results to the State Bituminous Construction Engineer's Office on a daily basis. In addition, a Georgia Department of Transportation Representative will be at the plant fulltime and a fee will be charged to the producer.
3. If the Producer's quality control program is adequate and the State Materials a Research Engineer finds that the Producer meets the requirements for approved plants; the Producer will be reinstated to the approved list.

IV. INSPECTION

Random visits will be made to all approved plants by inspectors from the Office of Materials and Research. These visits will be made to insure that the plant facilities are maintained in satisfactory operating condition. Annual visits will be made for the purpose of updating the plant for compliance as set forth in Section II of this SOP.

A. Materials Invoices

In accordance with Section 400.1.03, formal written invoices for all hydrated lime and Asphalt Cement that has been modified with either polymer or anti-strip additive will be copied and filed at each asphalt plant for a minimum time period of 3 months (90 days). These invoices are to be furnished to the Department upon request.

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A. General Description

Use this procedure to sample bituminous materials.

Bituminous materials manufacturers that supply material to highway projects are required to comply with the Standard Operating Procedure for Monitoring the Quality of Bituminous Material (SOP 4).

The Office of Materials and Research maintains a list of approved sources of bituminous materials, stating the full name of each organization, the type and grade of their approved products, and the location of their refineries or terminals.

1. Bituminous Materials from Approved Sources

   a. Ensure that the material is not contaminated.
   b. Approve use of the material.

NOTE: If you see questionable material, regardless of its source, test it first. Do not use the material until you receive satisfactory test results from the Office of Materials and Research.

2. Bituminous Materials from Other Sources

   You may sample bituminous materials from these areas:

   - The sampling valve on tankers, distributors, or storage tanks
   - The tank or tanker (in absence of a sampling valve)

NOTE: Report missing sampling valves to the Bituminous Control Engineer.

   a. Observe these and other safety precautions when handling bituminous materials:
      1) Wear gloves and a long-sleeve shirt or other protective clothing while sampling the sealing containers.
      2) Do not smoke while sampling.
      3) Do not hold the container in your hand while sampling and sealing. Use tongs or some other device to hold the container.
      4) Stand above and away from the material being sampled and on the windward side. Never stand in front of the sampling valve.
      5) Take the sample slowly to prevent splashing.
      6) Let at least a gallon (four liters) of material run from the valve. The first gallon (four liters) helps purge the sample line.

NOTE: Beware of a sudden surge from a partially clogged valve.

      7) Let the flow stabilize before filling the container. This gives a better representation of the material in the storage tank.
      8) Take two samples each time you sample.
         a) Submit one sample for testing.
         b) Properly identify and store the second sample until test results come back from the first sample.
         c) If the first sample fails, send the second sample as a retained sample to the Office of Materials and Research.
   b. Carefully obtain an uncontaminated sample. Follow these precautions during sampling:
      1) Ensure sample containers are clean and dry.
         a) Do not wash or rinse the containers before use.
         b) Ensure the top and container fit tightly together.
         c) Do not place emulsion samples into metal containers.
      2) Ensure no contamination enters the sample from different types and grades of bituminous material or cleaning agents.
         a) Never wipe the outside of the sample container with a solvent-saturated cloth.

NOTE: Only a drop or two of any kind of fuel will contaminate the asphalt.

3) Examine the hauler's Bill of Lading to determine the type of material hauled on the previous load. Sample with caution when the previous load was of different material.

4) Examine the Bill or Bills of Lading to determine the supplier's name and the grade of materials sampled.

a) If the last few shipments were different suppliers (or grades), note the date, supplier name, and grade of the most recent three or four shipments on the sample card.

5) Always sample the material or observe it being sampled.

6) Take suspect samples to the Laboratory as soon as possible.

7) Notify the appropriate Engineer of the results.

c. To take a sample from the sampling valve:

1) Circulate the bituminous material to obtain thorough mixing.
2) Open the valve until a steady small flow stabilizes. Allow about one gallon (four liters) to flow through the valve before obtaining the sample.
3) Use a small funnel to direct the flow into the container and fill it.
4) Tightly seal the sample.
5) Wipe off spilled material from the outside of the container with a clean, dry cloth.

d. To take a sample from a storage tank or tanker:

1) Vigorously stir the material with a clean paddle or stick to disperse any contaminants on the surface.
2) Attach a clean can, bucket, or other suitable container to a stick, plank, or other type of handle.
3) Rapidly submerge the container into the bituminous material until the container is full.
4) Immediately transfer the material to the sample container and seal it.

e. Identify each control sample on Form 170.

f. Submit the sample to the Office of Materials and Research designated by the Bituminous Control Section.

g. Report test results on the following forms:

- Form 504 M—Performance Graded Asphalt binder
- Form 503 M—Cutback Asphalt
- Form 325 M—Emulsified Asphalt

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A. General Description

Use this procedure to sample hot mix asphalt concrete mixtures from full trucks, roadways, or, occasionally, partially loaded trucks. You may also use this sampling procedure for sand asphalt base or surface courses.

NOTE: When sampling hot mix asphalt concrete mixtures, ensure that the samples accurately represent the materials being produced.

3. To take sample from trucks:
   c. Prepare a sampling area in the truck by shoveling off the cone of the material until you create a flat area at least 60 percent of the width of the truck and at least 6 in (150 mm) deep.
      1) Take samples with a square-nosed shovel.
      2) If the truck contains more than one cone, take samples from different cones. For example, take the first sample from the first cone, the second sample from the second cone, etc.
   d. Take a sample from the full width of the flattened area so that the sample will weigh 25 to 30 lbs (10 to 15 kg) (about 3 or 4 shovels-full of material). Take the sample from a uniform depth.
   e. Place all the material into the sample bag.
   f. If you need to take second or third samples, use the same procedures to take them from the areas immediately adjacent to the original sampling area.
4. To take samples from the roadway:
   g. Divide the roadway spreader width into 3 sections.
   h. Wait until approximately 1/2 of the load has been dumped from the truck.
   i. Use a square-nosed shovel to take a 25 to 30 lb (10 to 15 kg) sample from each section.
      1) Remove material for the total depth of the pavement course.
      2) Place all the material in the sample bag.
5. For either sampling area, mix the composite sample and quarter it with a quartering device (WQ-1).
   j. Remove opposite quarters.
   k. Quarter again to split the remaining undisturbed quarters to the required sample size .
6. If you cut a core on in-place material for your sample of asphaltic concrete mixtures, ensure the cores meet the size requirements of GDT 83 and GDT 38.
7. Take all samples of Asphaltic Concrete “OGFC” mixtures from trucks at the plant as soon after loading as possible, using the following procedure:
   l. Take samples with a preheated scoop (place the scoop in the hot mixture to preheat).
   m. Prepare a sampling area in the truck by shoveling off the cone of material until you create a flat area at least 60 percent of the width of the truck and at least 6 in (150 mm) deep.
   n. Scoop a sample by starting at one side of the prepared area and moving horizontally across the area until you get a sample between 2 and 4 lbs (900 and 1800 g).

NOTE: Do not quarter this sample.

   o. Place the Asphaltic Concrete “OGFC” sample in a can (Warehouse Numbers OC-1 or OC-1-1) rather than a sample bag.
   p. Send the sample to the Office of Materials and Research for analysis.

GSP 21

A. General Description

This procedure governs the sampling procedures for contractor acceptance testing of hot mix asphaltic concrete.

The sampling testing, and inspection duties described herein are to be performed by a Georgia Department of Transportation Certified Contractor QCT.

1. Sampling
   a. Randomly select samples from within Sublots of 500 tons (454 Mg) per mix type. Use the same procedure in situations where more than one mix is produced or mix is produced for different projects within the same working day.
   b. An Acceptance Lot consists of the amount of each type of asphaltic concrete mixture produced and placed in one construction day or at least 500 tons (454 Mg). If less than 500 tons (454 Mg) is produced per mixture type, it may be incorporated into the next day's production for Lot determination. In this case, use the same mix-sampling schedule as if the mix had been produced all in one operation.
   c. Sublots may be increased to 750 tons (675 Mg) if approved by both the District Testing Management Operations Supervisor and the Area Bituminous Technical Services Engineer. To be considered for use of expanded sublots, the contractor must have produced at least 2000 tons (1800 Mg) per day for three consecutive working days. Approval for increased sublot sizes may be rescinded upon agreement by both the District Testing Management Operations Supervisor and the Area Bituminous Technical Services Engineer any time the contractor fails to produce at least 2000 tons (1800 Mg) for any of the three days within a consecutive three day work period.
   d. Sample the mix from the truck or roadway and quarter it according to GSP 15. The appropriate sample size required is prescribed in GDT 83 or GDT 125. When roadway cores are to be obtained or required for mix acceptance samples, take these cores according to GDT 73. The coring operation will be supervised by the respective District Testing Management Operations Supervisor (TMOS) or the Technical Service Engineer (TSE).
   e. If the size of the sample obtained is too small, the opposite quarter should be checked for size. If the opposite quarter is also too small, the next available truck should be sampled, with care taken to obtain a sample that meets the minimum size required. During the quartering process of Hot Mix samples, the opposite quarters from the acceptance test specimen shall be labeled by the QCT and retained for Department comparison testing. In addition, label the remaining material removed from the total sample and retain it for possible Referee testing by the Department.

References:

GSP 15 (Sampling Procedures For Asphalt Concrete Mixtures)

GDT 73 (Method of Random Selection And Acceptance

Testing of Asphaltic Concrete).

DOT 163 (Asphaltic Concrete Plant Sampling Report).

Sampling Report and Random Number Selection Examples.

Subsection 400.3.06

Note: All asphaltic concrete hot mix samples of SMA/PEM/OGFC obtained by QCT's for Comparison and Referee testing shall be placed in a hot melt box (hot or cooled), or samples may be placed in a cloth or plastic bag after material has cooled. These sampling methods will help to eliminate the loss of liquid Asphalt Cement. (Do not use metal cans or place hot asphaltic concrete in cloth or plastic bags when sampling SMA/PEM/OGFC mixes.)

Note: It will be the responsibility of the QCT Manager or QCT Technician to inform the Testing Management Operations Supervisor and Technical Service Engineer 24 hours prior to starting production if plant operations have been discontinued for more than seven calendar days.

2. Mixture Temperature
   a. Take the mix temperature when extractions are obtained and also at other times as necessary to maintain uniform and specification temperatures. If problems exist, take one per load until problem has been corrected. Take the temperature on OGFC and PEM mixes at a frequency of at least one per hour.
   b. The QCT shall take the temperature of the mixture and record the results on the load ticket each time a sample is taken. The respective load tickets shall also be signed by the QCT for each load from which a sample or temperature check is taken.
   c. Perform asphalt thermometer calibration at least once per week or at increased intervals as necessary to assure accuracy. Document calibrations in the plant diary.

      Temperature Tolerance = ± 20 °F (± 11 °C) of the Job Mix Formula (JMF).

      Reference: Subsection 400.2.01.A

3. Stripping Tests

   Stripping tests will only be required on Open Graded Friction Course (OGFC) and Porous European Mix (PEM) for every sample obtained.

   Reference: GDT 56 (Test Method For Heat Stable Anti-Strip Additive)

4. Extractions
   a. Determine the liquid asphalt content either by the extraction or ignition method. Sieve the remaining aggregate to determine gradation.
   b. Properly label the extracted aggregate, ensure that it is stored in an approved container and secured in a protected environment. If samples are not procured by the Department within three working days, they may be discarded.
   c. Perform these procedures at the prescribed frequency in accordance with GDT 83 or GDT 125, GDT 38 and Subsection 400.3.06 of the Contract. Complete acceptance test results on the same day samples are obtained and entered on the extraction worksheet and the DOT Form 159-5. Enter results for projects not requiring compactions into the Plant Computer and up-load daily to the DOT data collection system. Enter results for projects that require compaction tests into the plant computer and up-load the day the compaction test results are received. If compaction test results are not received within 2 days, notify the Testing Management Operations Supervisor. In the event the DOT data collection system is unavailable or error messages are given, FAX a printout of the results to the Testing Management Operations Supervisor within one working day.

   Notes: Any test out of Section 828 must be reported to TMOS and Bituminous TSE immediately and documented.

   References: GDT 38 (Method of Test for Mechanical Analysis of Extracted Aggregate)

GDT 83 (Method of Test for Extraction of Bitumen from Paving Mixtures using the Vacuum Extractor)

GDT 125 (Method of Test for Determining AC Content by Ignition)

Subsection 400.3.06.A.3.b.3)

OMR-TM-140 (Extraction Analysis Worksheet)

DOT 159-5 (Asphaltic Concrete Lot Report)

Extraction Worksheet Example

Extraction Analysis Sieve Sizes for Each Mix

Asphalt Extraction Handout

In the event the Contractor's computer system is inoperable, operations may be allowed to continue for a maximum of three working days by providing hand written test reports to the TMOS on a daily basis.

5. Lot Tonnage And Deviation

   Enter the Average Test Deviation and Lot Tons on the Asphaltic Concrete Quality Control Apparatus Sheet on a daily or Lot basis. Give the completed apparatus sheet to the TMOS no later than two working days after the end of the respective month.

   Reference: Asphaltic Concrete Quality Control Apparatus Data & Master File Layout.

6. Haul Vehicle Inspection

   Inspect haul vehicles prior to loading for proper tarps, strapping, insulation, and hole for taking temperature. Inspect vehicle beds for evidence of diesel fuel, loose, foreign material and asphalt build-up. When any of these items are found to be in noncompliance with the specifications, make corrections before haul vehicle is allowed to transport material.

   References: Subsection 400.2.01.A.

7. Lime Checks

   a. Make lime checks daily according to lime check procedures posted at each plant for type of system. Record the calculations and test results of these in the Plant Diary. Place the percent lime on DOT 159-5.

      Tolerance: Daily plus or minus 10% of JMF requirement.

      Semi-weekly (Volumetric System)- plus or minus 10% of weighed volume

      of lime compared to target weight of lime.

      Semi-weekly (Weigh Pod System)- plus or minus 2% of weights.

   b. Check weight systems by utilizing test weights at least twice per week or at increased intervals as needed to maintain accurate calibration. Record the results of these checks and the calculations in the plant diary.

   c. Check volumetric systems by weight and record in diary at least twice per week.

   d. Check lime interlock systems according to the posted procedure or once per month to insure plant operations will interrupt mixture production if hydrated lime introduction fails. Record the actual time it takes for systems to interrupt mixture production in the plant diary.

      References: Subsection 400.3.02.6.c

8. Rap Requirements
   a. Take an Abson Recovery Sample on all asphaltic concrete mixtures that contain more than 15% RAP. Take a sample at the beginning of construction for each affected mix. Thereafter, use a sampling frequency of one sample per week for verification testing by DSR for viscosity of recovered AC.
   b. Samples may be taken at the same time extraction samples are taken from trucks. Take samples with a clean scoop, trowel, or spoon and deposit into a 0.5 gallon (2 L) tin can. Seal the can. Properly identify the samples and submit them along with the accompanying completed report to the appropriate DOT Lab.

      References: Section 402

9. A.C. Samples
   a. Take liquid asphalt samples and submit them to the Central or Branch Lab for testing.
   b. Obtain samples from the AC storage tank sample valve after allowing approximately two (2) quarts to run off. Obtain samples in two (2) 1-quart (one liter), tin cans. If liquid overruns can, discard and obtain another sample.
   c. Frequency
      - Start-up Samples = When plant has been down for more than seven (7) calendar days, obtain results prior to plant operation beginning.
      - Quality Assurance AC Samples Interstate projects = Two (2) per week.
      - Quality Assurance AC Samples Non-Interstate projects = One (1) per week.

      References: GSP 10 (Sampling Procedure for Bituminous Material)
      DOT 170 (Sample Card for all Materials)
      Sample of completed DOT 170

   Note: Obtain Quality Assurance AC samples with a GDOT Testing Management Technician present.

   Notes: All contractors will be required to submit start-up samples to the Central or Branch Lab 24 hours prior to starting production. When production is scheduled to begin on a weekend, state holiday or the day after a state holiday, submit samples 3 to 4 days (production begins on day after state holiday) prior to start of production. Production will not be allowed to start until test results are complete and meet the specification requirements for liquid asphalt.

   The start-up sampling requirement can be waived by the State Bituminous Construction Engineer in extenuating circumstances on all grades of liquid asphalt cement except PG 76-22, if mix is produced for private work during this time and can be verified with the bill of lading that the material is fresh and of the grade intended for a state project.

   If a failing AC sample is obtained, ensure that a Testing Management Technician is present when the follow-up sample is obtained.

10. Other Sampling Requirements
   a. Provide all sample containers, extractants, forms, diaries and other supplies. These items are subject to the approval of the Engineer.
   b. The following are materials that the Contractor's QCT will be required to sample and submit to the appropriate DOT laboratory, as directed:
      1) Sampling mix for LWT testing.

2) Sampling mix for field verification of mix design.

3) Sampling of miscellaneous materials used in the mix.

For 1) and 2), obtain the mix from the same load as the acceptance sample. Record the sample test results and JMF requirements on the back of the sample card.

11. Interstate Projects Only

a. Sampling and fabrication of HMA specimens for field verification of mix designs:

1) Fabricate one set (two specimens) of samples from the same portion of mix as taken for asphalt content and gradation.

2) Prepare the specimens using the gyratory compactor at the N Design Level Specified for the mixtures. Compact the mixtures at the Job Mix Formula temperature. Provide one set of specimens for each mix type per Lot within the first two days of production and one set every week, thereafter. In addition, prepare one set during the first Lot after a change in the Job Mix Formula.

b. Conduct testing for AASHTO T-209 to determine the maximum specific gravity of the mixture by testing one sample for each specimen taken for gyratory compactor described above. Determine the mix density and percent air voids of each gyratory compactor specimen described above by using the average result of the two AASHTO T-209 samples for each set of specimen compacted.

c. Fabricate and submit six specimens to the Branch Laboratory for LWT. Thereafter, submit one 1-gallon (4 L) can of mix to the Branch Laboratory for T-209 at the rate of one (1) per week.

d. When mix problems constitute a Job Mix Formula adjustment, obtain approval for the changes from the Technical Services Engineer. Upon approval, fabricate one set (two specimens) for gyration at N design and two samples of mix for ASSHTO T-209, and six specimens for LWT. Submit the fabricated samples to the Branch Laboratory.

Note: Supply a gyratory compactor, including a calibration kit, electronic balance with a weighing capacity of 12,000 grams, asphalt ignition oven and all T-209 test equipment in the field laboratory as specified in Section 152 of the contract on all Interstate projects mainline paving only.

12. Non-Interstate Projects Only (No Gyratory Compactor Required)

a. Sampling and fabrication of HMA specimens for field verification of mix designs:

1) Sampling and fabrication of HMA specimens for field verification will only be required when a new Mix design is submitted or a Job Mix Formula change is requested.

2) For the first day of production or after a JMF change, submit material to the lab for verification of mix design.

3) Submit ten 1-gallon (4 liter) cans of mix to the branch laboratory for fabrication of one set (two specimens) for gyration at N design, six specimens for LWT and two samples for AASHTO T-209.

13. Plant Inspection Duties

Perform the inspection duties listed below at the designated frequency, document on the OMR-TM-143 form, and submit to the respective TMOS.

a) Visually observe cold feed bins and mechanical condition of each.

b) Visually inspect stockpiles for proper construction, segregation, and contamination.

c) Visually observe dryer, dust collection system, and bag house.

d) Visually observe asphalt storage system (unloading of tanker).

e) Visually inspect mixer on batch type plants and discharge gate on all type plants.

f) Visually inspect mix for segregation.

g) Visually inspect haul vehicles for proper covers, beds, and approved releasing agents.

h) Visually inspect lime systems.

i) Check A.C. and aggregate scales for accuracy and enter results in plant diary.

Reference: OMR-TM-143 (Asphalt Plant Check List)
Asphalt Plant Diagram: Batch and Drum

14. Plant Diary
    a. The plant diary is a legal document. Ensure that it remains at each plant and is properly filled out, daily. All entries are to be neat and legible.
    b. Use preprinted Plant Diaries and include, as a minimum, the following information, to be entered on a daily basis.

       Entries shall include, but are not limited to:

       1) Project number or numbers
       2) Date and weather conditions
       3) Contractor's Representative (specify Q.C.)
       4) Type of mix
       5) Tons
       6) Lot number
       7) Mix I.D. number (from JMF)
       8) CPW checks (Furnished by DOT personnel)
       9) AC sample, Releasing Agent and Lime Samples including any samples taken for Lab testing
       10) Thermometer calibration
       11) Daily and Semi-weekly lime check calculations
       12) Any instructions given or received
       13) Any DOT visitors
       14) Any activities pertaining to State work.
       15) Signature and title

15. Computer
    a. Enter all DOT 159-5 test data into the Plant Computer and upload daily to the DOT computer system as described in Section 4.c, above. Each plant must keep a copy of all acceptance tests in a file separated by Contract ID numbers and sub files for each Project listed per contract. Test data is to be backed up on electronic media,, which shall remain at each plant site secured from dust or other environmental hazards. Keep a separate disk or CD for each project and ensure it becomes part of the project record. Place a copy of all completed 159-5's, work sheets, random number reports, and compaction results furnished by GDOT, in field lab project files daily for future reference. Ensure that all files are accessible to GDOT representatives at all times
    b. At each plant provide an internet service provider connection and an e-mail address for exchanging electronic correspondence with GDOT.
    c. In accordance with SOP 27, provide an individual PC or laptop computer at each plant. Ensure that this computer remains at the plant at all times.
    d. Ensure that each plant has a computer and accessories meeting the following requirements and as specified in Section 152 of the contract,

       1) Minimum Requirements/Preferred:

For optimal performance, these are the recommended system requirements for installing and running the Field Data Collection System applications:

- Computer: IBM PC or compatible
- Software: Windows 98 - Preferred: Windows 2000 or Windows® XP
- Processor: Intel Pentium III or better (above 500HZ) - Preferred: 2.5GZ.
- RAM: 256MB - Preferred: 512MB or better
- Hard Disk 10 GB or better with 500 MB of free space
- Pointing Device: Mouse or other Windows-compatible pointing device
- Floppy Disk Drive: 3.5-inch 1.44 MB Floppy disk drive
- Multimedia: CD-ROM drive
- Display: Super VGA (1024x768 pixels)
- Printer: Windows-compatible laser or ink jet printer
- Internet: Dial up OK for uploads but slow for download installation – Preferred: DSL or Cable
- Browser: IE5 or better – Preferred: IE6

16. Control of Asphaltic Concrete Mixtures

a. Designate a Level II QCT Manager to be responsible for the daily quality control operations within his organization and held accountable for the action of all assigned QCTs as specified in contract. The Quality Control Manager will be responsible of ensuring that Quality Control Technicians do not simultaneously perform QCT and Plant Operator Duties.

b. The designated Level II - QCT manager will be responsible to control the Asphaltic Concrete mixtures produced for GADOT Projects. The mixture control tolerances from an approved Job Mix Formula are written in Section 828 and mixture acceptance tolerances are as written in Section 400 of the governing GDOT Specifications for the respective Project.

References: GSP 21 (Sampling Procedures for Contractors)
GDTs (Sampling and Testing Manual or Study Guide)
Section 828 (Hot Mix Asphaltic Concrete Mixtures)
Section 400 (Hot Mix Asphaltic Concrete Construction)

GDT-2
DETERMINING THE AMOUNT OF MATERIAL FINER THAN NO.200 SIEVE IN AGGREGATE AND BASE MATERIAL

A. SCOPE

This method of test covers the procedures for determining the total quantity of material finer than No. 200 sieve in aggregate and base materials.

B. APPARATUS

1. Sieves
   A nest of not less than two sieves, the lower being a No. 200 sieve and the upper a larger mesh sieve such as a No. 16 sieve, both conforming to the requirements of the "Standard Specifications for Sieves for Testing Purposes," AASHTO Designation: M-92 (WS-08). These sieves should be frequently inspected for sag or tears.

2. Container
   A pan or vessel of a size sufficient to contain the sample covered with water and to permit vigorous agitation without loss of any part of the sample or water. (WB-12).

3. Balance
   The balance or a scale shall be sensitive to within 0.2 percent of the weight of the sample tested. (WB-ELC-1). The capacity of the balance or scales shall be at least that required for the size sample tested.

4. Oven
   Oven or other apparatus capable of drying the material to a consistent weight.

5. Pint Jar
   Pint Jar or similar scaleable container.

C. SAMPLE SIZE

The test sample shall have a dry weight at least the size given in the following table. The sample shall be obtained and prepared as directed by the appropriate alternate.

Nominal Maximum Particle Size	Minimum Weight Of Sample Grams
*No. 8 or smaller	200
No.	4500
3/8 in.	1000
3/4 in.	2500
1 ½ in. or over	5000

*This material may be tested by Alternate A or B. The others shall be Alternate A only.

D. PROCEDURE

Alternate A

1. Quarter or slit the sample to the appropriate size and dry to a constant weight at a temperature not exceeding 120°F. Allow the sample to cool to the surrounding air temperature and weights.

2. Place the sample in a container and cover with water. A wetting agent such as Calgon may be added. Vigorously agitate the material then pour the water over a nest of No. 16 and No. 200 sieves.

3. Repeat the washing operation until the water is clear.

4. Return all material on the sieves to the sample and dry the sample to a constant weight at a temperature not in excess of 230°F. Allow the sample to cool before weighing.

Alternate B

1. Thoroughly mix the material and using a large spoon or similar device, obtain a sample of the material. Care should be exercised to avoid segregation.

2. Dry the material to a constant weight at a temperature not in excess of 230°F, and allow to cool to the surrounding air temperature.

3. Weigh the material and place in a container. Cover with water and thoroughly agitate. Pour the wash water over a next of No. 16 and No. 200 sieves. Repeat the washing operation until the wash water is clear.

Note: To conserve time, two samples may be obtained. One shall be dried to determine the percent moisture while the sample is being washed. The original dry weight of the second sample shall be calculated as follows:

$$W_d = \frac{W_w}{1 + 01\ M}$$

Where:

W_d = dry weight

W_w = wet weight

M = Moisture

Alternate C (for Sand Clay Base or Soil for Soil Cement Base)

1. Choose a representative sample of the material to be tested that weighs about 7000 grams. Exercise care to insure that only the material to be tested is included in the sample; i.e., base samples must not include portions of the subgrade and pit samples must be the depth proposed for removal.

2. From this sample obtain two (2) specimens weighing 200 grams each. Dry one sample and record its weight as the original dry weight (W_d).

3. Place the second sample in a pint jar that is about half full of 5% ammonia solution (or sand equivalent solution), replace and secure the lid then invert two or three times to insure that all grains are wet. Allow the jar to sit for two minutes then shake vigorously for two minutes.

4. Pour the fluid slowly onto the No. 200 sieve (and breaker sieve if needed). Then refill the jar and pour the fluid over the sieves. Continue to do this until the fluid consistency approaches that of water (this procedure prevents the No. 200 sieve from becoming clogged). Then pour the material from the jar into the sieves. Rinse all the grains from the jar and pour onto the sieves. Allow water to flow through the sieves until the material smaller than the No. 200 sieve has been washed through. Tile the sieve and flush the material to the lower edge and dump the material onto a pan. Using as little water as practical, rinse the remaining material from the sieve onto the pan. Allow the pan to sit until the water is clear then pour off the excess water. Be careful not to lose any of the material.

   Note. Where needed for control purposes, the No. 40 or No. 60 sieve may be used in lieu of the No. 200 sieve in Alternate C.

E. CALCULATIONS

$$P = 100 - \left(100 \times \frac{W_f}{W_d}\right)$$

WHERE:

W_d = original dry weight of sample

W_f = final dry weight of washed sample

P = Percent passing No. 200 sieve

F. REPORT

Report the percent passing the No. 200 sieve to the nearest 0.1 percent.

GDT 38

A. Scope

For a complete list of GDTs, please see the Table of Contents.

Use this test method to determine the particle size distribution of fine and coarse aggregates extracted from bituminous mixtures.

B. Apparatus

The apparatus consists of the following:

8. Balance: Use a balance or scale sensitive to within 0.0002 lb (0.1 g) of the weight of the sample to be tested.
9. Sieves: Use woven-wire cloth sieves that conform to the "Standard Specification for Sieves for Testing Purposes," AASHTO M 92 (WS-08).

   Mount sieves with square openings on substantial frames constructed to prevent material loss during sifting. Select sieve sizes to furnish the information required by the Standard Specifications for the material to be tested.
10. Oven or Stove (WS-12).

C. Sample Size and Preparation

Use the entire lot or sample of aggregate from which the bituminous material has been extracted (see GDT 37 or GDT 83).

D. Procedures

11. Dry the test sample to a constant weight in a vented oven or a stove with vented hood.
12. Weigh the sample.
13. Separate the sample into a series of sizes using sieves as required by the Standard Specifications for the material under test.
    q. Sift with a lateral, vertical, and jarring motion to keep the sample moving continuously over the surface of the sieve.
    r. Do not turn or manipulate fragments in the sample through the sieve by hand.
    s. Continue sifting for about 10 minutes, or until less than 1 percent by weight of the residue passes any sieve during 1 minute.
    t. When using a mechanical sieve, test the sieve's accuracy with the results of sifting by hand.
    u. Record the accumulative weight of the material retained on each sieve.

E. Calculations

Calculate the percent passing each sieve as follows:

$$P = 100 - \frac{R}{T} \times 100$$

where:

P = Accumulative percent passing sieve by weight of total aggregate

R = Accumulative weight of mineral aggregate retained on sieve

T = Total weight of extracted mineral aggregate

F. Report

Report the results of the sieve analysis as accumulated percentages passing each sieve. Report percentages to the nearest 0.1 percent on Form 159-5.

GDT 39

A. Scope

For a complete list of GDTs see the Table of Contents.

Use this test method to determine bulk specific gravity of specimens of compacted bituminous mixtures. These procedures are described:

- Uncoated Specimens, Dense Graded Mixtures Only
- Paraffin Coated Specimens

B. Apparatus

The apparatus consists of the following:

14. Balance: Use a balance having a capacity of 10 lb (4.5 kg) or more and sensitive to 0.0002 lbs (0.1 g) or less.
15. Wire Basket: Use a basket of No. 4 (4.75 mm) mesh, approximately 8 in (203 mm) diameter and 8 in (203 mm) high.
16. Container: Use a container with an overflow device for immersing the wire basket in water and maintaining a constant water level.
17. Suspension Apparatus: Use an apparatus for suspending the wire basket from center of scale pan.

C. Sample Size and Preparation

18. Make test specimens from either laboratory-molded bituminous mixtures or cut or cored compacted pavements. Do not distort, bend, or crack specimens during and after removal from pavement or mold.
19. Store specimens in a safe, cool place.
20. Ensure specimens are free from foreign materials such as seal coat, tack coat, foundation material, soil, or paper. 4. Separate specimens from other pavement layers by sawing or other suitable means.

D. Procedures

21. Uncoated Specimens

Note: When roadway cores are saturated with water, conduct the following steps in this order: 4, 5, 1, 2, 3, and 6.

v. Dry the specimen to a constant weight. Constant weight is attained when further drying at 140 °, ± 9 °F (60 °, ± 5 °C) will not alter the weight 0.0002 lbs (0.1 g).

w. Cool the specimen to room temperature.

x. Weigh the uncoated specimen.
   1) Determine the dry weight of the specimen to the nearest 0.0002 lbs (0.1 g).
   2) Designate this weight as “A”.

y. Weigh the specimen in water.
   1) Place the specimen in the wire basket.
   2) Immerse the basket in water at room temperature for one minute.
   3) Leave the basket in the water and weigh to the nearest 0.0002 lbs (0.1 g).
   4) Designate this weight as “C”.

z. Weigh the surface-dry specimen.
   1.) Remove the specimen from the water.
   2.) Dry the surface by blotting with a damp towel.
   3.) Measure the surface-dry weight.
   4.) Designate this weight as “B”.

aa. Calculate the bulk specific gravity of the uncoated test specimen as follows:

$$\text{Bulk Specific Gravity} = \frac{A}{B - C}$$ where

A = weight of dry sample in air in grams

B = weight of surface-dry sample in air in grams

C = weight of sample in water in grams

22. Paraffin Coating

bb. Dry the specimen to a constant weight. Constant weight is attained when further drying at 140°, ± 9° F (60 °, ± 5 °C) will not alter the weight 0.0002 (0.1 g).

cc. Cool the specimen to room temperature.

dd. Weigh the uncoated specimen.

1) Determine the dry weight of the specimen to the nearest0.0002 (0.1 g).
2) Designate this weight as "A".

ee. Weigh the coated specimen.

1) Preheat the paraffin to 130 ° to 150 °F (54 ° to 66 °C).
2) Coat the test specimen on all surfaces with paraffin thick enough to seal all surface voids. Apply the coat in one of two ways: either use a paint brush to apply the hot paraffin or dip the specimen in the heated paraffin and brush more on to seal all pin-point holes.
3) Determine the dry weight of the test specimen at room temperature. Weigh to the nearest 0.0002 lbs (0.1 g).
4) Designate this weight as "D".

Note: If you want to use the specimen for further tests that require removing the paraffin coating, dust the specimen with talc before applying the paraffin.

ff. Weigh the coated specimen in water.

1) Place the paraffin-coated specimen in the wire basket.
2) Immerse the basket in water at room temperature.
3) Weigh to the nearest 0.0002 (0.1 g).
4) Designate this weight as "C".

gg. Calculate the bulk specific gravity of the test specimen as follows:

$$\text{Bulk Specific Gravity} = \frac{A}{(D-C)\left(\frac{D-A}{0.90}\right)} \text{ where}$$

A = Weight in grams of the specimen before paraffin coating in air

D = Weight in grams of the paraffin-coated specimen in air

C = Weight in grams of the paraffin-coated specimen in water

0.90 = Bulk specific gravity of the paraffin

E. Calculations

Determine compaction of a specimen taken from the compacted mixture on the roadway as follows:

$$\% \text{ Compaction} = \frac{\text{Roadway Specific Gravity}}{\text{Target Specific Gravity}}(100)$$

NOTE: Target Specific Gravity is the Actual Specific Gravity as shown on the job mix formula or the Specific Gravity obtained on the project control strip.

F. Report

23. Calculate the specific gravity to the nearest 0.001.
24. Report compaction to the nearest 0.1 on Form 159-5.

GDT 56

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to determine the heat stability of a liquid anti-strip additive in bituminous mixtures. Use this method to evaluate an anti-strip additive before placing it on the Approved Products List or to evaluate the effectiveness of the additive in the mix manufactured at a hot mix plant.

B. Apparatus

The apparatus consists of the following:

25. Balances: Use balances that are accurate to the nearest 0.0002 lb (0.1 g).
26. Hot-Plate, Gas Burner, or Stove (05-10)
27. Watch or Timer (WS-15 or WC-3)
28. Metal Container: Use a non-corrosive metal beaker with a volume of about 0.5 gal (2000 ml) for boiling the asphaltic concrete mixture. The container is equipped with a shelf made of No. 10 (2.00 mm) wire mesh elevated 1 in (25 mm) off the bottom.
29. Pans: Use shallow, 12 in (305 mm) diameter pans, or equivalent (WP-01).
30. Spatula: Use a spatula with a stiff blade (WS-10-1).
31. Quart Can: Use a quart can or similar container for treating the asphalt cement with anti-strip additive (WC-1).
32. Other Equipment: Use equipment necessary to perform AASHTO T 49 and T 202.

C. Sample Size and Preparation

The two alternatives presented differ with the intended use of the test.

33. Alternate 1: Approving Anti-Strip Additives for the Approved Products List
    hh. Ensure that mixing temperatures conform to AASHTO T 245.
    ii. Prepare a mix with the gradation shown in item c., below for the stripping test with 0.5 lbs (227 g) of a laboratory-standard aggregate and 0.04 lbs (18.2 g) of a laboratory-standard asphalt treated with the additive in question.

NOTE: The laboratory-standard aggregate has a known history of stripping problems, and the laboratory-standard asphalt is an PG-67-22 normally used in the laboratory for mix design purposes.

jj. Ensure that the mix from the stripping test meets the following gradation requirements:

Size	Percent Passing
1/2 in (12.5 mm)	100
3/8 in (9.5 mm)	95-100
No.4 (4.75 mm)	60-65
No. 8 (2.36 mm)	45
No. 50 (300 µm)	18-22
No. 200 (75 µm)	6

kk. Heat the asphalt cement to 325 °F (163 °C).

ll. Thoroughly mix in 0.5 percent of the additive by weight of the asphalt cement.

mm. Maintain the treated asphalt cement at 325 °F (163 °C) for 96 hours.

nn. Perform the stripping test in Procedures, step 2 after the 96-hour curing period and before the mix temperature falls below 250 °F (121 °C).

oo. The additive is considered heat-stable if no more than 5 percent of the particles become totally or partially uncoated.

pp. After approving a liquid anti-strip additive with this test, subject it to GDT 66 to determine diametral tensile strength. The materials must meet test requirements as outlined in Section 828 of the Standard Specifications.

34. Alternate 2: Evaluating Anti-strip Additives at Hot Mix Plants

NOTE: Carefully handle the sample and maintain an adequate mix temperature, according to the type of mix you are sampling.

qq. Start the water boiling at the test site. It should be boiling by the time you arrive with the test sample.

rr. Keep the scoop preheated. When the scoop is preheated, it will not cool down the mix.

ss. As soon as the mix comes out of the plant (samples from silos should not be used in testing), take one representative large shovel full.

NOTE: Perform the next steps within 10 minutes after the mix comes out of the plant.

tt. Place the sample gently into a bag so that the mass remains intact.

uu. Quickly take the bag to the testing area where the container of water is already boiling slowly.

vv. Break open the mass of mix [0.44 to 0.66 lbs (200 to 300 g)] and perform the appropriate tests.

D. Procedures

35. Asphalt Cement

ww. Test the thermoplastic asphalt cement with and without the heat-stable anti-strip additive.

xx. When you add the anti-strip additive, it shall not change the asphalt cement penetration at 77 °F (25 °C) by more than 3 mm nor viscosity at140 °F (60 °C) by more than 1.68 lbs/in (300 poises) per second.

yy. Approve additives based on tests performed with the standard asphalt cement. However, the specific asphalt to be used on the project must comply with Section 820 of the Standard Specifications.

36. Stripping Test (Boil Test)

zz. Use a preheated scoop to transfer a small portion of the mix [0.44 to .66 lbs (200 to 300 g)] into the boiling water for 10 minutes

aaa. Drain off the water and dump the mix onto a paper towel.

bbb. Let the mix cool at room temperature until dry.

ccc. Do not move or disturb the mix until you visually inspect the material. A stripped particle is one that visually appears to have the asphalt cement totally or partially removed.

E. Calculations

No calculations are necessary for these tests.

F. Report

Report the visual inspection of the stripping test result to the nearest 5 percent for the 96-hour test or field test, whichever applies, on Form 159-5.

GDT 73

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use these test methods to randomly select and test for acceptance asphaltic concrete mixes and pavement construction under End Result Specifications. The characteristics to be tested are mixture composition and compaction.

B. Apparatus

For Method C, the apparatus consists of the following:

37. Computer—Use the computer specified in Section 152 of the Specifications.

C. Sample Size and Preparation

38. Lot Boundaries

    An Acceptance Lot normally consists of the amount of asphaltic concrete produced and placed in one construction day, or at least 500 tons (Mg).

39. Evaluate each Lot with the sampling procedures and the specified acceptance criteria for mixture composition and compaction.

40. When evaluating these features, always use the same Lot boundaries. If the Job Mix Formula changes significantly, you need to end one Lot and begin a new Lot.

D. Procedures

41. Selecting Loads to be Sampled

    ddd. Randomly sample the designated Lot based on the load number.

    eee. Randomly sample the mix for the Lot from sublots consisting of approximately 500 Mgtons.

    1) If you expect plant production to be more than 2,000 tons (Mg) per day for more than two successive days (with approval of the respective District Testing Management Supervisor), use sublots of about 750 tons (Mg). Sample from each sublot by either multiplying the number of loads required for the sublots by using one of three methods:

       Method A: Use random numbers chosen from Table 1.

       Method B: Draw numbered tokens from a container.

       Method C: Use the DOT computer-generated numbers.

       See the examples in Calculations, for using each of these methods.

42. Testing for Asphalt Cement Content

    fff. Use GDT 83 or GDT 125 to test the asphalt cement content.

    1) When the plant that produces the mix is operating with a digital recorder, use the asphalt cement content calculated from the ticket instead of the extraction test value. Calculate the content from the appropriate ticket that corresponds to the load from which the sample was taken.

    2) In all cases, test the mixture gradation with GDT 38.

    ggg. Project personnel may submit to the Central Laboratory for approval any other method for random sampling when existing conditions make load sampling impractical.

43. Re-evaluating Lots of Non-Conforming Mix

    hhh. If a Lot received less than a 1.0 pay factor, the Contractor may request a re-evaluation.

    iii. Re-evaluate the Lot by cutting a minimum of the same number of cores as acceptance samples tested. Ensure the cores meet the size requirements of GDT 83 or GDT 125.

    jjj. Determine core locations as follows:

    1) Divide the Lot into the same number of sublots as the original Lot.

    2) Make the longitudinal distances equal to the original Lot.

GDT 73 Table 1

1		2		3		4		5		6		7	
.576	.730	.430	.754	.271	.870	.732	.721	.998	.239	.053	.899	.554	.627
.892	.948	.858	.025	.935	.114	.153	.508	.749	.291	.810	.159	.225	.163
.669	.726	.501	.402	.231	.505	.009	.420	.517	.858	.081	.277	.035	.039
.609	.482	.809	.140	.396	.025	.937	.310	.253	.761	.982	.468	.334	.921
.971	.824	.902	.470	.997	.392	.892	.957	.640	.463	.095	.801	.576	.417
8		**9**		**10**		**11**		**12**		**13**		**14**	
.427	.760	.470	.040	.904	.993	.509	.025	.794	.850	.917	.887	.751	.608
.549	.405	.285	.542	.231	.919	.371	.059	.164	.838	.289	.169	.569	.977
.860	.507	.081	.538	.986	.501	.165	.996	.356	.375	.654	.979	.815	.592
.690	.806	.879	.414	.106	.031	.477	.535	.137	.155	.767	.187	.579	.787
.251	.884	.522	.235	.398	.222	.788	.101	.434	.638	.021	.894	.324	.871
15		**16**		**17**		**18**		**19**		**20**		**21**	
.698	.683	.566	.815	.622	.548	.947	.169	.817	.472	.864	.466	.897	.877
.796	.996	.901	.342	.873	.964	.942	.985	.123	.086	.335	.212	.875	.969
.348	.743	.470	.682	.412	.064	.150	.962	.925	.355	.909	.019	.190	.696
.358	.595	.068	.242	.667	.356	.195	.313	.396	.460	.740	.247	.341	.688
.698	.539	.874	.420	.127	.284	.448	.215	.833	.652	.601	.326	.846	.355
22		**23**		**24**		**25**		**26**		**27**		**28**	
.209	.862	.428	.117	.100	.259	.425	.284	.882	.227	.552	.077	.454	.731
.109	.843	.759	.239	.890	.317	.428	.802	.464	.658	.629	.269	.069	.998
.757	.283	.666	.491	.523	.665	.919	.146	.123	.791	.503	.447	.659	.463
.587	.908	.865	.333	.928	.404	.892	.696	.116	.120	.721	.137	.263	.176
.831	.218	.945	.364	.673	.305	.195	.887	.836	.206	.914	.574	.870	.390
29		**30**		**31**		**32**		**33**		**34**		**35**	
.716	.265	.058	.075	.636	.195	.614	.486	.629	.663	.619	.007	.296	.456
.917	.217	.220	.659	.630	.673	.665	.666	.399	.592	.441	.649	.270	.612
.994	.307	.631	.422	.804	.112	.331	.606	.551	.928	.830	.841	.602	.183
.798	.879	.432	.391	.360	.193	.181	.399	.564	.772	.890	.062	.919	.875
.104	.755	.082	.939	.183	.651	.157	.150	.800	.875	.205	.446	.648	.685

3) Take one random core in each sublot.
4) Select successive numbers, depending on the number of sublots, from Table 1 for the longitudinal coordinate.
5) Select the same number of successive numbers for the transverse coordinate.
6) Determine the axis based on the beginning of a sublot and the right-hand edge of the pavement looking ahead.

kkk. Example for re-evaluating lots (using Method A).

You are given the following:

- The lot is 3,000 ft (914.4 m) long and the lane is 12 ft (3.65 m) wide.
- You are re-evaluating three samples from the lot.

1) By an unbiased method, use the last random number in Block 18 of Table 1 in the right column and the two successive numbers (0.215, 0.284, and 0.802) to determine longitudinal values.
2) By the same unbiased method, use the fourth random number in block 9 of the left column and the two successive numbers (0.879, 0.522, and 0.566) to determine the transverse value.

Location of Sample from Beginning of Each Sublot		
Sample No.	**Longitudinal Coordinate**	**Transverse Coordinate**
1	1000 ft. x .215 = 215 ft	12 ft. x .879 = 11 ft
2	1000 ft. x .284 = 284 ft	12 ft. x .522 = 6 ft
3	1000 ft. x .802 = 802 ft	12 ft. x .566 = 7 ft

Location of Sample from Beginning of Each Sublot		
Sample No.	**Longitudinal Coordinate**	**Transverse Coordinate**
1	304.8 m x .215 = 65.532 m	3.658 m x .879 = 3.048 m
2	304.8 m x .284 = 26.563 m	3.658 m x .522 =1.829 m
3	304.8 m x .802 = 244.446 m	3.658 m x .566 = 2.134 m

Note: Test according to GDT 83 and GDT 38. Accept according to Section 400 of the Standard Specifications.

44. Testing Compaction

lll. Divide the Lot into five sublots with equal longitudinal distances.

mmm. Select one random location within each sublot.

nnn. Select any five successive numbers in Table 1 to determine the station within each sublot.

Note: In some individual cases, you will need to test safety and construction techniques on the same day they were used. This will make equal sublots impossible; however, you must include the full length of each day's production in the Lot.

ooo. Example with Nuclear Gauge (GDT 59)

1) The length of the Lot is 5,000 ft (1,524 m). Use 1,000 ft ((1,524 m)/(5) = 304.8 m) per sublot (5000/5 = 1000).
2) To determine stations, use an unbiased method. The last random number in block 18 in the right column and the four successive ones (.215, .284, .802, .146, and .696) determine the stations.

Station Within Each Sublot	
Sublot 1	1000 feet x .215 = 215 feet from start of sublot
Sublot 2	1000 feet x .284 = 284 feet from start of sublot
Sublot 3	1000 feet x .802 = 802 feet from start of sublot
Sublot 4	1000 feet x .146 = 146 feet from start of sublot
Sublot 5	1000 feet x .696 = 696 feet from start of sublot

Station Within Each Sublot	
Sublot 1	304.8 m x .215 = 65.532 m from start of sublot
Sublot 2	304.8 m x .284 = 86.563 m from start of sublot
Sublot 3	304.8 m x .802 = 244.45 m from start of sublot
Sublot 4	304.8 m x .146 = 44.5 m from start of sublot
Sublot 5	304.8 m x .696 = 212.147 m from start of sublot

3) To determine transverse coordinates, divide the lane into three equal transverse zones.
4) Record on the work sheet one reading within each zone at the random selected site.
5) Determine the average and record it as a test.
6) If the width of lane is 12 feet (3.66 m), you will use 4 feet (1.22 m) per zone (12 ft/3 zones = 4 ft per zone [3.66 m/3 zones = 1.22 m per zone]).
7) For this example, place 4 tokens, numbered 1 through 4, in a container.
8) By an unbiased method, you select three numbers from the left column in block 11 (Table 1) to determine the transverse locations of the test sites. The numbers are 0.371, 0.165, and 0.477.
9) Since the right edge of the lane looking ahead is the axis, take the readings at the following transverse locations:

Zone	Calculation	Location
1	4 ft x 0.371	1.48 or 1.5 ft
2	4 ft x 0.165	0.66 or 1 ft
3	4 ft x 0.477	1.91 or 1.9 ft

Zone	Calculation	Location
1	1.2 m x 0.371	0.45 m
2	1.2 m x 0.165	0.79 m
3	1.2 m x 0.477	0.57 m

Note: Avoid testing sites that fall on the edge of a paving lane. For example, use 1 ft (300 mm) for any sites falling 1 ft (300 mm) or less.

10) Take the 3 gauge readings for sublot #1 starting 215 ft (65.53 m) from the beginning of the sublot at 1.5 ft, 5 ft, and 9.9 ft (0.45 m, 1.52 m, and 3.0 m) from the right edge of the lane.
11) Use the average of the three readings as the test for that sublot.
12) Determine the test locations for the remaining sublots using the same process.

Note: Before reporting test results for payment, automatically retest non-conforming lots of asphaltic concrete density. Test at the same longitudinal location as the previous tests and at a randomly selected transverse site according to GDT 39. Base official values for non-conforming average Lot density on the core average from step e below.

ppp. Example with Cores (GDT 39)

1) Determine compaction with five cores, one from each sublot at the selected stations.
2) Select the transverse coordinate by either using Table 1 or another approved random numbering system.
3) For example, to determine the stations within each sublot, use the method described in Procedures, step d.
4) To determine transverse coordinates in this example, the width of the lane is 12 ft (3.66 m).

5) By some unbiased method, you determine that the fourth random number (0.908) in the right column of block 22 (Table 1) will be used to calculate the transverse location of the test.

6) Since the right-hand edge of the lane looking ahead is the axis, take the core 12 ft x 0.908 = 10.8 ft (3.66 m x 0.908 = 3.32 m) from the edge of the lane.

7) Determine the remaining transverse locations in the same manner.

Note: Avoid testing sites that fall on the edge of a paving lane. For sites falling at 1 ft (300 mm) or less, use 1 ft (300 mm). For sites falling at 11 ft (3.36 m) or more, use just 11 ft (3.36 m).

8) Determine the Lot Average by averaging the five sublot tests.

45. Re-evaluating Non-Conforming Average Compaction

qqq. If you reevaluate beyond the automatic recheck, use randomly determined cores at new locations as described in Procedures, step 4.e.

rrr. Re-evaluate according to Section 400 of the Standard Specifications.

E. Calculations

46. Method A

This example uses Table 1 to calculate the sublot tests.You are given the following:

Expected plant production: 1,600 to 1,800 tons (Mg) (3 to 4 samples)

Average load of haul vehicles: 20 Mgtons

sss. Therefore, use 25 loads [(500 tons (Mg)) / (20 tons (Mg)/load) = 25] for the first sublot.

ttt. By an unbiased method, use the last random number in Block 18 of Table 1 in the right column and the four successive numbers (.215, .284, .802, .146 and .696).

uuu. Calculate the loads to sample as follows:

Sample	Calculation	Load
1	25 loads x .215 = 5.4 or 5 +0 + 25	= 5th Load
2	25 loads x .284 = 7.1 or 7 + 25 + 25	= 32nd Load
3	25 loads x .802 = 20.1 or 20 + 50 + 25	= 70th Load
4	25 loads x .146 = 3.7 or 4 + 75	= 79th Load

vvv. If the plant produced 92 loads for that day, take samples of the mix from loads 5, 32, 70, and 79 to represent that Lot.

Note: When technicians are responsible for acceptance tests at more than one operation, group the plant assignments so each technician is assigned only one high-production operation. Choose sublots at the secondary plant as follows:

1. Use the first available load as you enter the plant for the first sublot.

2. Use Method A to determine the remainder of the sublots.

3. Take samples from loads as near to the designated loads as possible and still retain the proper sampling, testing, and inspection procedures at the primary plant.

47. Method B (Random Tokens)

This example uses Method B to calculate the sublot tests. You are given the following:

Plant production: 2600 to 3000 tons (Mg) (4 to 5 samples)

Average load of haul vehicles: 22 tons (Mg)

www. Therefore, use 34 loads (750 tons (Mg) / 22 tons (Mg)/load = 34) for the sublots.

xxx. Place 34 tokens numbered 1 through 34 in a container.

yyy. Draw a token from the container.

zzz. Record the number and return it to the container.

aaaa. Calculate the sublots to be tested as follows:

Sample	Calculation	Load
1	Token #1 drawn = 1 + 0+34	= 1st Load
2	Token #16 drawn = 16 + 34 +34	= 50th Load
3	Token #31 drawn = 31 + 68+34	= 99th Load
4	Token #16 drawn = 16 + 102+34	= 118th Load
5	Token #11 drawn = 11 +136	= 147th Load

bbbb. If the plant produced 130 loads for that day, take samples of the mix from loads 1, 50, 99, 118, and 147 to represent that Lot.

Note: When technicians are responsible for acceptance tests at more than one operation, group the plant assignments so each technician is assigned only one high-production operation. Choose sublots at the secondary plant as follows:

1. Use the first available load as you enter the plant for the first sublot.

2. Use Method B to determine the remainder of the sublots.

3. Take samples from loads as near to the designated loads as possible and still retain the proper sampling, testing, and inspection procedures at the primary plant.

48. Method C (DOT Computer Program)

This example uses Method C to calculate the sublot tests.

cccc. Using the computer program developed by the Georgia DOT, enter the requested pertinent data about expected production and the haul load sizes. The program will randomly select the loads per sublot for the entire Lot.

dddd. Retain this list for future reference.

F. Report

49. Keep track of the loads sampled in the Log Book. Otherwise, you need not report any numbers on set DOT forms. However, report the results of the actual tests on the respective forms:

eeee. From GDT 83 or GDT 125 for Asphalt Cement Content

ffff. From GDT 38 for Mixture Gradation

gggg. From GDT 59 for Nuclear Gauge Compaction

hhhh. From GDT 39 for Core Compaction

GDT 83

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to determine the bitumen content of hot paving mixtures by using the vacuum extractor. You may use the aggregate remaining after extraction for sieve analysis.

B. Apparatus

The apparatus consists of the following:

50. Vacuum Extractor—Use a vacuum extractor complete with filter ring (WV-E-01).
51. Vacuum Source— Use a source with a minimum vacuum of 5 psi (34 kPa) (WV-E-02).
52. Filter Paper—Use filter paper, medium grade, fast filtering, of the diameter required to fit inside the ring, normally either 11 in (29 cm) or 13 in (33 cm) (WV-E-07).
53. Oven or Hot Plate—Use an oven or hot plate for drying capable of maintaining a temperature of approximately 230° F (110° C).
54. Trowel—Use a trowel (WT-07) and/or quartering device (WQ-1)—not necessary when testing cores.
55. Mixing Bowls—Use a 4qt (3.8 L) mixing bowl (WB-12).
56. Plastic Beakers—Use two plastic beakers, 34 oz (1000 ml) capacity (WVE-06).
57. Mixing Spoon (WS-14).
58. Plastic Wash Bottle—Use two 1pt (0.47 L), plastic wash bottles (WV-E-05).
59. Spatula (WS-10).
60. Glass Stirring Rod—Use a glass stirring rod (WG-10).
61. Drying Pans—Use two 18 in or 16 in (450 mm or 400 mm) diameter drying pans (WP-12 or WP-10).
62. Laboratory Balance—Use an approved laboratory balance with a capacity of at least 7.9 lb (3600 g) and readable to 0.00022 lb (0.1 g).
63. Solvent—Use 1.1.1 Trichloroethane (WT-06) or terpene hydrocarbon (WL-03).

Note: If you use terpene hydrocarbon, you may need a rinsing agent.

64. Filtering Aid—Use a diatomaceous silica filtering aid (WV-E-03).
65. No. 16 (1.18 mm) Sieve—Use a 12 in (300 mm) diameter No. 16 (1.18 mm) Sieve (WS-12 #16).
66. No. 200 (75µm) Sieve—Use a 12 in (300 mm) diameter No. 200 (75µm) Sieve (WS-12 #200).
67. Thermometer (WT-04-1).

C. Sample Size and Preparation

68. If the mixture is not soft enough to separate with a trowel or quartering device, place the sample in an oven at about 290° F (143° C) long enough to separate it.
69. If you took the sample before compaction, quarter it to the desired test size minimum:

Sample Designation			Minimum Sample Wt.
Old	Metric	Superpave	
Large Stone Mix (LSM)		1.5 in Superpave (37.5 mm)	6.6 lb(3000 g)
Base	1 in Mix (25 mm)	1 in Superpave (25 mm)	5.5 lb (2500 g)

B	0.75 in Mix (19 mm)	0.75 in Superpave (19 mm)	4 lb (2000 g)
B-Modified	0.75 in Modified Mix (19 mm)	0.75 in Superpave (19 mm)	4 lb (2000 g)
E	0.5 in Mix (12.5 mm)	0.5 in Superpave (12.5 mm)	3.3 lb (1500 g)
F	3/8 in Mix (9.5 mm)	3/8 in Superpave (9.5 mm)	2.6 lb (1200 g)
H	3/8 in Modified Mix (9.5 mm)	3/8 in Superpave (9.5 mm)	2.6 lb (1200 g)
G	No. 4 Mix (4.75 mm)	No. 4 Mix (4.75 mm)	2.2 lb(1000 g)
Sand Asphalt I and II	3/8 in SA (9.5 mm)	3/8 in SA (9.5 mm)	2.2 lb (1000 g)
Sand Asphalt Base	0.5 in SA (12.5 mm)	0.5 in SA (12.5 mm)	2.2 lb (1000 g)
D	3/8 in OGFC (9.5 mm)	3/8 in OGFC (9.5 mm)	2.2 lb (1000 g)
D-Modified	0.5 in OGFC (12.5 mm)	0.5 in OGFC (12.5 mm)	2.6 lb (1200 g)
Porous European Mix (PEM)	0.5 in PEM (12.5 mm)	0.5 in PEM (12.5 mm)	2.6 lb (1200 g)
SMA-C	0.75 in SMA (19 mm)	0.75 in SMA(19 mm)	4 lb (2000 g)
SMA-F	0.5 in SMA (12.5 mm)	0.5 in SMA (12.5 mm)	3.3 lb (1500 g)
SMA-F	3/8 in SMA (9.5 mm)	3/8 in SMA (9.5 mm)	2.6 lb (1200 g)

70. If the samples are roadway cores, test the whole sample and do not quarter it.
71. Allow the sample to cool to approximately 140° F (60° C) before adding any solvent.

D. Procedures

72. Place the warm sample into a bowl.
73. Add approximately 17 oz (500 ml) of solvent and stir occasionally.
74. Weigh a dry filter and place it on the vacuum extractor.
75. Place the funnel ring over the filter and tighten the wing nuts.
76. Weigh approximately 0.1 lb (50 g) to 0.2 lb (100 g) of diatomaceous filtering aid into a beaker and add approximately 17 oz (500 ml) of solvent.
77. For mixes with a high percentage of minus No. 200 (75 µm) material or for mixes made with local material, the amount of diatomaceous earth may be increased to improve the filtering process.
78. Stir until the filtering aid is completely in suspension.
79. Immediately pour the solution onto the filter and start the vacuum pump.
80. Leave the vacuum on until the pad formed by the filtering aid is surface dry and begins to crack slightly.

Note: You may apply the diatomaceous filtering aid dry if you distribute it evenly.

81. Place nested No. 16 (1.18 mm) and No. 200 (75 µm) mesh 12 in (300 mm) sieves onto the funnel ring.

Note: You can use just the No. 200 (75 µm) mesh 12 in (300 mm) sieve if you carefully pour (decant) the solution to prevent larger aggregate particles from damaging the sieve.

82. Gently decant the solvent and asphalt solution from the sample container onto the No. 16 (1.18 mm) sieve or No. 200 (75 µm) sieve, whichever is applicable. Be careful while you pour to not disturb the filtering pad.
83. Start the vacuum pump and adjust the vacuum to at least 5 psi (34 kPa).
84. Continue vacuuming until all of the solvent has disappeared through the filter. If a hard crust appears after vacuuming, gently pull a glass stirring rod or similar device across the filter to break the crust.
    iiii. In tests where you use 1.1.1 trichloroethane as the solvent, continue washing and decanting the sample until the solution is a light straw color and the aggregate looks clean.
    jjjj. In tests where you use a terpene hydrocarbon as the solvent, continue washing and decanting the sample three to five times (depending on the sample size).

1) After vacuuming, pour 17 oz (500 ml) of water over the aggregate in the mixing bowl and stir well with the mixing spoon. The water will turn milky-white.
2) After the asphalt extract/asphalt solution is completely vacuumed from the diatomaceous filtering aid, decant the water from the mixing bowl through the sieve or sieves onto the filter pad.
3) Pour the water over the entire surface of the sieve.
4) Repeat the water washing from 3 to 5 times until the water is clear.

Note: The additional water removes the solvent from the aggregate. Four to six washes should be adequate, but you may need more water to clean very large samples.

85. After the last washing with the No. 16 (1.18 mm) sieve serving as a breaker screen, pour the entire specimen onto the sieves.
86. Use a wash bottle with water (or trichloroethane, if it is the wash solvent) to thoroughly rinse all aggregate particles from the sample container and spoon onto the sieve.
87. With a spatula, carefully distribute the aggregate evenly over the sieve and wash additional solvent over the aggregate as needed.
88. Remove the 12 in (300 mm) sieve or sieves containing the plus No. 200 (75 µm) material and put them aside to dry.
89. After you have vacuumed all the liquid through the filter, use a spatula to transfer the filtering aid away from the edges of the filter toward the center.
90. Use the wash bottle to rinse the side of the funnel ring.
91. Allow the vacuum to run an additional 5 minutes to dry the filter.
92. Carefully remove the filter and place it into a drying pan without losing any material.
93. Move the aggregate retained on the two sieves to another drying pan.
94. Dry each of the pans of material to a constant weight and record the weights.
95. If you need the aggregate gradation, use GDT 38 and always use "T" for total weight of extracted aggregate.

E. Calculations

96. Calculate the percent bitumen in the sample.

    Weight of extracted aggregate:

    $W_0 = W_1 + (F_2 - (F_1 + DE))$ where

    W_1 = Weight of aggregate retained on sieves or removed from the centrifuge bowl

    F_1 = Original weight of the filter placed in the vacuum extractor

    F_2 = Final weight of the filter (includes the diatomaceous earth and minus No. 200 (75 µm) materials)

    DE = Original weight of diatomaceous earth

97. Percent bitumen =

    $\frac{W - W_0}{W}(100) + R$ where

    W = Original weight of the sample

    W_0 = Weight of extracted aggregate

    R = Retention factor

98. Report the percent bitumen to the nearest 0.01.
99. Calculate the Retention Factor

    Most types of aggregate will retain a small amount of bitumen after being tested by the vacuum extractor. Take this into consideration when calculating the final percent bitumen in the mixture.

Note: Perform this test procedure separately on at least two samples of aggregate representative of the material to be used in the mix.

kkkk. Use a test specimen weighing at least 2.6 lb (1200 g).

llll. Dry the aggregate specimen to a constant weight.

mmmm. Place the specimen in a tared metal container and weigh.

nnnn. Heat the aggregate and asphalt cement to the temperature specified in the Asphaltic Concrete Mixture Control Temperature Charts.

oooo. Add the asphalt cement to the aggregate mixture at the amount prescribed by the Job Mix Formula.

pppp. Calculate the exact percentage of bitumen added to the nearest 0.01 percent.

qqqq. Mix the bitumen and aggregate by hand as fast as possible until the aggregate is thoroughly coated. The fast mix reduces temperature loss.

rrrr. Cool the specimen to approximately 140° F (60° C).

ssss. Add solvent and proceed as in Procedures.

100. Calculate the percentage of bitumen extracted as in Calculations, step 1 and determine the retention factor as follows:

$$P_2 = \frac{S - A}{S}(100) \text{ and } R = P_1 - P_2 \text{ where}$$

S =Total weight of mixture

A = Weight of extracted mineral aggregate

P_1 = Percent of bitumen added to mix

P_2 = Percent of bitumen extracted

R = Retention factor

F. Report

Report the percentage of bitumen extracted and the retention factor, if applicable, on Form 159-5.

GDT 107

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to determine asphalt plant ratings. The ratings help evaluate the effectiveness of a Contractor's quality control program.

The asphalt plant rating system was developed using the Mixture Control Tolerances established in Section 828 of Georgia's Standard Specifications. This system is designed to provide Industry and the Department with a management tool for measuring the success of the Producer Certification Program and to promote consistency of products.

B. Apparatus

None listed for this test.

C. Sample Size and Preparation

No sample preparation is needed.

D. Procedures

In order to produce the ratings, certain data must be calculated. The following procedures are applicable to producing data for the rating system:

A. Tolerance Band

A tolerance band derived from the tolerances established in Section 828 is used to calculate the rating for all types of asphaltic concrete mixes. The maximum deviation allowed in Section 828 from the Job Mix Formula represents a grade of 70.

Example:

9.5 mm Superpave Level A

Tolerances established in Section 828

Rating Criteria		Deviation
4.75 mm Sieve	0 = 100	± 5.6 = 70
2.36 mm Sieve	0 = 100	± 4.6 = 70
75 um Sieve	0 = 100	± 2.0 = 70
Asphalt Cement	0 = 100	± 0.4 = 70

B. Rating Standards

Ratings	**Quality of Mixes**
90-100	Excellent
80-89	Good
70-79	Marginal
Below 70	Unacceptable

E. Calculations

A. Determination of Mix Score:

1. A score for each type of asphalt mixture produced by a plant is calculated as follows:

MIX SCORE = (0.6 x Average score for rated sieves) + (0.4 x score for AC content)

**Gradation accounts for 60% of Composite Score and AC accounts for 40%.

Note: If the combined score is < 70, report the combined score. If the combined rating is ≥ 70, but either gradation or AC portion of rating is < 70, show the combined rating as 69.9.

2. The rating criteria for each type mix in order to calculate the mix score are:

MIX	AC & SIEVES USED
25 mm Superpave, 19mm SMA	12.5 mm, 2.36 mm, 75 um, AC
19 mm Superpave 12.5 mm PEM 12.5 mm OGFC 12.5 mm SMA 12.5 mm Superpave	9.5 mm, 2.36 mm, 75 um, AC
9.5 mm OGFC 9.5 mm SMA 9.5 mm Superpave	4.75 mm, 2.36 mm, 75 um, AC
4.75 mm	2.36 mm, 75 um, AC

3. A Specification Tolerance Factor (**STF**) is used to determine the score for each rated sieve. The **STF** is derived using the tolerances established in Section 828 of the specifications and assuming that the maximum allowed tolerance for each rated sieve equals a score of 70. The **STF**s for each mix type is listed below.

Superpave

12.5 mm Sieve	0 = 100	± 6.0 = 70	6.0 ÷ 30 = 0.2000 (0.2000 = **STF**)
9.5 mm Sieve	0 = 100	± 5.6 = 70	5.6 ÷ 30 = 0.1870 (0.1870 = **STF**)
4.75 mm Sieve	0 = 100	± 5.6 = 70	5.6 ÷ 30 = 0.1870 (0.1870 = **STF**)
2.36 mm Sieve	0 = 100	± 4.6 = 70	4.6 ÷ 30 = 0.1534 (0.1534 = **STF**)
75 um Sieve	0 = 100	± 2.0 = 70	2.0 ÷ 30 = 0.0670 (0.0670 = **STF**)
Asphalt Cement	0 = 100	± 0.4 = 70	0.4 ÷ 30 = 0.0134 (0.0134 = **STF)**

SMA, OGFC and PEM

12.5 mm Sieve	0 = 100	± 6.1 = 70	6.1 ÷ 30 = 0.2034 (0.2034 = **STF**)
9.5 mm Sieve	0 = 100	± 5.6 = 70	5.6 ÷ 30 = 0.1870 (0.1870 = **STF**)
4.75 mm Sieve	0 = 100	± 5.7 = 70	5.7 ÷ 30 = 0.1900 (0.1900 = **STF**)
2.36 mm Sieve	0 = 100	± 4.6 = 70	4.6 ÷ 30 = 0.1534 (0.1534 = **STF**)
75 um Sieve	0 = 100	± 2.0 = 70	2.0 ÷ 30 = 0.0670 (0.0670 = **STF**)
Asphalt Cement	0 = 100	± 0.4 = 70	0.4 ÷ 30 = 0.0134 (0.0134 = **STF)**

B. Determination of Plant Score:

1. The plant score is determined from the mix scores and the percent of each type mix produced as a function of total production. Acceptance sample results shall be used in determining the monthly asphalt plant rating. Monthly plant ratings shall be based on a minimum of three extractions per mix. If less than three extractions are taken, the mix will not be rated. A monthly rating of less than 70 for any mix will result in an overall monthly plant rating of less than 70.

   The score for each rated sieve and AC based on the average absolute deviation from the job mix formula is divided by the specification tolerance factor (**STF**) and then subtracted from 100. Find the score to the nearest one decimal place.

2. PLANT SCORE = The sum of (% of type mix of total production x mix score).

3. Listed below is an example of a plant score that has produced two different mixes, a 9.5 mm Superpave and a 12.5 mm Superpave.

   a. Example: Type 9.5 mm Superpave Level A Produced Tons =1000

Average Absolute Deviation from Job Mix Formula				
Sieves	**4.75 mm**	**2.36 mm**	**75 um**	**AC**
Test 1	0.6	1.3	0.8	0.08
Test 2	1.3	2.8	1.3	0.13
Test 3	3.0	3.4	0.8	0.17
Test 4	1.0	1.9	1.5	0.22
Test 5	3.1	3.5	1.4	0.09
Avg. Abs. Dev.	1.800	2.580	1.160	0.138

Grades	4.75 mm	100 – (1.800 ÷ 0.1870) = 90.37
	2.36 mm	100 – (2.580 ÷ 0.1534) = 83.18
	75 um	100 – (1.160 ÷ 0.0670) = 82.69
	AC	100 – (0.138 ÷ 0.0134) = 89.70

Mix Score for 9.5 mm Superpave Level A

$$\{[(90.37 + 83.18 + 82.69) \times .60] / 3 + (89.70 \times .40)\} = 87.1$$

   b. Example: 12.5 mm Superpave Level B Produced Tons = 785

Average Absolute Deviation from Job Mix Formula				
Sieves	**9.5 mm**	**2.36 mm**	**75 um**	**AC**
Test 1	2.1	1.6	0.8	0.06
Test 2	1.1	1.3	0.3	0.11
Test 3	1.6	1.45	.55	0.085
Avg. Abs. Dev.	1.6	1.45	0.55	0.085

Grades	9.5 mm	100 – (1.60 ÷ 0.1870) = 91.44
	2.36 mm	100 – (1.45 ÷ 0.1534) = 90.55
	75 um	100 – (0.55 ÷ 0.0670) = 91.79
	AC	100 – (0.085 ÷ 0.0134) = 93.66

Mix Score for 12.5 mm Superpave Level B

$$\{[(91.44 + 90.55 + 91.79) \times .60] / 3 + (93.66 \times .40)\} = 92.2$$

   c. Weighted Average Rating for Day's Run

9.5 mm Superpave Level A ={ [1000/(1000 + 785)] x 100} = 56.02 % of day's production

12.5 mm Superpave Level B = {[785/(1000 + 785)] x 100} = 43.98 % of day's production

Total day's production = 1785 Tons

Plant Score: (87.1 x 0.5602) + (92.2 x 0.4398) = 89.3

Note: Example is for one day's run; format would be the same for any chosen span of time.

C. Determination of Overall Plant Rating for Extended Time Periods

1. Overall Plant Rating for time periods longer than one month will be calculated based upon the average of the monthly plant ratings and adjusted for the tonnage produced per month to provide weighted plant ratings for the time period being rated.

a. Example Begin date 1/1/04 To 6/30/04

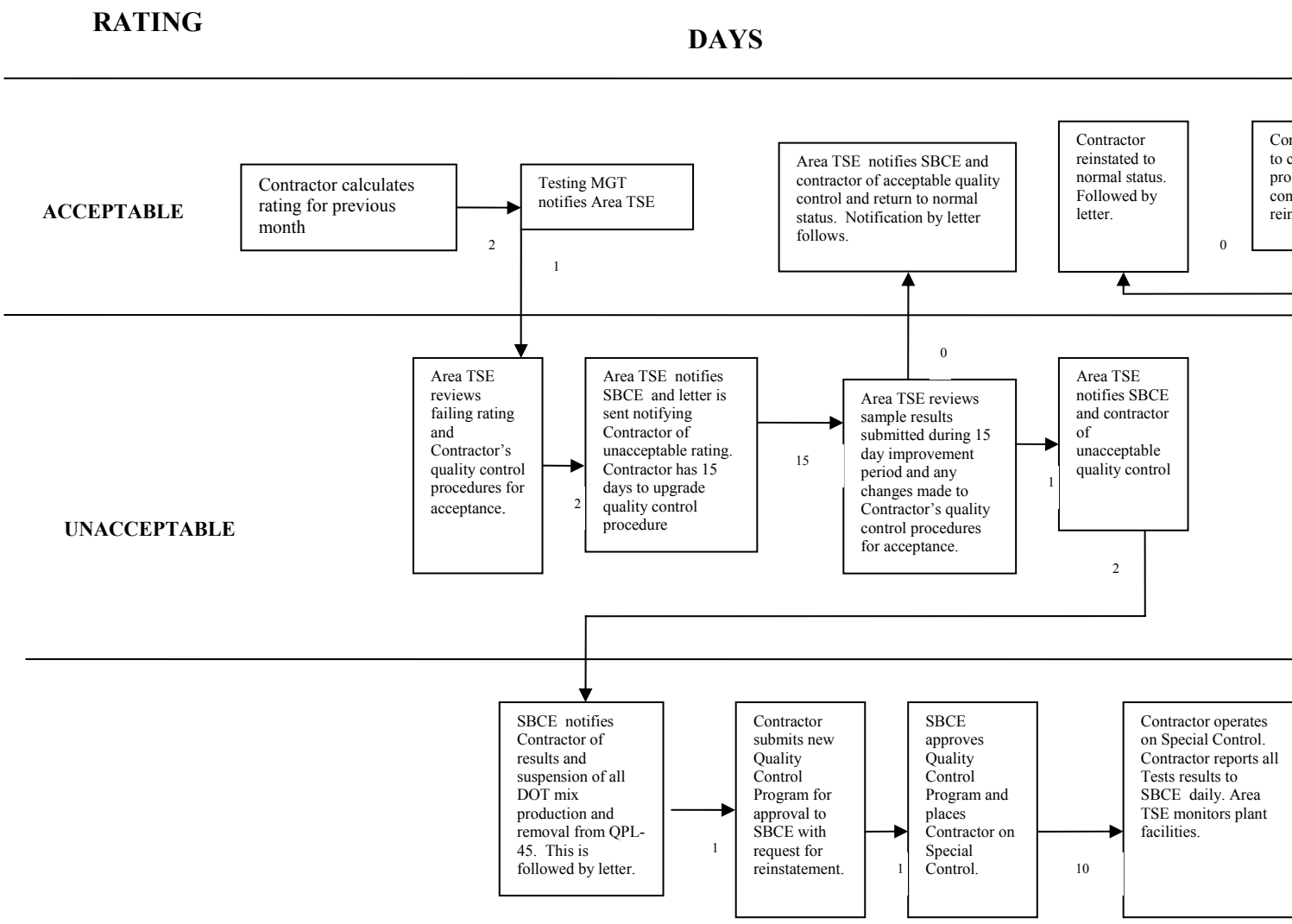
Date	Tonnage	% Tonnage	Plant Rating	Calculation	Weighted Rating
1/04	1785	21.8	89.3	(.218 x 89.3)	19.5
2/04	800	9.8	90.7	(.098 x 90.7)	8.9
3/04	1500	18.3	95.3	(.183 x 95.3)	17.4
4/04	500	6.2	86.7	(.062 x 86.7)	5.4
5/04	2000	24.4	91.7	(.244 x 91.7)	22.4
6/04	1600	19.5	94.0	(.195 x 94.0)	18.3
Totals	8185	100.0			91.9

Average Plant Rating for the time period 1/01/04 to 6/30/04 = 91.9

F. Report

10. Report test results monthly on a Quality Control Rating form; however, you may make more frequent checks to determine the effectiveness of a Contractor's quality control procedure.
11. Unless approved by the Office of Materials and Research, close all open Lots of Asphaltic Concrete on the last day of the month.
12. Make reports on the first working day after the end of each rating period. Notify the Area Bituminous Construction Engineer of the results in writing.
13. Yearly Plant Ratings will be reported annually by the Office of Materials and Research
14. Figure 107-1, below, describes the normal reporting procedure.
15. To be included in the List of Approved Hot Mix Asphaltic Concrete Plants (QPL 45), a Contractor must meet the requirements of SOP 27 which requires an acceptable rating. Figure 107-1

Figure 107-1


RATING
DAYS
ACCEPTABLE
Contractor calculates rating for previous month
2
Testing MGT notifies Area TSE
1
Area TSE notifies SBCE and contractor of acceptable quality control and return to normal status. Notification by letter follows.
Contractor reinstated to normal status. Followed by letter.
0
UNACCEPTABLE
Area TSE reviews failing rating and Contractor's quality control procedures for acceptance.
2
Area TSE notifies SBCE and letter is sent notifying Contractor of unacceptable rating. Contractor has 15 days to upgrade quality control procedure
15
Area TSE reviews sample results submitted during 15 day improvement period and any changes made to Contractor's quality control procedures for acceptance.
0
Area TSE notifies SBCE and contractor of unacceptable quality control
1
2
SBCE notifies Contractor of results and suspension of all DOT mix production and removal from QPL-45. This is followed by letter.
1
Contractor submits new Quality Control Program for approval to SBCE with request for reinstatement.
1
SBCE approves Quality Control Program and places Contractor on Special Control.
10
Contractor operates on Special Control. Contractor reports all Tests results to SBCE daily. Area TSE monitors plant facilities.

GDT 125

A. Scope

For a complete list of GDTs, see the Table of Contents.

Use this test method to determine the asphalt cement content of Asphaltic Concrete paving mixtures by igniting the asphalt binder at approximately 1000 °F (538 °C) in a furnace. The aggregate remaining may be used for sieve analysis using GDT 4 and GDT 38.

B. Apparatus

101. The apparatus consists of the following:

tttt. Forced-Air Ignition Furnace

Provide a Forced-Air Ignition Furnace that meets the following requirements:

- Can maintain a temperature of 1072 ° F (578 °C) with an internal balance thermally isolated from the furnace chamber accurate to 0.00022 lb (0.1 g).
- The balance is capable of weighing a 7.7 lbs (3500 g) sample in addition to the sample baskets.
- Has an internal data collection system which will automatically print and display ignition chamber temperature, weight loss, and per cent weight loss, during the test.
- Provides for the input of a correction factor for aggregate loss and shall issue a printed ticket for each test, which shall list the initial sample weight (grams), temperature compensation factor (%), calibration factor (%), calibrated asphalt content (%), elapsed time, and set temperature (°C).
- The furnace chamber dimensions are adequate to accommodate a sample size of 6.6 lb (3000 g).
- The furnace has an audible alarm and indicator light when the sample weight loss does not exceed 0.01 percent of the total sample weight for three consecutive minutes.
- The furnace door is equipped so that the door cannot be opened during the ignition test.
- The furnace completely oxidizes the exhaust gases before they are filtered and is equipped with an exhaust filtration system to remove particulate matter.
- The furnace is vented to the outside via a forced exhaust system which maintains a pressure difference sufficient to prevent the escape of smoke and strong odors into the laboratory.
- The exhaust is not be vented near flammable materials.

uuuu. Mesh Baskets

Use baskets made of tempered stainless steel or other high-temperature alloy and of sufficient size to allow all samples to be thinly spread. Ensure that sets of two or more baskets are nested. Ensure that the sample is completely enclosed with screen mesh, perforated sheet metal, or other suitable material to allow air to flow through and around the sample.

vvvv. Catch Pan

Use a catch pan sized to hold the sample baskets to catch all aggregate particles and melting asphalt binder falling through the screen mesh.

wwww. Oven

Use an oven capable of maintaining a temperature of approximately 260 °F (125 °C).

e. Balance

Use an approved laboratory balance with a weighing capacity of at least 7.7 lbs (3500 g) readable to 0.00022 lb (0.1 g).

f. Safety Equipment

Use Safety glasses or face shield, high-temperature protective apparel (forearm covers, apron, and gloves), heat resistant surface capable of withstanding 1200 °F (650 °C), and a protective cage to surround the sample baskets.

h. Miscellaneous Equipment

Pan with dimensions larger than the sample baskets, for transferring sample after ignition; plastic wash bottle; trowel; spoon; spatula; bowl; quartering device; 2 in (50 mm) paint brush; wire sieve brushes.

102. Equipment Calibration

Note: A calibration factor must be established for each mixture tested.

- Prepare four calibration specimens according to the approved mix design, at the design optimum asphalt content, and with aggregates from the stockpiles from which the mix will be produced. Specimen size should conform to the minimum sample weight table of Section IV. The asphalt cement used shall be representative of that to be used on the project. Prior to mixing the calibration specimens, prepare the mixing vessel by mixing a mock specimen (a "butter mix") at the same asphalt content and discard it.
- Prepare an additional specimen without asphalt cement and test it according to GDT 4 and GDT 38. Ensure that the washed gradation falls within the Mixture Control Tolerances for the mix to be tested.
- Test the four mixture specimens in the ignition furnace, following the test procedure above (Steps C through L of Section III). In Step D, enter a calibration value of **0.00**. Using the worksheet form, record the per cent weight losses (asphalt contents) calculated from the initial and final weighings. For each specimen, determine the difference between the actual asphalt content and the value determined by the ignition test. Calculate and record the average difference as the Calibration Factor for the mixture.

C. Sample Size and Preparation

1. Take samples as prescribed in GSP-15. Samples may consist of cores or loose mix.
2. Quarter loose samples. Sufficient loose material should be obtained to provide the minimum sample size after quartering. If a sample cannot be separated with a trowel or quartering device, heat it in a conventional oven at approximately 260 °F (125 °C) until it becomes workable. Roadway core samples shall be heated and separated in the same manner.
3. Ensure that core samples are a minimum of 6 inches in diameter, with layers of different mixtures completely trimmed away. Do not quarter core samples. Obtain a sufficient number of cores to meet the minimum sample weight requirements set forth below. Test an additional sample for moisture if deemed necessary by the Testing Management Supervisor or Area Bituminous Construction Engineer. The sample used for moisture determination may not be used for asphalt cement determination. Minimum sample weights are as follows:

Superpave Mix	Min. Sample Wt lbs (g)
25 mm Superpave	5.5 (2500)
19 mm Superpave	4.4 (2000)
12.5 mm Superpave	3.3 (1500)
9.5 mm Superpave	2.6 (1200)
4.75 mm Mix	2.2 (1000)
9.5 mm OGFC	2.2 (1000)
12.5 mm OGFC	2.6 (1200)
12.5 mm PEM	2.6 (1200)
12.5 mm SMA	3.3 (1500)

NOTE: Steps 2 through 11 below describe how to operate the furnace. Ignition ovens from different manufacturers may vary somewhat in the arrangement and functions of manual controls, although the test procedure is the same. The following instructions apply to the most common equipment currently in use. Always refer to the manufacturer's handbook for instructions on the particular model to be used.

D. Procedures

1. Prerequisites

   A calibration factor must be established for each mixture tested, in accordance with B.2, above. The technician-operator shall be thoroughly familiar with the operating manual provided by the manufacturer, especially safety information, and a copy of the manual shall be on hand at all times. The ignition furnace shall be inspected for

cleanliness and safety, and the paper tape on which the data is printed must be in adequate supply to complete the test.

2. Temperature

   The furnace must be pre-heated to 1000 °F (538 °C). (This requires setting the furnace's timer to begin pre-heating two to four hours before testing.) Press "Temp" and enter the target temperature ("set point") to 1000 °F (538 °C). Press "Enter." Note and record the temperature displayed before starting the test.

3. Settings

   The Calibration Factor ("% Correction"), Sample Weight, and Percent Loss are each displayed in the same window, depending on which quantity is being entered. To enter the Calibration Factor, press "% Correction". The display will read "0.00". Enter the Calibration Factor for the specific mix to be tested, as determined in B.2 above, and Press "Enter". In rare cases, the Calibration Factor may be negative. To enter a negative calibration factor, press "% Correction" a second time, then enter the numerals. The Calibration Factor will be displayed with a negative sign in the window.

4. Weigh basket assembly

   On the laboratory balance, weigh the sample baskets and catch pan with guards in place; record the total weight on the attached worksheet.

5. Load sample

   Place the lower sample basket in the catch pan. Use a spatula or trowel to spread and level the material. Spread about half of the prepared sample into the lower basket in an even layer, taking care to keep the material away from the sides. Fit the upper basket in place over the lower one; place the remainder of the sample in an even layer in the upper basket.

6. Initial total and net weights

   Using the laboratory balance, take the total weight of the sample, baskets, catch pan, and basket guards. Calculate and record the net weight of the sample – i.e., the total weight minus the empty weight of the basket assembly, pan, and guards as determined in Step 4, above.

7. Set furnace

   Press "Weight" and enter the net weight of the sample – four digits, rounded to the nearest whole gram. The "Percent Loss" window will briefly display the sample weight. Ensure that the correct weight is displayed. Press "Enter" immediately.

8. Install baskets

   Place the sample baskets into the ignition chamber, ensuring that the baskets do not contact the sides and that the door latches firmly. The furnace will display the total weight of the assembly in the window marked "Balance Indicator". This weight should not differ from the total weight recorded in Step 7 above by more than 0.01 lb (5.0 grams). A difference greater than this or failure of the furnace scale to stabilize may indicate that the sample assembly is contacting the wall of the chamber or that there is a scale malfunction, which will invalidate the test. Refer to the manufacturer's procedures for resetting and adjusting the balance.

9. Start test

   Press the "Start/Stop" button. This will lock the ignition chamber door, actuate the combustion blower, and start the test. The test will continue until the weight of the sample has stabilized, during which time the apparatus will record the progressive loss of weight from the sample and the increase in ignition chamber temperature.

10. End of Test

    When the weight of the sample has stabilized, this will be indicated by a light and audible signal. Press the "Start/Stop" button again to unlock the chamber and cause the printer to print the test results. Remove the sample basket assembly (wearing the prescribed protective apparel) to a safe location and allow it to cool.

11. Final weight

    When the sample basket assembly has cooled to a safe temperature for handling, return it to the laboratory balance and record the final weight on the worksheet.

12. Gradation

    Empty the contents of the sample baskets into a flat pan. Use a sieve brush to remove any remaining fines. Perform a gradation analysis according to GDT 4 and GDT 38. Record results on the attached worksheet.

    - Fines by Correlation Method

      Where this test procedure is to be performed on numerous successive lots of the same production mixture, the amount passing the 0.075 mm sieve may be determined by the GDT 38 procedure alone and adjusted by means

of an established correlation between washed and unwashed gradations. The method of establishing the adjustment value is presented below. Use of the correlation method is authorized for quality control and quality assurance testing.

Establish the Adjustment for the amount passing the No. 200 (75 µm) sieve by averaging the differences between GDT 4 and GDT 38 (washed and unwashed) results for all samples from two successive lots from the same mixture, provided that the washed results are within 0.70% of each other and that the average difference obtained between washed and unwashed samples does not exceed 3.0%. The average difference may be used as the Adjustment and may be applied to the GDT 38 results for successive lots, in lieu of a washed gradation for each sample. Obtain a washed gradation at least every ten lots to verify the correlation. If the differences for all results, including previous as well as the new values, are within a range of 1.20% of each other, average all the results, and the average will used as the correlation for subsequent lots unless revised. If the range of washed gradation results exceeds 1.20%, or if the average difference between washed and unwashed samples exceeds 3.0 %, repeat the above procedure or perform the GDT 4 procedure on all samples.

E. Calculations

Perform the gradation analysis according to GDT 4 and GDT 38.

Calculate and report the Calibrated Asphalt Content of the sample as follows. Subtract the final total weight (W') from the initial total weight (W) determined in Step III.G and record as "Loss (W-W')." Divide this by the initial net weight (W), multiply by 100 per cent, and record as the percent loss. Add the Calibration Factor to the percent loss and record the result as "Calibrated Asphalt Content." As a check, compare this result with the final "% loss" and "calibrated asphalt content" as calculated by the furnace. (Note: The result determined with the external laboratory scale is deemed more accurate, since it is not affected by large temperature changes or variations in draft.) Attach the original printed test data to the worksheet.

F. Report

The worksheet form at the end of this document should be followed in recording and reporting all data. For project record purposes, report results on Form DOT 159-5.

Mixtures containing lime. It is sometimes useful to compare asphalt contents obtained by the extraction method with ignition test results on a mixture **for which no Calibration Factor has been determined**. It has been established through field studies that mixtures containing hydrated lime typically require adjustment for comparison with extraction results. In these cases, for mixtures containing 1.0 % lime, add 0.28 % to the “Percent Loss” and use the adjusted value to compare with extraction results.

D E P A R T M E N T O F T R A N S P O R T A T I O N
OFFICE OF MATERIALS AND RESEARCH

WORKSHEET FOR GDT-125:
METHOD OF TEST FOR DETERMINING ASPHALT CONTENT BY IGNITION

Test date _____ Technician preparing report:_____

Mix identification no. **or** source of mixture _____

Source code_____ Project no., if any _____

Comparison with (Independent Assurance sample only)_____

A. ASPHALT CONTENT

1. Initial weight: sample + basket assembly ____g
— basket assembly ____g
initial weight of sample ____g (W)

2. Final weight: sample + basket assembly ____g
— basket assembly _g
final weight of sample ____g (W')

3. Loss and per cent loss: W — W' = ____g
per cent loss: $\frac{(W - W')}{W} \times 100\%$ ___ %

4. Apply calibration factor + 0.___ %

CALIBRATED ASPHALT CONTENT ___.___%

B. GRADATION BY GDT-2 AND GDT -38

Sieve size, in. (mm)	Cumulative wt. retained	Per cent passing
1½ (37.5)		
1 (25)		
¾ (19)		
½ (12.5)		
3/8 (9.5)		

#4 (4.75)		
#8 (2.36)		
#16 (1.18)		
#30 (600 µm)		
#50 (300 µm)		
#100 (150 µm)		
#200 (75 µm)		

C. DETERMINING CALIBRATION FACTOR

Complete the following:

Mix Identification No. _____, or
Source codes and percentages of ingredients_____

DATA	Sample A	Sample B	Sample C	Sample D
a. Initial wt. of sample & basket assembly				
– Wt. of basket assembly				
= Wt., **W**, of unburned sample				
b. Final wt. of sample & basket assembly				
– Wt. of basket assembly				
= Wt., **W'**, of burned sample				
Enter Wt. Loss, **W –W'**				
Per cent loss, **P'** =100% ×**[W – W']** ÷**W**				
% AC, **P**, as mixed				
Difference = **P – P'** (show negative if **P'** is greater)				

<u>Calibration factor</u>. Average the differences algebraically: **_.__ %**

Check results. In nearly all cases, the average per cent loss will be less than the as-mixed asphalt content in the prepared samples, since some components of the bituminous material may not escape as gases. For this reason the calibration factor usually is positive; when added to the per cent loss, it compensates for these residual compounds.

The Calibration Factor normally will fall between – 0.06 % and 0.35%. When results fall outside this range, all procedures, batch weights, and calculations should be reviewed for possible errors. Also, a single result which differs from the average of the other three as much as 0.20% should be omitted from the final calculation.

Section 106—Control of Materials

106.01 Source of Supply and Quantity of Materials

The materials used in The Work shall meet all quality requirements of the Contract. Materials will not be considered as finally accepted until all tests, including any to be taken from the finished Work have been completed and evaluated. To expedite the inspection and testing of materials, the Contractor shall notify the Engineer in writing of his proposed sources of materials at least 2 weeks before delivery, or earlier if blend determinations or mix designs are required. When required, representative preliminary samples of the character and quality prescribed shall be submitted for examination and testing. The approval of preliminary samples does not obligate the Engineer to accept materials from the same source delivered later. If, after trial, it is found that sources of supply for previously approved materials do not produce uniform and satisfactory products, or if the product from any source proves unacceptable at any time, the Contractor shall furnish materials from other sources. The Engineer shall have the right to reject the entire output of any source from which he finds it is impractical to secure a continuous flow of uniformly satisfactory material.

Upon request by the Department, the Contractor shall furnish formal written invoices from the materials suppliers.

The invoice shall show the date shipped, the quantities, and the unit prices.

The Contractor shall purchase materials from suppliers who are willing for the Contractor to furnish the Department copies of invoices as noted herein upon request by the Department.

Materials used and operations performed under Section 400- Hot Mix Asphaltic Concrete Construction, shall be controlled and tested by the Contractor. This shall be done in such a manner as to produce a uniform product that meets Specification requirements. In the event the Contractor's quality control procedures do not achieve the desired objective, operations shall be suspended until satisfactory results are obtained.

The Contractor's quality control personnel shall be properly instructed and trained to perform all tests and make calculations, and shall be competent to control all processes so that the requirements are met.

106.02 Unacceptable Material

All material not conforming to the requirements of the Specifications will be considered as unacceptable. All unacceptable materials, whether in place or not, will be rejected and shall be removed immediately from the site of The Work unless otherwise directed by the Engineer. In case of failure by the Contractor to comply promptly with any order by the Engineer to remove rejected materials, the Engineer shall have authority to have such rejected materials removed by other means and to deduct the expense of such removal from any monies due, or to become due, to the Contractor. No rejected materials, the defects of which have been corrected, shall be used until the Engineer has given approval.

106.03 Samples, Tests, Cited Specifications

All materials will be inspected, tested, and approved by the Engineer before incorporation into The Work. Samples will be taken by a qualified representative of the Department. Unless otherwise designated, tests will be made by and at the expense of the Department and in accordance with methods of AASHTO, ASTM, or the published Specifications of any other designated organization that are current on the date of advertisements for bids. Copies of all tests will be furnished to the Contractor's representative at his request. Sampling and testing by the Department will be performed in accordance with the *Sampling, Testing and Inspection Manual*.

For Work performed under Section 400—Hot Mix Asphaltic Concrete Construction all materials shall be inspected and tested by the Contractor before incorporation into the Work. The Contractor's Quality Control Technician shall sample and test all quality control samples. The Contractor's quality control tests may be used as acceptance tests at the discretion of the Engineer. Sampling and testing by the Contractor shall be performed according to the Sampling, Testing, and Inspection Manual. Copies of all tests performed by the Contractor shall be furnished to the Engineer and will become a part of the project records. The Department will be responsible only for determining the acceptability of the construction and materials incorporated therein. The Contractor shall be responsible for the quality of the construction and materials incorporated therein. The Department will monitor the Contractor's Quality Assurance Acceptance Program to verify test accuracy.

A. Testing and Acceptance Plans

103. **A Lot:** Work will be accepted on a Lot-to-Lot basis in accordance with the requirements specified in the Acceptance Plans specified in Section 400- Hot Mix Asphaltic Concrete Construction. Lot sizes will normally be specified. In the event, however, that operational conditions cause work to be interrupted, or only partially completed before the Lot size specified has been achieved, the Lot may be redefined by the Engineer as being either the amount of work accomplished within the day, or he may combine that work with the next Lot of work. A Lot is set forth in these Specifications as a defined quantity of a specified material from a single source or a measured amount of specified construction assumed to be produced by the same process.

104. **Acceptance Plans:** The Acceptance Plan for a material, product, or an Item of construction, or completed work will be as specified hereinafter in Section 400 and Section 430 of these Specifications. However, in addition to the following conditions, the Department reserves the right to test any additional material for Work that appears defective and to require correction if necessary prior to acceptance.

105. **Resampling of Lots:** It is the intent of these Specifications that Lots of materials, products, Items of construction, or completed construction will meet Specification requirements at the time of submission. Resampling of deficient Lots as a basis for check tests may be done by the Engineer at his option.

Non-conforming Lots, which can be corrected by reworking, will not be re-sampled before such corrective action is taken. Sampling and testing of reworked areas shall be at the expense of the Contractor.

106. **Acceptance or Rejection:** Nonconforming Lots, materials, products, or Items of construction that are not adaptable to correction by reworking shall be removed and replaced, accepted without payment, or accepted at an adjusted price as stated in the Specifications, or if not stated, as directed by the Engineer.

Following the application of the Acceptance Plan, the decision of the Engineer shall be final as to the acceptance, rejection, or acceptance at an adjusted price of the Lots unless the Contractor elects to remove and replace any deficient materials or Work at his expense.

107. **Adjusted Payment**:

g. **Single Deficiency:** A single deficiency is defined as a deficiency involving one characteristic of a material within a Lot. In the case of single-characteristic deficiency, it shall be used directly to determine an adjusted Contract Price.

h. **Multiple Deficiency:** A multiple deficiency is defined as deficiencies involving more than one characteristic of construction within a Lot. In the case of multiple deficiencies, the related adjusted percentage of Contract Price for each characteristic shall be determined and the greatest reduction in price shall be used to determine the Contract Unit Price to be paid. Should the total adjustment for any individual Lot be 50 percent or more, the Engineer will determine whether the deficient Lot should be removed and replaced or allowed to remain in place. No payment will be made for the original Lot or for its removal. Replacement of the Lot will be paid for in accordance with the provisions for the Item.

106.04 Plant Inspection

At the option of the Engineer, materials may be sampled and tested at the source of supply. In the event plant inspection is undertaken, the following conditions shall be met:

A. The Engineer shall have the cooperation and assistance of the Contractor as well as the Contractor's material supplier.

B. The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished.

C. If specified in the Proposal, the Contractor shall arrange for an approved building for the use of the inspector; such building to be located conveniently near the plant, independent of any building used by the material producer, and conforming to the requirements of Subsection 106.11 and Section 152.

D. Adequate safety measures shall be provided and maintained. This shall include sampling valves on storage tanks for bituminous materials and safety stands for use in sampling from truck beds.

E. It is understood that the Department reserves the right to retest all materials which, prior to incorporation into the Work, have been tested and accepted at the source of supply and after the same have been delivered. The Department further reserves the right to reject all materials which, when retested, do not meet the requirements of the Contract Specifications.

106.05 Materials Certification

For certain products, assemblies, and materials, in lieu of normal sampling and testing procedures by the Contractor and the Department, the Engineer may accept from the Contractor the manufacturer's certification with respect to the product involved, under the conditions set forth in the following paragraphs:

A. The certification shall state that the named product conforms to the Department's requirements and that representative samples thereof have been sampled and tested as specified.

B. The certification shall either:

1. Be accompanied with a certified copy of the test results, or
2. Certify that such test results are on file with the manufacturer and will be furnished to the Engineer upon demand.

C. The certification shall give the name and address of the manufacturer and the testing agency and the date of tests, and shall set forth the means of identification which will permit field determination of the product delivered to the project as being the product covered by the certification.

D. The certification shall be in duplicate with one copy to be sent with the shipment of the covered product to the Department's Project Engineer, and with one copy sent to the Department's Materials Engineer at Atlanta, Georgia.

No Certificate will be required for Portland Cement when furnished from a manufacturer approved by the Department.

E. The Department will not be responsible for any costs of certification or for any costs of the sampling and testing of products in connection therewith.

F. The Department reserves the right to require samples and to test products for compliance with pertinent requirements irrespective of prior certification of the products by the manufacturer. Any materials that fail to meet specification requirements will be rejected.

106.06 Agricultural Lime and Fertilizer

The sale and distribution of Fertilizers and Agricultural Lime are governed by Acts of the Georgia General Assembly and Rules and Regulations of the State Department of Agriculture.

Therefore, either of these materials may be sampled by authorized representatives of the State Commissioner of Agriculture. The Contractor may use these materials in The Work without sampling provided he notifies the Engineer 48 hours in advance of anticipated delivery to the job site. The Engineer reserves the right to request random sampling by a representative of the State Department of Agriculture.

The Contractor will not be expected to withhold application pending completion of tests, but will not be relieved of the responsibility for the quality of the material furnished. In the event a sample fails to meet the requirements of the Georgia Law as evidenced by a report furnished by the Commissioner of Agriculture, the Engineer will deduct from monies due to the Contractor a sum equal to the penalty authorized by the above referenced Act.

106.07 Sample Holes

All holes dug or drilled for the purpose of taking samples or determining thickness any time before final acceptance of The Work shall be repaired by the Contractor.

The material replaced shall be compacted and finished to the satisfaction of the Engineer. Costs of this work shall be included in the appropriate Bid Items.

106.08 Storage of Materials

Portions of the right-of-way, approved by the Engineer, may be used for material storage purposes and for the placing of the Contractor's plant and equipment. Additional space required must be provided by the Contractor at no additional expense to the Department. Private property shall not be used for storage purposes without written permission of the owner or lessee, and if requested by the Engineer, copies of such written permission shall be furnished.

Materials shall be stored to assure the preservation of their quality and fitness for The Work, and shall be located so as to facilitate their prompt inspection. Stored materials, even though approved before storage, may again be inspected before their use in The Work.

All storage sites shall be restored to their original condition by the Contractor at no additional expense to the Department.

No inflammable materials or harmful chemicals shall be stored within 200 ft (60 m) of a structure nor within 200 ft (60 m) of a roadway open to traffic. Such materials shall be stored in accordance with directions from the manufacturer.

106.09 Handling Materials

All materials shall be handled in such a manner as to preserve their quality and fitness for The Work. Aggregates, and mixtures of aggregates with other materials, shall be transported from the storage site to The Work in tight vehicles so constructed as to prevent loss or segregation of materials after loading and measuring in order that there may be no inconsistency in the qualities of the materials intended for incorporation into The Work as loaded and the qualities as actually received at the place of operation. The actual incorporation of the material in The Work shall be such that the quality and fitness of the material is retained and no segregation results.

106.10 Local Material Sources

A. Sources Shown on the Plans

Possible sources of local materials and/or disposal areas may be designated on the Plans. The quality of materials in such deposits will be acceptable in general but the Department does not warrant either the quality or the quantity of materials shown on the Plans. The Contractor shall determine the amount of equipment and work required to produce a material meeting the Specifications. Pit mixing, selective excavation, and other such operations shall be expected and the Contractor shall determine the extent of these activities. It shall be understood that it is not feasible to ascertain from samples the limits for an entire deposit and that variations in quality and quantity shall be considered as usual and are to be expected.

108. When easements to secure local materials and/or disposal areas are obtained by the Department, the Plans will show the locations of the pits or areas, the amount of royalties and other costs and conditions of acquisition of the material. In all cases where the Department has secured easements for material pits and/or disposal areas, these easements will be assigned to the Contractor who shall make prompt payment to the owners of such pits for all royalty and crop damage costs for materials and/or areas, and who shall further fulfill all of the terms of the Easement. The Department does not warrant the title or any interest of the property owner in such Easements.

109. If the Contractor elects to use only a portion of the materials or area estimated to be available in any pit or disposal area, or only clears or partially clears the pit or area, and does not remove or deposit any material, he shall make a minimum payment to the property owner of at least 33-1/3 percent of the estimated value of the pit or areas as shown in the Easement, plus any crop damage costs called for by the Easement.

    The Contractor shall, before receiving final payment from the Department, submit to the Engineer a written statement signed by the owner stating that the owner has been paid in full and that all conditions agreed to have been fulfilled to the satisfaction of the owner. The Department will not take any separate payment to the Contractor for these material acquisition costs except that reclamation of the pit or area, if required, will be paid for in accordance with Section 160.

    Should the Contractor fail to pay the property owner within 60 days after ceasing to use the pit or area, the Department may pay directly to the property owner any amounts due and deduct same from any funds due the Contractor. This provision does not affect the obligation of the Contractor under his Bond or the rights of the property owner or the Department under the Bond.

B. Substitution of Sources of Materials

110. If, after the Contract is awarded, the Contractor wishes to substitute other sources for sources designated on the Plans, he may do so provided the material to be substituted conforms to the Specifications. The Contractor shall make all necessary arrangements with the property owners for removal of the material from substituted pits. Payment will be made for Clearing and Grubbing, Stripping Excavation, Pit Reclamation, and Ditch Excavation only to the extent required for pits shown in the Plans. This does not relieve the Contractor from planting a satisfactory cover crop of the type called for on the Plans or required by the Specifications on all scarred areas created by the removal of materials.

    In the event the Contractor substitutes a source for soil-cement, soil-bituminous, or other material to be stabilized, and the Engineer determines that the substitute source requires more stabilizing agent than the Plan pit, no payment will be made for the additional stabilizing agent required.

111. Substitution sources will not be allowed where the resulting scars will present an unsightly appearance from any State or Federal highway.

C. Material Pits Furnished By the Contractor

When sources of any, or all, local materials are not shown on the Plans, or when location maps of possible sources of materials are shown on the Plans for information but no Easements are obtained, the Contractor shall provide sources of material meeting Contract requirements and acceptable to the Engineer. The Contractor shall make arrangements with the property owner regarding rights to remove material from the pits but prior to final acceptance by the State, the Contractor shall furnish the Engineer documentary proof of payment to the property owner for all materials as stated in

Subsection 106.10.A.2 above. Under these circumstances, no separate payment will be made for Clearing and Grubbing, or Reclamation of Pits. Material sources shall not be excavated at locations where the resulting scars will present an unsightly appearance from any State or Federal highway. No payment will be made for material obtained in violation of this provision.

The Contractor shall provide a survey and sketch for all contractor-furnished material pits and haul road routes in accordance with the following:

The pit boundaries and haul road routes shall be selected and staked at 200 ft (60 m) intervals or as required by the Engineer. Minimum work shall include measurement of pit boundaries and haul road routes using a chain or stadia and measurement of angles or bearings using a transit or a Brunton Compass. Pit boundaries and haul road routes shall be adequately marked and referenced to a centerline station number on the project.

D. Haul Roads

Unless specifically provided, no separate payment will be made to the Contractor for construction or maintenance of any roads constructed for hauling materials. The cost of constructing, maintaining, and revegetating, if necessary, these haul roads shall be included in the prices bid for the Pay Items pertaining to the part of The Work in which the materials are used. Other designated Haul Roads will be paid for in accordance with Section 233.

106.11 Field Laboratory

The Contractor may be required to provide a field laboratory on or near the Project consisting of a suitable building in which to house and use the equipment necessary to perform the required tests. The building, if required, will meet the requirements of and be paid for in accordance with Section 152.

At all permanent plants producing asphaltic concrete, Portland cement concrete or cement stabilized base course materials, a fully equipped plant laboratory shall be furnished at no expense to the Department.

106.12 Inspection for Non-Domestic Materials

A. Materials Manufactured Outside the United States

Materials which are manufactured outside the United States shall be delivered to a distribution point in the United States, where the materials shall be retained for a sufficient period of time to permit inspection, sampling, and testing. The Contractor, at no cost to the Department, shall furnish facilities and arrange for all testing as required by the Engineer to ensure that the materials comply with the Specifications. All such tests shall be made in the presence of the Engineer or his representative, and if the tests are performed outside of the boundaries of the State of Georgia and its contiguous area, the Contractor shall reimburse the Department for the expenses actually incurred by the Engineer or his representative in attending the tests.

B. Certified Mill Test Reports

Certified mill test reports shall be furnished for all materials obtained from foreign manufacturers. Such reports shall be printed in English and shall be clearly identifiable to the lot of material tested.

C. Materials from Foreign Manufacturers

Materials shall be furnished only from those foreign manufacturers who have previously established, to the satisfaction of the Engineer, the sufficiency of their in-plant quality control which will give satisfactory assurance of the manufacturer's ability to furnish material uniformly and consistently in compliance with the Specifications. Such sufficiency shall be established by detailed written evidence to the Engineer's satisfaction, or, if deemed necessary, through in-plant inspection by the Engineer or his representative; the cost of such inspection to be reimbursed by the Contractor.

D. Structural Steel Fabricated Outside the State of Georgia

In the event the Contractor elects to have items of structural steel fabricated outside the boundaries of the State of Georgia and its contiguous area, the Contractor shall reimburse the Department for the actual cost of the shop inspection of such fabrication in excess of the average inspection cost for shop inspection of fabrication within the State of Georgia and its contiguous area. Such actual costs of shop inspection may include the actual expenses incurred by the Engineer or his representative in making an in-plant inspection, arranging for an approved inspection agency to make the shop inspection, and the cost of the shop inspection by the approved inspection agency.

E. Department Reimbursement

In the event the Contractor fails to reimburse the Department promptly for any of the costs established by this provision, the Contractor agrees that the amount of such costs may be deducted from amounts of money owing to the Contractor on Monthly Estimates or Final Estimate.

F. Definitions

The following definitions shall apply to Subsection 106.12.

United States: The geographical area of the United States of America excluding its territories and possessions.

State of Georgia and Contiguous Area: The geographical area within the State of Georgia and those states which share a common border with the State of Georgia.

Average Inspection Cost: The average of the actual expenses incurred in making an inspection within the area designated as determined by the Engineer.

Foreign Manufacturer: A manufacturer of materials where the materials are manufactured outside the geographical area of the United States.

106.13 Out of State Materials Payment

Materials payments to Contractors who elect to have materials fabricated and stored outside the boundaries of the State of Georgia shall be made under the following guidelines.

The Contractor shall submit a written request to the Engineer for an inspection of out-of-state materials. This request shall state that the Contractor agrees to reimburse the Department for the actual cost of travel, subsistence, and extra expense incurred by the Department in the execution of this inspection and any subsequent inspection that may be necessary. This request shall be signed by a person legally responsible to bind the company and shall be notarized.

In the event the Contractor fails to reimburse the Department promptly for any of the costs established by this provision, the Contractor agrees that the amount of such costs may be deducted from amounts of money owing to the Contractor on Monthly Estimates or Final Estimate.

The above requirements are not applicable to the fabrication and materials payment for structural steel, prestress beams, precast bridge units, and piling for bridge construction within the states which share a common border with the State of Georgia.

Section 152—Field Laboratory Building

152.1 General Description

This work includes furnishing and maintaining field laboratory buildings, if required by the Contract. The building is reserved for the Engineer's exclusive use as long as the Engineer deems necessary.

152.1.01 Definitions

General Provisions 101 through 150.

152.1.02 Related References

A. Standard Specifications

Section 400—Hot Mix Asphaltic Concrete Construction

Section 402—Hot Mix Recycled Asphaltic Concrete

B. Referenced Documents

AASHTO TP4

AASHTO T166

AASHTO T209

AASHTO T309

GDT 125, "Method of Test for Determining Asphalt Content by Ignition"

NFPA–10A

152.1.03 Submittals

General Provisions 101 through 150.

152.2 Materials

General Provisions 101 through 150.

152.2.01 Delivery, Storage, and Handling

General Provisions 101 through 150.

152.3 Construction Requirements

General Provisions 101 through 150.

152.3.01 Personnel

General Provisions 101 through 150.

152.3.02 Equipment

General Provisions 101 through 150.

152.3.03 Preparation

General Provisions 101 through 150.

152.3.04 Fabrication

General Provisions 101 through 150.

152.3.05 Construction

A. Field Laboratory Physical Requirements

Provide a laboratory using a structure approved by the Engineer, such as a:

- Building
- Trailer

- Fixed building erected on the site
- Vacated house at an approved location

Each field laboratory shall house the required testing equipment and meet the minimum requirements for dimensions, space, and facilities.

Each building or trailer shall be at least 7 ft (2.1 m) wide and 7 ft (2.1 m) high inside and contain not less than 120 ft² (11 m²) of floor space. Each unit shall be floored, roofed, and weather tight and contain the following:

- At least one hinged or sliding window on each side with each window having at least 6.5 ft² (0.6 m²) of openings
- An entrance door that can be securely locked
- Built-in work table with at least two drawers (one lockable)
- Lighting and ventilation
- Heating with necessary fuel
- Potable running water
- Electric current
- Sheds and platforms required for special testing equipment
- Sanitary Facilities—Include in each field laboratory sanitary facilities that meet the requirements of the local or State Health Departments.
- Fire Extinguisher—Equip each building with at least one approved fire extinguisher that meets the following requirements:
  1) Multipurpose dry chemical type extinguisher
  2) Underwriters Laboratory rating of 4A-40BC

  Mount the extinguisher(s) in a convenient and conspicuous place that is easily accessible from any part of the building. Maintain the extinguisher(s) in working condition according to the requirements of NFPA–10A.

B. Plant Laboratory Physical Requirements

Provide laboratory buildings at asphalt, concrete, or base plants. Place the buildings so that the plant is in full view from one of the windows.

C. Number of Laboratories Required

The number of laboratories shown in the Proposal is based on estimated job requirements. Actual conditions may require more or fewer. Provide the quantity as required by the Engineer at the Unit Price Bid for the facility.

D. Asphaltic Concrete Plant Laboratory Requirements

112. **Laboratory Building.** Provide a laboratory building that meets the minimum requirements for a Field Laboratory as described in Subsection 152.3.05.A.

113. **Ventilation System.** Equip the laboratory so that when the windows and doors are closed and the ventilation system is functioning as required, the temperature can be maintained between 65 °F and 80 °F (18 °C and 27 °C).

114. **Enclosures.** Provide enclosures in laboratories for procedures where extracting solvent vapors are emitted. After the asphalt is extracted, dry samples under an enclosure or inside an oven that is vented outside the lab. Provide enclosures as follows:

i. Equip each enclosure with the following:

- A hood, glass, or other doors capable of enclosing the extracting solvent vapors from the ambient air in the lab
- An exhaust fan located in the rear or top of the hood for each work compartment
- Replacement air provided through an open window or other opening to achieve the specified exchange of air
- Ventilation system capable of exchanging air at the rate of 100 ft³/ft²/min (30 m³/m²/min) over the entire open door area of each enclosure

j. Locate the laboratory ventilation, heating, and cooling systems so that the exhausted extracting solvent vapors do not re-enter the laboratory through either the heating or cooling systems.

k. Ensure that the extracting solvent is supplied to the laboratory through a closed-system opening only under the enclosures.

l. Mount the storage containers for the extracting solvent outside the laboratory and run a feed line from the container to a cut-off valve located in the enclosures. Ensure that all parts of the enclosures, hoods, and other related equipment are functional during testing.

115. **Platform.** Provide a safe platform to the proper height for the Inspector to use to obtain asphalt mix or base samples and to inspect mixes in the truck beds.

116. **Testing Equipment.** Furnish and maintain in good condition at the field laboratory the following testing equipment. All testing equipment is subject to the Engineer's approval.

m. One each—Oven (mechanical convection, range to 400 °F (204 °C). Comparable to Blue M Model OV-560A-2.

NOTE: Vent the oven exhaust outside the laboratory.

n. b. One each—Sieve Shaker (Ro-Tap design or approved equal). Designed for Standard 8 in (203 mm) diameter sieve.

c. One each—

- Computer, IBM or IBM Compatible
- 540 Megabyte Hard Disk Drive (Minimum)
- 3 ½ inch (90 mm) High Density Floppy Disk Drive
- CD-ROM Drive (4X Minimum)
- Mouse
- Modem 9600 Baud (Minimum)
- 1 Parallel and 2 Serial Ports
- 16 Megabyte Random Access Memory Expandable to at Least 32 Megabytes
- VGA Monitor
- 486 Microprocessor Operating at 33 Megahertz (Minimum)

d. One each—Printer (Desk Jet HP Letter Quality Printer)

e. One each—Electronic balance with weighing capacity of at least 26.45 lb. (12,000 grams) with digital display, and sensitivity to meet requirements of AASHTO T166 and AASHTO T209. The weighing device shall have a suspension apparatus which meets requirements of AASHTO T166.

* One each—Superpave Gyratory Compactor (SGC) Equipment-A Superpave Gyratory Compactor and appurtenances, including a calibration kit, which meets equipment requirements and testing protocol of a nationally recognized Superpave Center and AASHTO TP 4. The SGC shall be equipped with:

- A printer to provide a real-time printout of the date and time of compaction, number of gyrations, and specimen height for each gyration during the compaction cycle.
- At least two mold assemblies
- A specimen extruder

*One each—Vacuum pump flasks or bowls, fittings and other accessories as required by AASHTO T209. (A corelok device with related accessories may be substituted if approved by the Department).

*One each—Asphalt Ignition Oven which meets requirements of GDT 125 and AASHTO T309.

f. *Required only for interstate Projects involving mainline traveled way that include pay items under Section 400 or Section 402.

g.

E. Portland Cement Concrete Plant Laboratory Requirements

For Portland cement concrete plants, provide a plant laboratory building and testing and curing equipment meeting the following minimum requirements.

117. **Laboratory Building.** Provide a laboratory building that contains:

- Combined office/workspace measuring 300 ft² (28 m²)
- Heating and air conditioning equipment capable of maintaining an interior temperature of 70 °F (21 °C)
- Separate office space with enough space for a desk and at least two chairs

- A work table at least 2.5 ft (750 mm) wide, 5 ft (1500 mm) long, and 3 ft (900 mm) high to prepare concrete cylinders for testing
- An outside work area of at least 10 ft by 10 ft (3 m by 3 m) consisting of a concrete slab constructed level and true, with a light broom finish

118. **Testing and Curing Equipment.** Provide the following testing and curing equipment:

- Concrete cylinder capping equipment including molds, melting pot with ventilation and accessories, and a sufficient supply of capping compound, all meeting applicable ASTM Specifications.
- Concrete cylinder compression testing machine with a minimum capacity of 250,000 lbs (1112 kN) that meets applicable ASTM Specifications.
- Concrete cylinder curing tanks capable of maintaining 200 cylinders at 73 °F ± 3 °F (23 °C ± 1.7 °C) for a 28-day curing period.
- Concrete cylinder warm water curing tank capable of maintaining 18 cylinders at 95 °F ± 5 °F (35 °C ± 2.8 °C) for a 24-hour curing period.

Maintain the equipment in good condition and to the Engineer's approval.

152.3.06 Quality Acceptance

The dimensions specified above are minimum requirements. Minor dimensional and detail deviations are not cause for rejection if the Engineer approves of the deviation.

152.3.07 Contractor Warranty and Maintenance

Maintain each building, appurtenance, and sanitary facility as required by this Specification. Furnish electricity, water, and heating as required by this Specification.

Ownership of the building(s) remains with the Contractor. Maintaining and furnishing the buildings(s) after the date of Final Acceptance of the Project is not required.

152.4 Measurement

The actual number of field laboratories furnished according to this Specification is measured separately for each laboratory. There will be no measurement or payment for laboratories furnished at base, asphaltic concrete, or Portland cement concrete central mix plants.

152.4.01 Limits

General Provisions 101 through 150.

152.5 Payment

Each field laboratory measured for payment as described in Subsection 152.4, is paid at the Contract Unit Price bid for each laboratory.

Payment is full compensation for the cost of all foundations, buildings, sheds, platforms, utilities, maintenance, sanitary facilities, removal, razing, heat, electricity, water, and site preparation and cleanup according to this Specification.

Payment for each field laboratory is made in two installments:

- Sixty-five percent of the contract price is paid when the Laboratory is ready for occupancy.
- Thirty-five percent of the contract price is paid when the Department finishes using the laboratory.

Payment will be made under:

Item No. 152	Field laboratory	Per each

152.5.01 Adjustments

General Provisions 101 through 150.

Section 400—Hot Mix Asphaltic Concrete Construction

400.1 General Description

This work includes constructing one or more courses of bituminous plant mixture on the prepared foundation or existing roadway surface. The mixture shall conform with lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

This section includes the requirements for all bituminous plant mixtures regardless of the gradation of the aggregates, type and amount of bituminous material, or pavement use.

Work will be accepted on a lot-to-lot basis according to the requirements of this Section and Section 106.

400.1.01 Definitions

Segregated Mixture: Mixture which lacks homogeneity in HMA constituents of such a magnitude that there is a reasonable expectation of accelerated pavement distress or performance problems. May be quantified by measurable changes in temperature, gradation, asphalt content, air voids, or surface texture.

New Construction: A roadway section more than 0.5 mile (800 m) long that is not longitudinally adjacent to the existing roadway. If more than one lane is added, and any of the lanes are longitudinally adjacent to the existing lane, each lane shall be tested under the criteria for a resurfacing project.

Trench Widening: Widening no more than 4 ft. (1.2 m) in width.

Comparison sample: Opposite quarter of material sampled by the Contractor.

Quality assurance sample: Independent sample taken by the Department.

Referee sample: A sample of the material remaining after quartering which is used for evaluation if a comparison of Contractor and Departmental test results is outside allowable tolerances.

400.1.03 Submittals

A. Invoices

When the Department requests, furnish formal written invoices from a supplier for all materials used in production of HMA. Show the following on the Bill of Lading:

- Date shipped
- Quantity in tons (megagrams)
- Included with or without additives (for asphalt cement)

Purchase asphaltic cement from a supplier who will provide copies of Bill of Lading upon the Department's request.

B. Paving Plan

Before starting asphaltic concrete construction, submit a written paving plan to the Engineer for approval. Include the following on the paving plan:

- Proposed starting date
- Location of plant(s)
- Rate of production
- Average haul distance(s)
- Number of haul trucks
- Paver speed feet (meter)/minute for each placement operation
- Mat width for each placement operation
- Number and type of rollers for each placement operation
- Sketch of the typical section showing the paving sequence for each placement operation
- Electronic controls used for each placement operation
- Temporary pavement marking plan

If staged construction is designated in the Plans or contract, provide a paving plan for each construction stage.

If segregation is detected, submit a written plan of measures and actions to prevent segregation. Work will not continue until the plan is submitted to and approved by the Department.

C. Job Mix Formula

After the Contract has been awarded, submit to the Engineer a written job mix formula proposed for each mixture type to be used based on an approved mix design. Furnish the following information for each mix:

- Specific project for which the mixture will be used
- Source and description of the materials to be used
- Mixture I.D. Number
- Proportions of the raw materials to be combined in the paving mixture
- Single percentage of the combined mineral aggregates passing each specified sieve
- Single percentage of asphalt by weight of the total mix to be incorporated in the completed mixture
- Single temperature at which to discharge the mixture from the plant
- Theoretical specific gravity of the mixture at the designated asphalt content
- Name of the person or agency responsible for quality control of the mixture during production

Do the following to have the formulas approved and to ensure their quality:

119. Submit proposed job mix formulas for review at least two weeks before beginning the mixing operations.
120. Do not start hot mix asphaltic concrete work until the Engineer has approved a job mix formula for the mixture to be used. No mixture will be accepted until the Engineer has given approval.
121. Provide mix designs for all Superpave and 4.75 mm mixes to be used. The Department will provide mix design results for other mixes to be used.
122. After a job mix formula has been approved, assume responsibility for the quality control of the mixtures supplied to the Department according to Subsection 106.01, "Source of Supply and Quantity of Materials."

D. Quality Control Program

Submit a Quality Control Plan to the Office of Materials and Research for approval. The Quality Control Program will be included as part of the certification in the semiannual plant inspection report.

400.2 Materials

Ensure that materials comply with the specifications listed in Table 1.

Table 1—Materials Specifications

Material	Subsection
Asphalt Cement, Grade Specified	820.2
Coarse Aggregates for Asphaltic Concrete	802.2.02
Fine Aggregates for Asphaltic Concrete	802.2.01
Mineral Filler	883.1
Heat Stable Anti-Stripping Additive	831.2.04
Hydrated Lime	882.2.03
Silicone Fluid	831.2.05
Bituminous Tack Coat: PG 58-22, PG 64-22, PG 67-22	820.2
Hot Mix Asphaltic Concrete Mixtures	828
Fiber Stabilizing Additives	819

When required, provide Uintaite material, hereafter referred to by the common trade name Gilsonite, as a reinforcing agent for bituminous mixtures. Supply a manufacturer's certification that the Gilsonite is a granular solid which meets the following requirements:

Softening Point (AASHTO: T-53)	300-350 °F (150-175 °C)
Specific Gravity, 77 °F (25 °C) (AASHTO: T-228)	1.04 ± 0.02

Flash Point, COC (AASHTO: T-48)	550 °F (290 °C) Min.
Ash Content (AASHTO: T-111)	1.0% Max.
Penetration, 77 °F (25 °C), 100 gm., 5 sec. (AASHTO: T-49)	0

400.2.01 Delivery, Storage, and Handling

Storage of material is allowed in a properly sealed and insulated system for up to 24 hours except that Stone Matrix Asphalt (SMA), Open-Graded Friction Course (OGFC), or Porous European Mix (PEM) mixtures shall not be stored more than 12 hours. Mixtures other than SMA, OGFC, or PEM may be stored up to 72 hours in a sealed and insulated system, equipped with an auxiliary inert gas system, with the Engineer's approval. Segregation, lumpiness, or stiffness of stored mixture is cause for rejection of the mixture. The Engineer will not approve using a storage or surge bin if the mixture segregates, loses excessive heat, or oxidizes during storage.

The Engineer may obtain mixture samples or recover asphalt cement according to GDT 119. AASHTO T 202 and T 49 will be used to perform viscosity and penetration tests to determine how much asphalt hardening has occurred.

A. Vehicles for Transporting and Delivering Mixtures

Ensure that trucks used for hauling bituminous mixtures have tight, clean, smooth beds.

Follow these guidelines when preparing vehicles to transport bituminous mixtures:

123. Use an approved releasing agent from QPL 39 in the transporting vehicle beds, if necessary, to prevent the mixture from sticking to the bed. Ensure that the releasing agent is not detrimental to the mixture. When applying the agent, drain the excess agent from the bed before loading.
124. Protect the mixture with a waterproof cover large enough to extend over the sides and ends of the bed. Securely fasten the waterproof cover before the vehicle begins moving.
125. Insulate the front end and sides of each bed with an insulating material with the following specifications:
    - Consists of builders insulating board or equivalent
    - Has a minimum "R" value of 4.0
    - Can withstand approximately 400 °F (200 °C) temperatures

    Install the insulating material so it is protected from loss and contamination.
126. Mark each transporting vehicle with a clearly visible identification number.
127. Create a hole in each side of the bed so that the temperature of the loaded mixture can be checked.

Ensure that the mixture is delivered to the roadway at a temperature within ± 20 °F (± 11 °C) of the temperature on the job mix formula.

If the Engineer determines that a truck may be hazardous to the Project or adversely affect the quality of the work, remove the truck from the project.

B. Containers for Transporting, Conveying, and Storing Bituminous Material

To transport, convey, and store bituminous material, use containers free of foreign material and equipped with sample valves. Bituminous material will not be accepted from conveying vehicles if material has leaked or spilled from the containers.

400.3 Construction Requirements

400.3. 01 Personnel

General Provisions 101 through 150.

400.3.02 Equipment

Hot mix asphaltic concrete plants that produce mix for Department use are governed by Quality Assurance for Hot Mix Asphaltic Concrete Plants in Georgia, Laboratory Standard Operating Procedure No. 27.

The Engineer will approve the equipment used to transport and construct hot mix asphaltic concrete. Ensure that the equipment is in satisfactory mechanical condition and can function properly during production and placement operations. Place the following equipment at the plant or project site:

A. Field Laboratory

Provide a field laboratory according to Section 152.

B. Plant Equipment

128. Scales

Provide scales as follows:

h. Furnish (at the Contractor's expense) scales to weigh bituminous plant mixtures, regardless of the measurement method for payment.

i. Ensure that the weight measuring devices that provide documentation comply with Subsection 109.01, "Measurement and Quantities."

j. When not using platform scales, provide weight devices that record the mixture net weights delivered to the truck. A net weight system will include, but is not limited to:

- Hopper or batcher-type weight systems that deliver asphaltic mixture directly to the truck
- Fully automatic batching equipment with a digital recording device

k. Use a net weight printing system only with automatic batching and mixing systems approved by the Engineer.

l. Ensure that the net weight scale mechanism or device manufacturer, installation, performance, and operation meets the requirements in Subsection 109.01, "Measurement and Quantities"

m. Provide information on the Project tickets according to Department of Transportation SOP-15.

129. Time-Locking Devices

Furnish batch type asphalt plants with automatic time-locking devices that control the mixing time automatically. Construct these devices so that the operator cannot shorten or eliminate any portion of the mixing cycle.

130. Surge- and Storage-Systems

Provide surge and storage bins as follows:

n. Ensure that bins for mixture storage are insulated and have a working seal, top and bottom, to prevent outside air infiltration and to maintain an inert atmosphere during storage.

Bins not intended as storage bins may be used as surge bins to hold hot mixtures for part of the working day. However, empty these surge bins completely at the end of the working day.

o. Ensure that surge and storage bins can retain a predetermined minimum level of mixture in the bin when the trucks are loaded.

p. Ensure that surge and storage systems do not contribute to mix segregation, lumpiness, or stiffness.

131. Controls for Dust Collector Fines

Control dust collection as follows:

q. When collecting airborne aggregate particles and returning them to the mixture, have the return system meter all or part of the collected dust uniformly into the aggregate mixture and waste the excess. The collected dust percentage returned to the mixture is subject to the Engineer's approval.

r. When the collected dust is returned directly to the hot aggregate flow, interlock the dust feeder with the hot aggregate flow and meter the flow to maintain a flow that is constant, proportioned, and uniform.

132. Mineral Filler Supply System

When mineral filler is required as a mixture ingredient:

s. Use a separate bin and feed system to store and proportion the required quantity into the mixture with uniform distribution.

t. Control the feeder system with a proportioning device that meets these specifications:

- Is accurate to within ± 10 percent of the filler required
- Has a convenient and accurate means of calibration
- Interlocks with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes

u. Provide flow indicators or sensing devices for the mineral filler system and interlock them with the plant controls to interrupt the mixture production if mineral filler introduction fails.

v. Add mineral filler to the mixture as follows, according to the plant type:

- Batch Type Asphalt Plant. Add mineral filler to the mixture in the weigh hopper.
- Continuous Plant Using Pugmill Mixers. Feed the mineral filler into the hot aggregate before it is introduced into the mixer so that dry mixing is accomplished before the bituminous material is added.

- Continuous Plants Using the Drier-Drum Mixers. Add the mineral filler so that dry mixing is accomplished before the bituminous material is added and ensure that the filler does not become entrained into the air stream of the drier.

133. Hydrated Lime Treatment System

When hydrated lime is required as a mixture ingredient:

w. Use a separate bin and feed system to store and proportion the required quantity into the mixture.

x. Ensure that the aggregate is uniformly coated with hydrated lime aggregate before adding the bituminous material to the mixture. Add the hydrated lime so that it will not become entrained in the exhaust system of the drier or plant.

y. Control the feeder system with a proportioning device that meets these specifications:

- Is accurate to within ± 10 percent of the amount required
- Has a convenient and accurate means of calibration
- Interlocks with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes and to ensure that mixture produced is properly treated with lime

z. Provide flow indicators or sensing devices for the hydrated lime system and interlock them with the plant controls to interrupt mixture production if hydrated lime introduction fails.

134. Net Weight Weighing Mechanisms

Certify the accuracy of the net weight weighing mechanisms by an approved registered scale serviceperson at least once every 6 months. Check the accuracy of net weight weighing mechanisms at the beginning of Project production and thereafter as directed by the Engineer. Check mechanism accuracy as follows:

aa. Weigh a load on a set of certified commercial truck scales. Ensure that the difference between the printed total net weight and that obtained from the commercial scales is no greater than 4 lbs/1,000 lbs (4 kg/Mg) of load.

Check the accuracy of the bitumen scales as follows:

- Use standard test weights.
- If the checks indicate that printed weights are out of tolerance, have a registered scale serviceperson check the batch scales and certify the accuracy of the printer.
- While the printer system is out of tolerance and before its adjustment, continue production only if using a set of certified truck scales to determine the truck weights.

bb. Have plants that use batch scales maintain ten 50 lb (25 kg) standard test weights at the plant site to check batching scale accuracy.

Ensure that plant scales that are used only to proportion mixture ingredients, not to determine pay quantities, are within two percent throughout the range.

135. Fiber Supply System

When stabilizing fiber is required as a mixture ingredient:

a. Use a separate feed system to store and proportion by weight the required quantity into the mixture with uniform distribution.

b. Control the feeder system with a proportioning device that meets these Specifications:

- Is accurate to within ± 10 percent of the amount required. Automatically adjusts the feed rate to maintain the material within this tolerance at all times
- Has a convenient and accurate means of calibration
- Provide in-process monitoring, consisting of either a digital display of output or a printout of feed rate, in pounds (kg) per minute, to verify feed rate
- Interlocks with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes

c. Provide flow indicators or sensing devices for the fiber system and interlock them with the plant controls to interrupt the mixture production if fiber introduction fails or if the output rate is not within the tolerances given above.

d. Introduce the fiber as follows:

- When a batch type plant is used, add the fiber to the aggregate in the weigh hopper. Increase the batch dry mixing time by 8 to 12 seconds from the time the aggregate is completely emptied into the mixer to ensure the fibers are uniformly distributed prior to the injection of asphalt cement into the mixer.

- When a continuous or drier-drum type plant is used, add the fiber to the aggregate and uniformly disperse prior to the injection of asphalt cement. Ensure the fibers will not become entrained in the exhaust system of the drier or plant.

C. Equipment at Project Site

1. Cleaning Equipment

   Provide sufficient hand tools and power equipment to clean the roadway surface before placing the bituminous tack coat. Use power equipment that complies with Subsection 424.3.02.F, "Power Broom and Power Blower."

2. Pressure Distributor

   To apply the bituminous tack coat, use a pressure distributor that complies with Subsection 424.3.02.B, "Pressure Distributor."

3. Bituminous Pavers

   To place hot mix asphaltic concrete, use bituminous pavers that can spread and finish courses that are:

   - As wide and deep as indicated on the Plans
   - True to line, grade, and cross section
   - Smooth
   - Uniform in density and texture

   a. Continuous Line and Grade Reference Control. Furnish, place, and maintain the supports, wires, devices, and materials required to provide continuous line and grade reference control to the automatic paver control system.

   b. Automatic Screed Control System. Equip the bituminous pavers with an automatic screed control system actuated from sensor-directed mechanisms or devices that will maintain the paver screed at a pre-determined transverse slope and elevation to obtain the required surface.

   c. Transverse Slope Controller. Use a transverse slope controller capable of maintaining the screed at the desired slope within ± 0.1 percent. Do not use continuous paving set-ups that result in unbalanced screed widths or off-center breaks in the main screed cross section unless approved by the Engineer.

   d. Screed Control. Equip the paver to permit the following four modes of screed control. The method used shall be approved by the Engineer.

      - Automatic grade sensing and slope control
      - Automatic dual grade sensing
      - Combination automatic and manual control
      - Total manual control

      Ensure that the controls are referenced with a taut string or wire set to grade, or with a ski-type device or mobile reference at least 30 ft (9 m) long when using a conventional ski. A non-contacting laser or sonar-type ski with at least four referencing mobile stations may be used with a reference at least 24 ft. (7.3 m) long. Under limited conditions, a short ski or shoe may be substituted for a long ski on the second paver operating in tandem, or when the reference plane is a newly placed adjacent lane.

      Automatic screed control is required on all Projects; however, when the Engineer determines that Project conditions prohibit the use of such controls, the Engineer may waive the grade control, or slope control requirements, or both.

   e. Paver Screed Extension. When the laydown width requires a paver screed extension, use bolt-on screed extensions to extend the screeds, or use an approved mechanical screed extension device. When the screed is extended, add auger extensions according to the paver manufacturer's recommendations.

      Note: Do not use extendible strike-off devices instead of approved screed extensions. Only use a strike-off device in areas that would normally be luted

4. Compaction Equipment

   Ensure that the compaction equipment is in good mechanical condition and can compact the mixture to the required density. The compaction equipment number, type, size, operation, and condition is subject to the Engineer's approval

5. Materials Transfer Vehicle (MTV)

a. Use a Materials Transfer Vehicle (MTV) when placing asphaltic concrete mixtures on Projects on the state route system with the following conditions:

1) When to use:

- The ADT is equal to or greater than 6000,
- The project length is equal to or greater than 3000 linear feet (915 linear meters),
- The total tonnnage (megagrams) of all asphaltic concrete mixtures is greater than 2000 tons (1815 Mg).

2) Where to use:

- Mainline of the traveled way
- Collector/distributor (C/D) lanes on Interstates and limited access roadways
- Leveling courses at the Engineer's discretion

b. Ensure the MTV and conventional paving equipment meet the following requirements:

1) MTV

- Has a truck unloading system which receives mixture from the hauling equipment and independently deliver mixtures from the hauling equipment to the paving equipment.
- Has mixture remixing capability by either a storage bin in the MTV with a minimum capacity of 14 tons (13 megagrams) of mixture and a remixing system in the bottom of MTV storage bin, or a dual pugmill system located in the paver hopper insert with two full length transversely mounted paddle mixers to continuously blend the mixture as it discharges to a conveyor system.
- Provides to the paver a homogeneous, non-segregated mixture of uniform temperature with no more than 20 °F(18 °C) difference between the highest and lowest temperatures when measured transversely across the width of the mat in a straight line at a distance of one foot to three feet from the screed while the paver is operating.

2) Conventional Paving Equipment

- Has a paver hopper insert with a minimum capacity of 14 tons (13 Mg) installed in the hopper of conventional paving equipment when an MTV is used.

c. If the MTV malfunctions during spreading operations, discontinue placement of hot mix asphaltic concrete after there is sufficient hot mix placed to maintain traffic in a safe manner. However, placement of hot mix asphaltic concrete in a lift not exceeding 2 in. (50 mm) may continue until any additional hot mix in transit at the time of the malfunction has been placed. Cease spreading operations thereafter until the MTV is operational.

d. Ensure the MTV is empty when crossing a bridge and is moved across without any other Contractor vehicles or equipment on the bridge. Move the MTV across a bridge in a travel lane and not on the shoulder. Ensure the speed of the MTV is no greater than 5 mph (8 kph) without any acceleration or deceleration while crossing a bridge.

400.3.03 Preparation

A. Prepare Existing Surface

Prepare the existing surface as follows:

1. Clean the Existing Surface. Before applying hot mix asphaltic concrete pavement, clean the existing surface to the Engineer's satisfaction.
2. Patch and Repair Minor Defects

   Before placing leveling course:

   cc. Correct potholes and broken areas that require patching in the existing surface and base as directed by the Engineer.

   dd. Cut out, trim to vertical sides, and remove loose material from the areas to be patched.

   ee. Prime or tack coat the area after it has been cleaned. Compact patches to the Engineer's satisfaction. Material for patches does not require a job mix formula, but shall meet the gradation range shown in Section 828. The Engineer must approve the asphalt content to be used.
3. Apply Bituminous Tack Coat

   Apply the tack coat according to Section 413. The Engineer will determine the application rate, which must be within the limitations Table 2.

Table 2—Application Rates for Bituminous Tack, gal/yd² (L/m²)

	Minimum	Maximum
Under OGFC and PEM Mixes	0.06 (0.270)	0.08 (0.360)
All Other Mixes	0.04 (0.180)	0.06(0.270)
*On thin leveling courses and freshly placed asphaltic concrete mixes, reduce the application rate to 0.02 to 0.04 gal/yd² (0.09 to 0.18 L/m²).		

B. Place Patching and Leveling Course

1. When the existing surface is irregular, bring it to the proper cross section and grade with a leveling course of hot mix asphaltic concrete materials.
2. Use leveling at the same Superpave Mix Design Level specified for the surface course except when leveling is no greater than 0.75 inch (19 mm).
3. Place leveling at the locations and in the amounts directed by the Engineer.
4. Use leveling course mixtures that meet the requirements of the job mix formulas defined in:
   - Subsection 400.3.05.A, "Observe Composition of Mixtures"
   - Section 828
   - Leveling acceptance schedules in Subsection 400.3.06.A, "Acceptance Plans for Gradation and Asphalt Cement Content"
5. If the leveling and patching mix type is undesignated, determine the mix type by the thickness or spread rate according to Table 3, but do not use 4.75 mm mix on interstate projects.

Table 3—Leveling and Patching Mix Types

Thickness	Rate of Spread	Type of Mix
Up to 0.75 in (19 mm)	Up to 85 lbs/yd² (45 kg/m²)	4.75 mm Mix or 9.5 mm Superpave (Level A)
0.75 to 1.5 in (19 to 38 mm)	85 to 165 lbs/yd²(45 to 90 kg/m²)	9.5 mm Superpave (Level B)
1.5 to 2 in (38 to 50 mm)	165 to 220 lbs/yd² (90 to 120 kg/m²)	12.5 mm Superpave *
2 to 3 in (50 to 75 mm)	220 to 330 lbs/yd² (120 to 180 kg/m²)	19 mm Superpave *
Over 3 in (75 mm)	Over 330 lbs/yd² (180 kg/m²)	25 mm Superpave

* These mixtures may be used for isolated patches no more than 6 in. (150 mm) deep and no more than 4 ft. (1.2 m) in diameter or length.

400.3.04 Fabrication

General Provisions 101 through 150.

400.3.05 Construction

Provide the Engineer at least one day's notice prior to beginning construction, or prior to resuming production if operations have been temporarily suspended.

A. Observe Composition of Mixtures

1. Calibration of plant equipment

   If the material changes, or if a component affecting the ingredient proportions has been repaired, replaced, or adjusted, check and recalibrate the proportions.

   Calibrate as follows:

   a. Before producing mixture for the Project, calibrate by scale weight the electronic sensors or settings for proportioning mixture ingredients.
   b. Calibrate ingredient proportioning for all rates of production.

2. Mixture control

   Compose hot mix asphaltic concrete from a uniform mixture of aggregates, bituminous material, and if required, hydrated lime, mineral filler, or other approved additive.

   Make the constituents proportional to produce mixtures that meet the requirements in Section 828. The general composition limits prescribed are extreme ranges within which the job mix formula must be established. Base mixtures on a design analysis that meets the requirements of Section 828.

   If control test results show that the characteristic tested does not conform to the job mix formula control tolerances given in Section 828, take immediate action to ensure that the quality control methods are effective.

   Control the materials to ensure that extreme variations do not occur. Maintain the gradation within the composition limits in Section 828.

B. Prepare Bituminous Material

Uniformly heat the bituminous material to the temperature specified in the job mix formula with a tolerance of ± 20 °F (± 10 °C).

C. Prepare the Aggregate

Prepare the aggregate as follows:

5. Heat the aggregate for the mixture, and ensure a mix temperature within the limits of the job mix formula.
6. Do not contaminate the aggregate with fuel during heating.
7. Reduce the absorbed moisture in the aggregate until the asphalt does not separate from the aggregate in the prepared mixture. If this problem occurs, the Engineer will establish a maximum limit for moisture content in the aggregates. When this limit is established, maintain the moisture content below this limit.

D. Prepare the Mixture

Proportion the mixture ingredients as necessary to meet the required job mix formula. Mix until a homogenous mixture is produced.

8. Add Mineral Filler

   When mineral filler is used, introduce it in the proper proportions and as specified in Subsection 400.3.02.B.5, "Mineral Filler Supply System."

9. Add Hydrated Lime

   When hydrated lime is included in the mixture, add it at a rate specified in Section 828 and the job mix formula. Use methods and equipment for adding hydrated lime according to Subsection 400.3.02.B.6, "Hydrated Lime Treatment System."

   Add hydrated lime to the aggregate by using Method A or B as follows:

   Method A—Dry Form—Add hydrated lime in its dry form to the mixture as follows, according to the type of plant:

   ff. Batch Type Asphalt Plant: Add hydrated lime to the mixture in the weigh hopper or as approved and directed by the Engineer.

   gg. Continuous Plant Using Pugmill Mixer: Feed hydrated lime into the hot aggregate before it is introduced into the mixer so that dry mixing is complete before the bituminous material is added.

   hh. Continuous Plant Using Drier-Drum Mixer: Add hydrated lime so that the lime will not become entrained into the air stream of the drier and so that thorough dry mixing will be complete before the bituminous material is added.

   Method B—Lime/Water Slurry—Add the required quantity of hydrated lime (based on dry weight) in lime/water slurry form to the aggregate. This solution consists of lime and water in concentrations as directed by the Engineer.

   Equip the plant to blend and maintain the hydrated lime in suspension and to mix it with the aggregates uniformly in the proportions specified.

10. Add Stabilizing Fiber

    When stabilizing fiber is included in the mixture, add it at a rate specified in Section 819 and the Job Mix Formula. Introduce it as specified in Subsection 400.3.02.B.8, "Fiber Supply System."

11. Add Gilsonite Modifier

    When required, add the Gilsonite modifier to the mixture at a rate such that eight percent by weight of the asphalt cement is replaced by Gilsonite. Use either PG 64-22 or PG 67-22 asphalt cement as specified in Subsection

820.2.01. Provide suitable means to calibrate and check the rate of Gilsonite being added. Introduce Gilsonite modifier by either of the following methods.

a. For batch type plants, incorporate Gilsonite into the pugmill at the beginning of the dry mixing cycle. Increase the dry mix cycle by a minimum of 10 seconds after the Gilsonite is added and prior to introduction of the asphalt cement. For this method, supply Gilsonite in plastic bags to protect the material during shipment and handling and store the modifier in a waterproof environment. The bags shall be capable of being completely melted and uniformly blended into the combined mixture.

   Gilsonite may also be added through a mineral filler supply system as described in Subsection 400.3.02.B.5, "Mineral Filler Supply System." The system shall be capable of injecting the modifier into the weigh hopper near the center of the aggregate batching cycle so the material can be accurately weighed.

b. For drum drier plants, add Gilsonite through the recycle ring or through an acceptable means which will introduce the Gilsonite prior to the asphalt cement injection point. The modifier shall be proportionately fed into the drum mixer at the required rate by a proportioning device which shall be accurate within ± 10 percent of the amount required. The entry point shall be away from flames and ensure the Gilsonite will not be caught up in the air stream and exhaust system.

12. Avoid Materials from Different Sources

    Do not use mixtures prepared from aggregates from different sources intermittently. This will cause the color of the finished pavement to vary.

E. Observe Weather Limitations

Do not mix and place asphaltic concrete if the existing surface is wet or frozen. Do not lay asphaltic concrete OGFC mix or PEM at air temperatures below 55 ºF (13 ºC). For other courses, follow the temperature guidelines in the following table:

Table 4—Lift Thickness Table

Lift Thickness	Minimum Temperature
1 in (25 mm) or less	55 °F (13 °C)
1.1 to 2 in (26 mm to 50 mm)	45 °F (8 °C)
2.1 to 3 in (51 mm to 75 mm)	35 °F (2 °C)
3.1 to 4 in (76 mm to 100 mm)	30 °F (0 °C)
4.1 to 8 in (101 mm to 200 mm)	Contractor's discretion

F. Perform Spreading and Finishing

Spread and finish the course as follows:

13. Determine the course's maximum compacted layer thickness by the type mix being used according to Table 5.

Table 5—Maximum Layer Thickness

Mix Type	Minimum Layer Thickness	Maximum Layer Thickness	Maximum Total Thickness
25 mm Superpave	3 in (75 mm)	5 in (125 mm) *	—
19 mm Superpave	1 3/4 in (44 mm)	3 in (75 mm) *	—
12.5 mm Superpave	1 3/8 in (35 mm)	2 1/2 in (62 mm)*	8 in (200 mm)
9.5 mm Superpave Levels B, C, or D)	1 1/8 in.(28 mm)	2 in (50 mm)	4 in (100 mm)
9.5 mm Superpave Level A)	3/4 in (19 mm)	1 3/8 in (35 mm)	4 in (100 mm)
4.75 mm Mix	7/8 in (22) mm)	1 1/8 in (30 mm)	2 in (50 mm)
9.5 mm OGFC	55 lbs/yd² (30 kg/m²)	65 lbs/yd² (36 kg/m²)	—
12.5 mm OGFC	85 lbs/yd² (47 kg/m²)	95 lbs/yd² (53 kg/m²)	—

Mix Type	Minimum Layer Thickness	Maximum Layer Thickness	Maximum Total Thickness
12.5 mm PEM	110 lbs/yd² (80 kg/m²)	165 lbs/yd² (90 kg/m²)	—
9.5 mm SMA	1 1/8 in (28 mm)	1 1/2 in (40 mm)	4 in (100 mm)
12.5 mm SMA	1 1/4 in (32 mm)	3 in (75 mm)	6 in (150 mm)
19 mm SMA	1 3/4 in (44 mm)	3 in (75 mm)	—
* Allow up to 6 in (150 mm) per lift on trench widening. Place 9.5 mm Superpave and 12.5 mm Superpave up to 4 in (100 mm) thick for driveway and side road transition.			

14. Unload the mixture into the paver hopper or into a device designed to receive the mixture from delivery vehicles.
15. Except for leveling courses, spread the mixture to the loose depth for the compacted thickness or the spread rate. Use a mechanical spreader true to the line, grade, and cross section specified.
16. For leveling courses, use a motor grader equipped with a spreader box and smooth tires to spread the material or use a mechanical spreader meeting the requirements in Subsection 400.3.02.C, "Equipment at Project Site."
17. Obtain the Engineer's approval for the sequence of paving operations, including paving the adjoining lanes. Minimize tracking tack onto surrounding surfaces.
18. Ensure that the outside edges of the pavement being laid are aligned and parallel to the roadway center line.
19. For Contracts that contain multiple lifts or courses, arrange the width of the individual lifts so that the longitudinal joints of each successive lift are offset from the previous lift at least 1 ft (300 mm). This requirement does not apply to the lift immediately over thin lift leveling courses.

    Ensure that the longitudinal joint(s) in the surface course and the mix immediately underneath asphaltic concrete OGFC are at the lane line(s).

NOTE: Perform night work with artificial light provided by the Contractor and approved by the Engineer.

20. Where mechanical equipment cannot be used, spread and rake the mixture by hand. Obtain the Engineer's approval of the operation sequence, including compactive methods, in these areas.
21. Keep small hand raking tools clean and free from asphalt build up. Do not use fuel oil or other harmful solvents to clean tools during the work.
22. Do not use mixture with any of these characteristics:
    - Segregated
    - Nonconforming temperature
    - Deficient or excessive asphalt cement content
    - Otherwise unsuitable to place on the roadway in the work
23. Remove and replace mixture placed on the roadway that the Engineer determines has unacceptable blemish levels from segregation, streaking, pulling and tearing, or other characteristics. Replace with acceptable mixture at the Contractor's expense. Do not continually place mixtures with deficiencies.

    Do not place subsequent course lifts over another lift or courses placed on the same day while the temperature of the previously placed mix is 140 °F (60 °C) or greater.
24. Obtain the Engineer's approval of the material compaction equipment. Perform the rolling as follows:

    ii. Begin the rolling as close behind the spreader as possible without causing excessive distortion of the asphaltic concrete surface.

    jj. Continue rolling until roller marks are no longer visible.

    kk. Use pneumatic-tired rollers with breakdown rollers on all surface and subsurface courses except asphaltic concrete OGFC, PEM and SMA or other mixes designated by the Engineer.
25. If applicable, taper or "feather" asphaltic concrete from full depth to a depth no greater than 0.5 in (13 mm) along curbs, gutters, raised pavement edges, and areas where drainage characteristics of the road must be retained. The Engineer will determine the location and extent of tapering.

G. Maintain Continuity of Operations

Coordinate plant production, transportation, and paving operations to maintain a continuous operation. If the spreading operations are interrupted, construct a transverse joint if the mixture immediately behind the paver screed cools to less than 250 ºF (120 ºC).

H. Construct the Joints

26. Construct Transverse Joints

ll. Construct transverse joints to facilitate full depth exposure of the course before resuming placement of the affected course.

mm. Properly clean and tack the vertical face of the transverse joint before placing additional material.

NOTE: Never burn or heat the joint by applying fuel oil or other volatile materials.

nn. Straightedge transverse joints immediately after forming the joint.

oo. Immediately correct any irregularity that exceeds 3/16 in. in 10 ft (5 mm in 3 m).

27. Construct Longitudinal Joints

Clean and tack the vertical face of the longitudinal joint before placing adjoining material. Construct longitudinal joints so that the joint is smooth, well sealed, and bonded.

28. Construction Joint Detail for OGFC and PEM Mixtures

In addition to meeting joint requirements described above, construct joints and transition areas for 12.5 mm OGFC and 12.5 mm PEM mixtures as follows:

a. For projects which do not have milling included as a pay item:

1) Place OGFC mixture meeting gradation requirements of 9.5 mm OGFC as specified in Section 828 on entrance and exit ramp gore areas and end of project construction joints.

- Taper mixture from 3/8 in (10 mm) at end of project to full plan depth within maximum distance of spread for one load of mixture
- Taper mixture placed on gore areas from thickness of the edge of the mainline to 3/8 in (10 mm) at the point of the ramp transverse joint.

2.) Construct the ramp transverse joint at the point specified in the plans or as directed by the Engineer.

3.) Mixture placed in the transition and gore areas will be paid for at the contract unit price for 12.5 mm OGFC or 12.5 mm PEM as applicable.

b. For projects which have milling included as a pay item:

1) Taper milling for a distance of no less than 50 ft (15 m) to a depth of 2 1/4 in (59 mm) at the point of the transverse joint

2) Taper thickness, if needed, of the dense-graded surface mix within the 50 ft (15 m) distance to 1 1/2 in (40 mm) at the point of the transverse joint

3) Taper thickness of the 12.5 mm OGFC or 12.5 mm PEM to 3/4 in (19 mm) so that it ties in at grade level with the existing surface at the point of the transverse joint

I. Protect the Pavement

Protect sections of the newly finished pavement from traffic until the traffic will not mar the surface or alter the surface texture. If directed by the Engineer, use artificial methods to cool the newly finished pavement to open the pavement to traffic more quickly.

J. Modify the Job Mix Formula

If the Engineer determines that undesirable mixture or mat characteristics are being obtained, the job mix formula may require immediate adjustment.

400.3.06 Quality Acceptance

A. Acceptance Plans for Gradation and Asphalt Cement Content

The Contractor will randomly sample and test mixtures for acceptance on a lot basis. The Department will monitor the Contractor testing program and perform comparison and quality assurance testing.

29. Determine Lot Amount

A lot consists of the tons (megagrams) of asphaltic concrete produced and placed each production day. If this production is less than 500 tons (500 Mg), or its square yard (meter) equivalent, production may be incorporated into the next working day. The Engineer may terminate a lot when a pay adjustment is imminent if a plant or materials adjustment resulting in a probable correction has been made. Terminate all open lots at the end of the month, except for materials produced and placed during the adjustment period. The lot will be terminated as described in Subsection 400.5.01,"Adjustments".

If the final day's production does not constitute a lot, the production may be included in the lot for the previous day's run; or, the Engineer may treat the production as a separate lot with a corresponding lower number of tests.

30. Determine Lot Acceptance

Determine lot acceptance as found in Subsection 400.5.01, "Adjustments."

The Department will perform the following task:

Determine the pay factor by using the mean of the deviations from the job mix formula of the tests in each lot and apply it to Table 9—Mixture Acceptance Schedule for Surface Mixes or Table 10—Mixture Acceptance Schedule for Subsurface Mixes, whichever is appropriate. This mean will be determined by averaging the actual numeric value of the individual deviations from the job mix formula, disregarding whether the deviations are positive or negative amounts. Do not calculate lot acceptance using test results for materials not used in the Work. Determine the pay factor for each lot by multiplying the contract unit price by the appropriate pay factor from the Mixture Acceptance Schedule - Table 9 or Table 10. When two or more pay factors for a specific lot are less than 1.0, determine the adjusted payment by multiplying the contract unit price by the lowest pay factor.

If the mean of the deviations from the job mix formula of the lot acceptance tests for a control sieve or for asphalt cement content exceeds the tolerances established in the appropriate Mixture Acceptance Schedule, and if the Engineer determines that the material need not be removed and replaced, the lot may be accepted at an adjusted unit price as determined by the Engineer. If the Engineer determines that the material is not acceptable to leave in place, the materials shall be removed and replaced at the Contractor's expense.

3. Provide Quality Control Program

Provide a Quality Control Program as established in SOP 27 which includes:

- Assignment of quality control responsibilities to specifically named individuals who have been certified by the Office of Materials and Research
- Provisions for prompt implementation of control and corrective measures
- Provisions for communication with Project Manager, Bituminous Technical Services Engineer, and Testing Management Operations Supervisor at all times
- Provisions for reporting all test results daily through the Office of Materials and Research computer Bulletin Board Service; other checks, calibrations and records will be reported on a form developed by the Contractor and will be included as part of the project records
- Notification in writing of any change in quality control personnel

a. Certification Requirements:

- Use laboratory and testing equipment certified by the Department. (Laboratories which participate in and maintain AASHTO accreditation for testing asphaltic concrete mixtures will be acceptable in lieu of Departmental certification.)
- Provide certified quality control personnel to perform the sampling and testing. A Quality Control Technician (QCT) may be certified at three levels:

1) Temporary Certification – must be a technician trainee who shall be given direct oversight by a certified Level 1 or Level 2 QCT while performing acceptance testing duties during the first 5 days of training. The trainee must complete qualification requirements within 30 production days after being granted temporary certification. A trainee who does not become qualified within 30 production days will not be re-eligible for temporary certification. A certified Level 1 or Level 2 QCT shall be at the plant at all times during production and shipment of mixture to monitor work of the temporarily certified technician.

2) Level 1 – must demonstrate they are competent in performing the process control and acceptance tests and procedures related to hot mix asphalt production and successfully pass a written exam.

3) Level 2 – must meet Level 1 requirements and must be capable of and responsible for making process control adjustments, and successfully pass a written exam.

- Technician certification is valid for 3 years from the date on the technician's certificate unless revoked or suspended. Eligible technicians may become certified through special training and testing approved by the Office of Materials and Research. Technicians who lose their certification due to falsification of test data will not be eligible for recertification in the future unless approved by the State Materials and Research Engineer.

b. Quality Control Management

1) Designate at least one Level 2 QCT as manager of the quality control operation. The Quality Control Manager shall meet the following requirements:

- Be accountable for actions of other QCT personnel
- Ensure that all applicable sampling requirements and frequencies, test procedures, and Standard Operating Procedures are adhered to
- Ensure that all reports, charts, and other documentation is completed as required

2) Provide QCT personnel at the plant as follows:

- If daily production for all mix types is to be greater than 250 tons (megagrams), have a QCT person at the plant at all times during production and shipment of mixture until all required acceptance tests have been completed
- If daily production for all mix types will not be greater than 250 tons (megagrams) a QCT may be responsible for conducting tests at up to two plants, subject to random number sample selection
- Have available at the plant or within immediate contact by phone or radio a Level 2 QCT responsible for making prompt process control adjustments as necessary to correct the mix

3) Sampling, Testing, and Inspection Requirements.

Provide all sample containers, extractants, forms, diaries, and other supplies subject to approval of the Engineer.

Perform daily sampling, testing, and inspection of mixture production that meets the following requirements:

(a) Randomly sample mixtures according to GSP 15, and GDT 73 (Method C) and test on a lot basis. In the event less than the specified number of samples are taken, obtain representative 6 in (150 mm) cores from the roadway at a location where the load not sampled was placed. Take enough cores to ensure minimum sample size requirements are met for each sample needed.

(b) Maintain a printed copy of the computer generated random sampling data as a part of the project records.

(c) Perform sampling, testing, and inspection duties of GSP 21.

(d) Perform extraction or ignition test (GDT 83 or GDT 125) and extraction analysis (GDT 38). If the ignition oven is used, a printout of sample data including weights shall become a part of the project records. For asphalt cement content only, digital printouts of liquid asphalt cement weights may be substituted in lieu of an extraction test for plants with digital recorders. Calculate the asphalt content from the ticket representing the mixture tested for gradation.

(e) Save extracted aggregate, opposite quarters, and remaining material (for possible referee testing) of each sample as follows:

- Store in properly labeled, suitable containers
- Secure in a protected environment
- Store for three working days. If not obtained by the Department, within three days they may be discarded.

(f) Maintain a process control flow chart daily for each sieve specified on the job mix formula and including the percent asphalt cement. The flow chart shall include:

- Allowable ranges based on the Mixture Control Tolerance in Section 828
- A graph plot of the deviations from the job mix formula for each test per mix type

(g) Add the following information on load tickets from which a sample or temperature check is taken:

- Mixture temperature
- Signature of the QCT person performing the testing

Note: Determine mixture temperature at least once per hour of production for OGFC and PEM mixes.

(h) Calibrate the lime system when hydrated lime is included in the mixture:

- Perform a minimum of twice weekly during production
- Post results at the plant for review
- Provide records of materials invoices upon request (including asphalt cement, aggregate, hydrated lime, etc.)

(i) Take action if acceptance test results are outside Mixture Control Tolerances of Section 828.

- One sample out of tolerance
  - (1) Contact Level 2 - QCT to determine if a plant adjustment is needed
  - (2) Immediately run a process control sample. Make immediate plant adjustments if this sample is also out of tolerance
  - (3) Test additional process control samples as needed to ensure corrective action taken appropriately controls the mixture
- Two consecutive acceptance samples of the same mix type out of tolerance regardless of Lot or mix design level, or three consecutive acceptance samples out of tolerance regardless of mix type
  - (1) Stop plant production immediately
  - (2) Reject any mixture already in storage that:
    - Deviates more than 10 percent in gradation from the job mix formula based on the acceptance sample
    - Deviates more than 0.7 percent in asphalt content from the job mix formula based on the acceptance sample
  - (3) Make a plant correction to any mix type out of tolerance prior to resuming production
    - Do not send any mixture to the project before test results of a process control sample meets Mixture Control Tolerances
    - Reject any mixture produced at initial restarting that does not meet Mixture Control Tolerances

4) Comparison Testing and Quality Assurance Program

Periodic comparison testing by the Department will be required of each QCT to monitor consistency of equipment and test procedures. The Department will take independent samples to monitor the Contractor's quality control program.

a) Comparison Sampling and Testing

Retain samples for comparison testing and referee testing if needed as described in Subsection 400.3.06.A.3.b.3. Discard these samples only if the Contractor's acceptance test results meet a 1.00 pay factor and the Department does not procure the samples within three working days.

The Department will test comparison samples on a random basis. Results will be compared to the respective contractor acceptance tests and the maximum difference shall be as follows:

Table 6—Allowable Percent Difference Between Department and Contractor Acceptance Tests

SIEVE SIZE	SURFACE	SUB-SURFACE
1/2 in. (12.5 mm)		4.0%
3/8 in. (9.5 mm)	3.5%	4.0%
No. 4 (4.75 mm)	3.5%	3.5%
No. 8 (2.36 mm)	2.5%	3.0%

No. 200 (75 μm)	2.0%	2.0%
A.C.	0.4%	0.5%

NOTE: Pavement courses to be overlaid with OGFC or PEM mixes ae considered surface mixes.

(1) If test comparisons are within these tolerances:

- Continue production
- Use the Contractor's tests for acceptance of the lot

(2) If test comparisons are not within these tolerances:

- Another Departmental technician will test the corresponding referee sample
- Results of the referee sample will be compared to the respective contractor and Departmental tests using the tolerance for comparison samples given above.
  - (a) If referee test results are within the above tolerances when compared to the Contractor acceptance test, use the Contractor's test for acceptance of the effected lot.
  - (b) If referee test results are not within the above tolerances when compared to the Contractor acceptance test, the Department will review the Contractor's quality control methods and determine if a thorough investigation is needed.

b) Quality Assurance Sampling and Testing

(1) Randomly take a minimum of two quality assurance samples from the lesser of five days or five lots of production regardless of mix type or number of projects.

(2) Compare test deviation from job mix formula to Mixture Control Tolerances in Section 828. If results are outside these tolerances, another sample from the respective mix may be taken.

NOTE: For leveling courses less than 110 lb/yd² (60 kg/m²) that have quality assurance test results outside the Mixture Control Tolerances of Section 828, use the Department's test results only and applicable pay factors will apply.

If test results of the additional sample are not within Mixture Control Tolerances, the Department will take the following action:

- Take random samples from throughout the lot as in Subsection 400.3.06.A.3.b.3 and use these test results for acceptance and in calculations for the monthly plant rating. Applicable pay factors will apply and the contractor QCT test results will not be included in pay factor calculations nor in the monthly plant rating.
- Determine if the Contractor's quality control program is satisfactory and require prompt corrective action by the Contractor if specification requirements are not being met.
- Determine if the QCT has not followed Departmental procedures or has provided erroneous information.
- Take samples of any in-place mixture represented by unacceptable QCT tests and use the additional sample results for acceptance and in calculations for the monthly plant rating and apply applicable pay factors. The Contractor QCT tests will not be included in the pay factor calculations nor in the monthly plant rating.

B. Compaction

Determine the mixture compaction using either GDT 39 or GDT 59. The compaction is accepted in lots defined in Subsection 400.3.06. A "Acceptance Plans for Gradation and Asphalt Cement Content" and is within the same lot boundaries as the mixture acceptance.

31. Calculate Pavement Mean Air Voids

The Department will calculate the pavement air voids placed within each lot as follows:

pp. Average the results of 5 tests run on randomly selected sites in that lot.

qq. Select the random sites using GDT 73.

Density tests are not required for asphaltic concrete placed at 90 lbs/yd^2 (50 kg/m^2) or less, 4.75 mm mix, and asphaltic concrete OGFC and PEM. Compact these courses to the Engineer's satisfaction.

The maximum Pavement Mean Air Voids for all Superpave and Stone Matrix Asphalt mixtures shall be 7.8 percent. The adjustment period for density shall be three lots or three production days, whichever is less, in order for the contractor to ensure maximum compactive effort has been achieved which will yield no more than 7.8 percent Mean Air Voids. If the contractor needs to adjust the mixture to improve density results, a change in the job mix formula may be requested for approval during the adjustment period so long as the following values are not exceeded:

- Coarse pay sieve ± 4%
- No. 8 (2.36 mm) sieve ± 2%
- No. 200 (75 µm) sieve ± 1%
- Asphalt Content ± 0.2%
- All value changes must still be within specification limits

If the Office of Materials and Research is satisfied that the contractor has exerted the maximum compactive effort and is not able to maintain Pavement Mean Air Voids at no more than 7.8%, the Engineer may establish a maximum target for Pavement Mean Air Voids.

Mixture placed during the adjustment period for density shall meet the requirements for a 0.90 pay factor in Table 12 of Subsection 400.5.01.C, "Calculate Mean Pavement Air Voids." Mixture which does not meet these density requirements shall be paid for using the applicable pay factor.

If the mean air voids of the pavement placed within a lot exceeds 7.8% (or 100% of the maximum target air voids, if established) and the Engineer determines that the material need not be removed and replaced, the lot may be accepted at an adjusted unit price as determined by the Engineer.

32. Obtain Uniform Compaction

For a lot to receive a pay factor of 1.00 for compaction acceptance, the air void range cannot exceed 4 percent for new construction or 5 percent for resurfacing projects. The range is the difference between the highest and lowest acceptance test results within the affected lot. If the air void range exceeds these tolerances, apply a Pay Factor of 95%.

The 5% reduced pay factor for the compaction range does not apply in these instances:

- The mixture is placed during the adjustment period as defined in Subsection 400.5.01.A, "Materials Produced and Placed During the Adjustment Period."
- All air void results within a given lot are less than 7.8%.

C. Surface Tolerance

In this Specification, pavement courses to be overlaid with a friction course are considered surface courses. Other asphalt paving is subject to straightedge and visual inspection and irregularity correction as shown below:

1. Visual and Straightedge Inspection

Paving is subject to visual and straightedge inspection during and after construction operations until Final Acceptance. Locate surface irregularities as follows:

rr. Keep a 10 ft (3 m) straightedge near the paving operation to measure surface irregularities on courses. Provide the straightedge and the labor for its use.

ss. Inspect the base, intermediate, and surface course surfaces with the straightedge to detect irregularities.

tt. Correct irregularities that exceed 3/16 in. in 10 ft (5 mm in 3 m) for base and intermediate courses, and 1/8 in. in 10 ft (3 mm in 3 m) for surface courses.

Mixture or operating techniques will be stopped if irregularities such as rippling, tearing, or pulling occur and the Engineer suspects a continuing equipment problem. Stop the paving operation and correct the problem. Correct surface course evaluations on individual Laser Road Profiler test sections, normally 1mile (1 km) long.

2. Target Surface Smoothness

The Department will use the Laser Road Profiler method to conduct acceptance testing for surface course tolerance according to GDT 126. This testing will be performed only on:

- Surface courses

- Mainline traveled way
- Ramps more than 0.5 mile (800 m) long

Achieve the smoothest possible ride during construction. Do not exceed the target Laser Road Profiler smoothness index as shown below:

Table 7—Pavement Smoothness Requirements—New Construction

Construction Description	Smoothness Index
Asphaltic concrete OGFC and PEM on interstates and asphaltic concrete OGFC and PEM on new construction	750
Other resurfacing on interstates, asphaltic concrete OGFC and PEM resurfacing on state routes, and new construction	825
All other resurfacing on state routes (excluding LARP, PR, airports, etc.)	900

If the target values are not achieved, immediately adjust the operations to meet the target values.

Corrective work is required if the surface smoothness exceeds the Laser Road Profiler smoothness index shown below:

Table 8—Pavement Smoothness Requirements—Corrective Work

Construction Description	Smoothness Index
Asphaltic concrete OGFC and PEM on interstates and asphaltic concrete OGFC and PEM on new construction	825
Other resurfacing on interstates, asphaltic concrete OGFC and PEM resurfacing on state routes, and new construction	900
All other resurfacing on state routes (excluding LARP, PR, airports, etc.)	1025

If surface tolerance deficiencies need correction, obtain the Engineer's approval of the methods and type mix used.

3. Bridge Approach Ride Quality

The following are subject to a ride quality test by the Department for 100 ft. (30 m) of roadway approaching each end of a bridge using the Rainhart Profilograph:

- A state road with 4 lanes or more
- A 2-lane state road with a current traffic count of 2,000 vpd or more
- Locations designated on the Plans

All other bridge approaches shall meet the 1/8 in. in 10 ft (3 mm in 3 m) straightedge requirement. Test ride quality as follows:

uu. The Department will determine a profile index value according to test method GDT 78.

vv. The Department will average the profile index value from the right and left wheelpath for each 100 ft (30 m) section for each lane. Keep the profile index value under 30.

ww. Meet the profile index value for the 100 ft (30 m) section of roadway up to the joint with the approach slab.

xx. Schedule the profilograph testing 5 days before needed. Clean and clear obstructions from the test area.

yy. Correct the sections that do not meet the ride quality criteria of this Specification. After correction, these sections are subject to retesting with the Rainhart Profilograph. The Engineer shall direct the type of correction method, which may include:

- Milling
- Grinding
- Removing and replacing the roadway

No additional compensation will be made.

The Department will perform Profilograph testing up to two times on the bridge approaches at no cost to the Contractor. Additional profilograph testing will cost the Contractor $500 per test.

D. Reevaluation of Lots

When lots are reevaluated as shown in Subsection 106.03, "Samples, Tests, Cited Specifications," sampling and testing is according to GDT 73. Request shall be made for reevaluation immediately upon notification of the lot results. The following procedures apply:

33. Mixture Acceptance

    The Department will take the same number of new tests on cores taken at a location where the load sampled was placed and will use only those core results for acceptance.

    The Department will use the mean of the deviations from the job mix formula for these tests to determine acceptance based on the appropriate column in the Asphalt Cement Content and Aggregate Gradation of Asphalt Concrete Mixture Acceptance Schedule—Table 9 or 10.

34. Compaction Acceptance

    The Department will reevaluate the lot through additional testing by cutting 5 cores and averaging these results with the results of the original 5 compaction tests. The Department will use the average to determine acceptance according to the Compaction Acceptance Schedule in Subsection 400.5.01.C, "Calculate Pavement Mean Air Voids".

Table 9—Mixture Acceptance Schedule—Surface Mixes

Mixture Characteristics	Pay Factor	Mean of the Deviations from the Job Mix Formula							
		1 Test	2 Tests	3 Tests	4 Tests	5 Tests	6 Tests	7 Tests	8 Tests
Asphalt Cement Content (Extraction, Ignition)	1.00	0.00 - 0.70	0.00 - 0.54	0.00 - 0.46	0.00 - 0.41	0.00 - 0.38	0.00 - 0.35	0.00 - 0.32	0.00 - 0.30
	0.95	0.71 - 0.80	0.55 - 0.61	0.47 - 0.52	0.42 - 0.46	0.39 - 0.43	0.36 - 0.39	0.33 - 0.36	0.31 - 0.34
	0.90	0.81 - 0.90	0.62 - 0.68	0.53 - 0.58	0.47 - 0.51	0.44 - 0.47	0.40 - 0.45	0.37 - 0.40	0.35 - 0.37
	0.80	0.91 - 1.00	0.69 - 0.75	0.59 - 0.64	0.52 - 0.56	0.48 - 0.52	0.44 - 0.47	0.41 - 0.44	0.38 - 0.41
	0.70	1.01 - 1.19	0.76 - 0.82	0.65 - 0.69	0.57 - 0.61	0.53 - 0.56	0.48 - 0.51	0.45 - 0.47	0.42 - 0.44
	0.50	1.20 - 1.40	0.83 - 0.85	0.70 - 0.72	0.62 - 0.64	0.57 - 0.59	0.52 - 0.55	0.48 - 0.51	0.45 - 0.48
3/8 in. (9.5 mm) Sieve (12.5 mm OGFC, 12.5 mm PEM, 12.5 mm Superpave)	1.00	0.00 - 0.9	0.00 - 6.6	0.00 - 5.6	0.00 - 5.0	0.00 - 4.6	0.00 - 4.2	0.00 - 3.9	0.00 - 3.6
	0.98	9.1 - 10.0	6.7 - 7.5	5.7 - 6.3	5.1 - 5.6	4.7 - 5.2	4.3 - 4.7	4.0 - 4.4	3.7 - 4.1
	0.95	10.1 - 11.9	7.6 - 8.4	6.4 - 7.0	5.7 - 6.3	5.3 - 5.8	4.8 - 5.3	4.5 - 5.0	4.2 - 4.6
	0.90	12.0 - 13.0	8.5 - 9.3	7.1 - 7.7	6.4 - 6.9	5.9 - 6.3	5.4 - 5.8	5.1 - 5.4	4.7 - 5.0
	0.85	13.1 - 14.0	9.4 - 10.2	7.8 - 8.6	7.0 - 7.6	6.4 - 6.9	5.9 - 6.3	5.5 - 5.9	5.1 - 5.5
	0.80	14.1 - 14.5	10.3 - 10.5	8.7 - 8.9	7.7 - 8.0	7.0 - 7.5	6.4 - 6.8	6.0 - 6.4	5.6 - 6.0
3/8 in. (9.5 mm) Sieve (12.5 mm SMA)	1.00	0.0 - 6.8	0.00 - 5.0	0.00 - 4.2	0.00 - 3.8	0.00 - 3.4	0.00 - 3.2	0.00 - 2.9	0.00 - 2.7
	0.98	6.9 - 7.5	5.1 - 5.6	4.6 - 4.7	3.9 - 4.2	3.5 - 3.9	3.3 - 3.5	3.0 - 3.3	2.8 - 3.1
	0.95	7.6 - 8.9	5.7 - 6.3	4.8 - 5.2	4.3 - 4.7	4.0 - 4.4	3.6 - 4.0	3.4 - 3.8	3.2 - 3.4
	0.90	9.0 - 9.8	6.4 - 7.0	5.3 - 5.8	4.8 - 5.2	4.5 - 4.8	4.1 - 4.4	3.9 - 4.1	3.5 - 3.8
	0.85	9.9 - 10.5	7.1 - 7.6	5.9 - 6.4	5.3 - 5.7	4.9 - 5.2	4.5 - 4.7	4.2 - 4.4	3.9 - 4.1
	0.80	10.6 - 10.9	7.7 - 7.9	6.5 - 6.7	5.8 - 6.0	5.3 - 5.6	4.8 - 5.1	4.5 - 4.8	4.2 - 4.5
No. 4 (4.75 mm) Sieve (9.5 mm OGFC, 9.5 mm Superpave)	1.00	0.00 - 9.0	0.00 - 6.7	0.00 - 5.7	0.00 - 5.2	0.00 - 4.8	0.00 - 4.4	0.00 - 4.1	0.00 - 3.8
	0.98	9.1 - 10.0	6.8 - 7.6	5.8 - 6.3	5.3 - 5.8	4.9 - 5.4	4.5 - 4.9	4.2 - 4.6	3.9 - 4.3
	0.95	10.1 - 11.9	7.7 - 8.5	6.4 - 6.9	5.9 - 6.4	5.5 - 5.9	5.0 - 5.4	4.7 - 5.0	4.4 - 4.7
	0.90	12.0 - 13.0	8.6 - 9.4	7.0 - 7.5	6.5 - 7.0	6.0 - 6.5	5.5 - 5.9	5.1 - 5.5	4.8 - 5.1
	0.85	13.1 - 14.0	9.5 - 10.2	7.6 - 8.0	7.1 - 7.6	6.6 - 7.0	6.0 - 6.4	5.6 - 5.9	5.2 - 5.5
	0.80	14.1 - 14.5	10.3 - 10.5	8.1 - 8.3	7.7 - 8.0	7.1 - 7.5	6.5 - 6.9	6.0 - 6.4	5.6 - 5.9
No. 4 (4.75 mm) Sieve (9.5 mm SMA)	1.00	0.00 - 6.8	0.00 - 5.0	0.00 - 4.3	0.00 - 3.9	0.00 - 3.6	0.00 - 3.3	0.00 - 3.1	0.00 - 2.8
	0.98	6.9 - 7.5	5.1 - 5.7	4.4 - 4.7	4.0 - 4.4	3.7 - 4.0	3.4 - 3.7	3.2 - 3.4	2.9 - 3.2

Mixture Characteristics	Pay Factor	Mean of the Deviations from the Job Mix Formula							
		1 Test	2 Tests	3 Tests	4 Tests	5 Tests	6 Tests	7 Tests	8 Tests
	0.95	7.6 - 8.9	5.8 - 6.4	4.8 - 5.2	4.5 - 4.8	4.1 - 4.4	3.8 - 4.0	3.5 - 3.8	3.3 - 3.5
	0.90	9.0 - 9.8	6.5 - 7.0	5.3 - 5.6	4.9 - 5.2	4.5 - 4.9	4.1 - 4.4	3.9 - 4.1	3.6 - 3.8
	0.85	9.9 - 10.5	7.1 - 7.7	5.7 - 6.0	5.3 - 5.7	5.0 - 5.2	4.3 - 4.8	4.2 - 4.4	3.9 - 4.1
	0.80	10.6 - 10.9	7.8 - 7.9	6.1 - 6.2	5.8 - 6.0	5.3 - 5.6	4.9 - 5.2	4.5 - 4.8	4.2 - 4.4
No. 8 (2.36 mm) Sieve (Superpave and 4.75 mm mixes)	1.00	0.00 - 7.0	0.00 - 5.6	0.00 - 4.8	0.00 - 4.3	0.00 - 4.0	0.00 - 3.6	0.00 - 3.4	0.00 - 3.2
	0.98	7.1 - 8.0	5.7 - 6.3	4.9 - 5.4	4.4 - 4.8	4.1 - 4.5	3.7 - 4.1	3.5 - 3.8	3.3 - 3.6
	0.95	8.1 - 9.0	6.4 - 7.0	5.5 - 6.0	4.9 - 5.3	4.6 - 4.9	4.2 - 4.5	3.9 - 4.2	3.7 - 3.9
	0.90	9.1 - 10.9	7.1 - 7.7	6.1 - 6.6	5.4 - 5.8	5.0 - 5.4	4.6 - 4.9	4.3 - 4.6	4.0 - 4.3
	0.85	11.0 - 12.0	7.8 - 8.5	6.7 - 7.2	5.9 - 6.4	5.5 - 5.8	5.0 - 5.3	4.7 - 5.0	4.4 - 4.6
	0.75	12.1 - 12.5	8.6 - 8.8	7.3 - 7.5	6.5 - 6.8	5.9 - 6.3	5.4 - 5.7	5.1 - 5.3	4.7 - 4.9
No. 8 (2.36 mm) Sieve (12.5 mm SMA, 9.5 mm SMA)	1.00	0.00 - 5.3	0.00 - 4.2	0.00 - 3.6	0.00 - 3.2	0.00 - 3.0	0.00 - 2.7	0.00 - 2.6	0.00 - 2.4
	0.98	5.4 - 6.0	4.3 - 4.7	3.7 - 4.0	3.3 - 3.6	3.1 - 3.4	2.8 - 3.1	2.7 - 2.9	2.5 - 2.7
	0.95	6.1 - 6.8	4.8 - 5.3	4.1 - 4.5	3.7 - 4.0	3.5 - 3.7	3.2 - 3.4	3.0 - 3.2	2.8 - 2.9
	0.90	6.9 - 8.2	5.4 - 5.8	5.6 - 5.0	4.1 - 4.5	3.8 - 4.0	3.5 - 3.7	3.3 - 3.5	3.0 - 3.2
	0.85	8.3 - 9.0	5.9 - 6.4	5.1 - 5.4	4.6 - 4.8	4.1 - 4.4	3.8 - 4.0	3.6 - 3.8	3.3 - 3.4
	0.75	9.1 - 9.4	6.5 - 6.6	5.5 - 5.0	4.9 - 5.1	4.5 - 4.7	4.1 - 4.3	3.9 - 4.0	3.5 - 3.7
No. 8 (2.36 mm) Sieve for OGFC and PEM mixes: When the mean of the deviations from the Job Mix Formula for a particular lot exceeds the tolerance for a 1.00 pay factor in the appropriate column, the lot will be paid for at 0.50 of the Contract Price.									

Table 10—Mixture Acceptance Schedule—Subsurface Mixes

Mixture Characteristics	Pay Factor	Mean of the Deviations from the Job Mix Formula							
		1 Test	2 Tests	3 Tests	4 Tests	5 Tests	6 Tests	7 Tests	8 Tests
Asphalt Cement Content (Extraction, Ignition)	1.00	0.00 - 0.80	0.00 - 0.61	0.00 - 0.52	0.00 - 0.46	0.00 - 0.43	0.00 - 0.39	0.00 - 0.36	0.00 - 0.34
	0.95	0.81 - 0.90	0.62 - 0.68	0.53 - 0.58	0.47 - 0.51	0.44 - 0.47	0.40 - 0.43	0.37 - 0.40	0.35 - 0.37
	0.90	0.91 - 1.00	0.69 - 0.75	0.59 - 0.64	0.52 - 0.56	0.48 - 0.52	0.44 - 0.47	0.41 - 0.44	0.38 - 0.41
	0.80	1.01 - 1.19	0.76 - 0.82	0.65 - 0.69	0.57 - 0.61	0.53 - 0.56	0.48 - 0.51	0.45 - 0.47	0.42 - 0.44
	0.70	1.20 - 1.40	0.83 - 0.85	0.70 - 0.72	0.62 - 0.64	0.57 - 0.59	0.52 - 0.55	0.48 - 0.51	0.45 - 0.48
	0.50	1.41 - 1.60	0.86 - 0.88	0.73 - 0.75	0.65 - 0.67	0.60 - 0.63	0.56 - 0.60	0.52 - 0.56	0.49 - 0.52
1/2 in. (12.5 mm) Sieve (25 mm Superpave)	1.00	0.00 - 12.9	0.00 - 8.1	0.00 - 6.9	0.00 - 6.1	0.00 - 5.5	0.00 - 5.0	0.00 - 4.7	0.00 - 4.4
	0.98	13.0 - 14.0	8.2 - 9.1	7.0 - 7.7	6.2 - 6.8	5.6 - 6.1	5.1 - 5.6	4.8 - 5.2	4.5 - 4.9
	0.95	14.1 - 15.0	9.2 - 10.1	7.8 - 8.5	6.9 - 7.5	6.2 - 6.7	5.7 - 6.1	5.3 - 5.7	5.0 - 5.4
	0.90	15.1 - 16.0	10.2 - 11.1	8.6 - 9.3	7.6 - 8.2	6.8 - 7.4	6.2 - 6.7	5.8 - 6.3	5.5 - 5.9
	0.85	16.1 - 17.0	11.2 - 11.5	9.4 - 9.6	8.3 - 8.6	7.5 - 7.8	6.8 - 7.0	6.4 - 6.5	6.0 - 6.1
	0.80	17.1 - 18.0	11.6 - 11.9	9.7 - 9.9	8.7 - 9.0	7.9 - 8.1	7.1 - 7.3	6.6 - 6.8	6.2 - 6.4
1/2 in. (12.5 mm) Sieve (19 mm SMA)	1.00	0.00 - 9.7	0.00 - 6.0	0.00 - 5.2	0.00 - 4.6	0.00 - 4.1	0.00 - 3.8	0.00 - 3.5	0.00 - 3.3
	0.98	9.8 - 10.5	6.2 - 6.8	5.3 - 5.8	4.7 - 5.1	4.2 - 4.6	3.9 - 4.2	3.6 - 3.9	3.4 - 3.7
	0.95	10.6 - 11.2	6.9 - 7.8	5.9 - 6.4	5.2 - 5.6	4.7 - 5.0	4.3 - 4.6	4.0 - 4.3	3.8 - 4.0
	0.90	11.3 - 12.0	7.9 - 8.3	6.5 - 7.0	5.7 - 6.1	5.1 - 5.6	4.7 - 5.0	4.4 - 4.7	4.1 - 4.4
	0.85	12.1 - 12.8	8.4 - 8.6	7.1 - 7.2	6.2 - 6.5	5.7 - 5.9	5.1 - 5.3	4.8 - 4.9	4.5 - 5.6
	0.80	12.9 - 13.5	8.7 - 8.9	7.3 - 7.4	6.6 - 6.8	6.0 - 6.1	5.4 - 5.5	5.0 - 5.1	4.7 - 4.8
3/8 in. (9.5 mm) Sieve (19 mm Superpave, 12.5 mm Superpave)	1.00	0.00 - 10.0	0.00 - 7.5	0.00 - 6.3	0.00 - 5.6	0.00 - 5.2	0.00 - 4.7	0.00 - 4.4	0.00 - 4.1
	0.98	10.1 - 11.9	7.6 - 8.4	6.4 - 7.0	5.7 - 6.3	5.3 - 5.8	4.8 - 5.3	4.5 - 5.0	4.2 - 4.6
	0.95	12.0 - 13.0	8.5 - 9.3	7.1 - 7.7	6.4 - 6.9	5.9 - 6.3	5.4 - 5.8	5.1 - 5.4	4.7 - 5.0

Mixture Characteristics	Pay Factor	Mean of the Deviations from the Job Mix Formula							
		1 Test	2 Tests	3 Tests	4 Tests	5 Tests	6 Tests	7 Tests	8 Tests
	0.90	13.1 - 14.0	9.4 - 10.2	7.8 - 8.6	7.0 - 7.6	6.4 - 6.9	5.9 - 6.3	5.5 - 5.9	5.1 - 5.5
	0.85	14.1 - 14.5	10.3 - 10.5	8.7 - 8.9	7.7 - 8.0	7.0 - 7.5	6.4 - 6.8	6.0 - 6.4	5.6 - 6.0
	0.80	14.6 - 15.0	10.6 - 10.8	9.0 - 9.2	8.1 - 8.4	7.6 - 7.8	6.9 - 7.3	6.5 - 6.8	6.1 - 6.5
No. 4 (4.75 mm) Sieve (9.5 mm Superpave)	1.00	0.00 - 10.0	0.00 - 7.6	0.00 - 6.3	0.00 - 5.8	0.00 - 5.4	0.00 - 4.9	0.00 - 4.6	0.00 - 4.3
	0.98	10.1 - 11.9	7.7 - 8.5	6.4 - 6.9	5.9 - 6.4	5.5 - 5.9	5.0 - 5.4	4.7 - 5.0	4.4 - 4.7
	0.95	12.0 - 13.0	8.6 - 9.4	7.0 - 7.5	6.5 - 7.0	6.0 - 6.5	5.5 - 5.9	5.1 - 5.5	4.8 - 5.1
	0.90	13.1 - 14.0	9.5 - 10.2	7.6 - 8.0	7.1 - 7.6	6.6 - 7.0	6.0 - 6.4	5.6 - 5.9	5.2 - 5.5
	0.85	14.1 - 14.5	10.3 - 10.5	8.1 - 8.3	7.7 - 8.0	7.1 - 7.5	6.5 - 6.9	6.0 - 6.4	5.6 - 5.9
	0.80	14.6 - 15.0	10.6 - 10.8	8.4 - 8.6	8.1 - 8.4	7.6 - 8.0	7.0 - 7.4	6.5 - 6.8	6.0 - 6.3
No. 8 (2.36 mm) Sieve (All mixes except SMA)	1.00	0.00 - 8.0	0.00 - 6.3	0.00 - 5.4	0.00 - 4.8	0.00 - 4.5	0.00 - 4.1	0.00 - 3.8	0.00 - 3.6
	0.98	8.1 - 9.0	6.4 - 7.0	5.5 - 6.0	4.9 - 5.3	4.6 - 4.9	4.2 - 4.5	3.9 - 4.2	3.7 - 3.9
	0.95	9.1 - 10.0	7.1 - 7.7	6.1 - 6.6	5.4 - 5.8	5.0 - 5.4	4.6 - 4.9	4.3 - 4.6	4.0 - 4.3
	0.90	10.1 - 11.9	7.8 - 8.5	6.7 - 7.2	5.9 - 6.4	5.5 - 5.8	5.0 - 5.3	4.7 - 5.0	4.4 - 4.6
	0.85	12.0 - 13.0	8.6 - 8.8	7.3 - 7.5	6.5 - 6.8	5.9 - 6.3	5.4 - 5.7	5.1 - 5.3	4.7 - 4.9
	0.75	13.1 - 14.0	8.9 - 9.1	7.6 - 7.8	6.9 - 7.2	6.4 - 6.6	5.8 - 6.1	5.4 - 5.7	5.0 - 5.3
No. 8 (2.36 mm) Sieve (19 mm SMA)	1.00	0.00 - 6.0	0.00 - 4.7	0.00 - 4.1	0.00 - 3.6	0.00 - 3.4	0.00 - 3.1	0.00 - 2.9	0.00 - 2.4
	0.98	6.1 - 6.8	4.8 - 5.2	4.2 - 4.5	3.7 - 4.0	3.5 - 3.7	3.2 - 3.4	3.0 - 3.2	2.8 - 2.9
	0.95	6.9 - 7.5	5.3 - 5.8	4.6 - 5.0	4.1 - 4.4	3.8 - 4.0	3.5 - 3.7	3.3 - 3.5	3.0 - 3.2
	0.90	7.6 - 8.9	5.9 - 6.4	5.1 - 5.4	4.5 - 4.8	4.1 - 4.4	3.8 - 4.0	3.6 - 3.8	3.3 - 3.5
	0.85	9.0 - 9.8	6.5 - 6.6	5.5 - 5.6	4.9 - 5.1	4.5 - 4.7	4.1 - 4.3	3.9 - 4.0	3.6 - 3.7
	0.75	9.9 - 10.5	6.7 - 6.8	5.7 - 5.9	5.2 - 5.4	4.8 - 5.0	4.4 - 4.6	4.1 - 4.3	3.8 - 4..0

E. Segregated Mixture

Prevent mixture placement that yields a segregated mat by following production, storage, loading, placing, and handling procedures. Also, make needed plant modifications and provide necessary auxiliary equipment. (See Subsection 400.1.01, "Definitions.")

If the mixture is segregated in the finished mat, the Department will take actions based on the degree of segregation. The actions are described below.

35. Unquestionably Unacceptable Segregation

When the Engineer determines that the segregation in the finished mat is unquestionably unacceptable, follow these measures:

zz. Suspend Work and require the Contractor to take positive corrective action. The Department will evaluate the segregated areas to determine the extent of the corrective work to the in-place mat as follows:

- Perform extraction and gradation analysis by taking 6 in (150 mm) cores from typical, visually unacceptable segregated areas.
- Determine the corrective work according to Subsection 400.3.06.E.3.

aaa. Require the Contractor to submit a written plan of measures and actions to prevent further segregation. Work will not continue until the plan is submitted to and approved by the Department.

bbb. When work resumes, place a test section not to exceed 500 tons (500 Mg) of the affected mixture for the Department to evaluate. If a few loads show that corrective actions were not adequate, follow the measures above beginning with step 1.a. above. If the problem is solved, Work may continue.

2. Unacceptable Segregation Suspected

When the Engineer observes segregation in the finished mat and suspects that it may be unacceptable, follow these measures:

ccc. Allow work to continue at Contractor's risk.

ddd. Require Contractor to immediately and continually adjust operation until the visually apparent segregated areas are eliminated from the finished mat. The Department will immediately investigate to determine the severity of the apparent segregation as follows:

- Take 6 in (150 mm) cores from typical areas of suspect segregation.
- Test the cores for compliance with the mixture control tolerances in Section 828.

When these tolerances are exceeded, suspend work for corrective action as outlined in Subsection 400.3.06.E.3.

3. Corrective Work

a. Remove and replace (at the Contractor's expense) any segregated area where the gradation on the control sieves is found to vary 10 percent or more from the approved job mix formula, the asphalt cement varies 1.0% or more from the approved job mix formula, or if in-place air voids exceed 13.5% based on GDT 39. The control sieves for each mix type are shown in Subsection 400.5.01.B "Determine Lot Acceptance."

b. Subsurface mixes. For subsurface mixes, limit removal and replacement to the full lane width and no less than 10 ft. (3 m) long and as approved by the Engineer.

eee. Surface Mixes. For surface mixes, ensure that removal and replacement is not less than the full width of the affected lane and no less than the length of the affected areas as determined by the engineer.

Surface tolerance requirements apply to the corrected areas for both subsurface and surface mixes.

400.3.07 Contractor Warranty and Maintenance

A. Contractor's Record

Maintain a dated, written record of the most recent plant calibration. Keep this record available for the Engineer's inspection at all times. Maintain records in the form of:

- Graphs
- Tables
- Charts
- Mechanically prepared data

400.4 Measurement

Thickness and spread rate tolerances for the various mixtures are specified in Subsection 400.4.A.2.b, Table 11, Thickness and Spread Rate Tolerance at Any Given Location. These tolerances are applied as outlined below:

A. Hot Mix Asphaltic Concrete Paid for by Weight

36. Plans Designate a Spread Rate

fff. Thickness Determinations. Thickness determinations are not required when the Plans designate a spread rate per square yard (meter).

If the spread rate exceeds the upper limits outlined in the Subsection 400.4.A.2.b, Table 11, "Thickness and Spread Rate Tolerance at Any Given Location", the mix in excess will not be paid for.

If the rate of spread is less than the lower limit, correct the deficient course by overlaying the entire lot.

The mixture used for correcting deficient areas is paid for at the Contract Unit Price of the course being corrected and is subject to the Mixture Acceptance Schedule—Table 9 or 10.

ggg. Recalculate the Total Spread Rate. After the deficient hot mix course has been corrected, the total spread rate for that lot is recalculated, and mix in excess of the upper tolerance limit as outlined in the Subsection 400.4.A.2.b, Table 11, "Thickness and Spread Rate Tolerance at Any Given Location" is not paid for.

The quantity of material placed on irregular areas such as driveways, turnouts, intersections, feather edge section, etc., is deducted from the final spread determination for each lot.

2. Plans Designate Thickness

If the average thickness exceeds the tolerances specified in the Subsection 400.4.A.2.b, Table 11, "Thickness and Spread Rate Tolerance at Any Given Location", the Engineer shall take cores to determine the area of excess thickness. Excess quantity will not be paid for.

If the average thickness is deficient by more than the tolerances specified in the Thickness and Spread Rate Tolerance at Any Given Location table below, the Engineer shall take additional cores to determine the area of deficient thickness. Correct areas with thickness deficiencies as follows:

hhh. Overlay the deficient area with the same mixture type being corrected or with an approved surface mixture. The overlay shall extend for a minimum of 300 ft (90 m) for the full width of the course.

iii. Ensure that the corrected surface course complies with Subsection 400.3.06.C.1, "Visual and Straightedge Inspection." The mixture required to correct a deficient area is paid for at the Contract Unit Price of the course being corrected.

The mixture is subject to the Mixture Acceptance Schedule—Table 9 or 10 . The quantity of the additional mixture shall not exceed the required calculated quantity used to increase the average thickness of the overlaid section to the maximum tolerance allowed under the following table.

Table 11—Thickness and Spread Rate Tolerance at Any Given Location

Course	Thickness Specified	Spread Rate Specified
Asphaltic concrete base course	± 0.5 in (±13 mm)	+40 lbs, -50 lbs (+20 kg, -30 kg)
Intermediate and/or wearing course	± 0.25 in (± 6 mm)	+20 lbs, -25 lbs (+10 kg, -15 kg)
Overall of any combination of 1 and 2	± 0.5 in (±13 mm)	+40 lbs, -50 lbs (+20 kg, -30 kg)

Note 1: For asphaltic concrete 9.5 mm OGFC and 12.5 mm OGFC, control the spread rate per lot within 5 lbs/yd^2 (3 kg/m^2) of the designated spread rate. For asphaltic concrete 12.5 mm PEM, control the spread rate per lot within 10 lbs/yd^2 (6 kg/m^2) of the designated spread rate.

Note 2: Thickness and spread rate tolerances are provided to allow normal variations within a given lot. Do not continuously operate at a thickness or spread rate not specified.

When the Plans specify a thickness, the Engineer may take as many cores as necessary to determine the average thickness of the intermediate or surface course. The Engineer shall take a minimum of one core per 1,000 ft (300 m) per two lanes of roadway. Thickness will be determined by average measurements of each core according to GDT 42.

If the average exceeds the tolerances specified in the Subsection 400.4.A.2.b, Table 11, "Thickness and Spread Rate Tolerance at Any Given Location", additional cores will be taken to determine the area of excess thickness and excess tonnage will not be paid for.

B. Hot Mix Asphaltic Concrete Paid for by Square Yard (Meter)

37. The thickness of the base course or the intermediate or surface course will be determined by the Department by cutting cores and the thickness will be determined by averaging the measurements of each core.
2. If any measurement is deficient in thickness more than the tolerances given in the table above, additional cores will be taken by the Department to determine the area of thickness deficiency. Correct thickness deficiency areas as follows:
   jjj. Overlay the deficient area with the same type mixtures being corrected or with surface mixture. Extend the overlay at least 300 ft (90 m) for the full width of the course.
   kkk. Ensure that the corrected surface course complies with Subsection 400.3.06.C.1, Visual and Straightedge Inspection" .
   lll. The mixture is subject to the Mixture Acceptance Schedule—Table 9 or 10.
3. No extra payment is made for mixtures used for correction.
4. No extra payment is made for thickness in excess of that specified.

NOTE: Thickness tolerances are provided to allow normal variations within a given lot. Do not continuously operate at a thickness not specified.

C. Asphaltic Concrete

Hot mix asphaltic concrete, complete in place and accepted, is measured in tons (megagrams) or square yards (meters) as indicated in the Proposal. If payment is by the ton (megagram), the actual

weight is determined by weighing each loaded vehicle on the required motor truck scale as the material is hauled to the roadway, or by using recorded weights if a digital recording device is used.

The weight measured includes all materials. No deductions are made for the weight of the individual ingredients. The actual weight is the pay weight except when the aggregates used have a combined bulk specific gravity greater than 2.75. In this case the pay weight is determined according to the following formula:

$$T1 = T \times \frac{\%\ AC + \frac{\%\ Aggregate \times 2.75}{combined\ bulk\ Sp.\ Gr.} + \%\ Y}{100}$$

Where:

T1	Pay weight, tonnage (Mg)
T=	Actual weight
% AC=	Percent asphalt cement by weight of total mixture
% Aggregate =	Percent aggregate by weight of total mixture
Combined Bulk Sp. Gr.=	Calculated combined bulk specific gravity of various mineral aggregates used in the mixture
% Y=	Percent hydrated lime by weight of mineral aggregate

D. Bituminous Material

Bituminous material is not measured for separate payment.

E. Hydrated Lime

When hydrated lime is used as an anti-stripping additive, it is not measured for separate payment.

F. Field Laboratory

The field laboratory required in this Specification is not measured for separate payment.

G. Asphaltic Concrete Leveling

Payment of hot mix asphaltic concrete leveling, regardless of the type mix, is full compensation for furnishing materials, bituminous materials, and hydrated lime (when required) for patching and repair of minor defects, surface preparation, cleaning, hauling, mixing, spreading, and rolling.

Mixture for leveling courses is subject to the acceptance schedule as stated in Subsection 400.3.06.A and Subsection 400.3.06.B.

H. Asphaltic Concrete Patching

Hot mix asphaltic concrete patching, regardless of the type mix, is paid for at the Contract Unit Price per ton (Megagram), complete in place and accepted. Payment is full compensation for:

- Furnishing materials such as bituminous material and hydrated lime (when required)
- Preparing surface to be patched
- Cutting areas to be patched, trimmed, and cleaned
- Hauling, mixing, placing, and compacting the materials

400.4.01 Limits

When the asphaltic concrete is paid for by the square yard (meter) and multiple lifts are used, the number and thickness of the lifts are subject to the Engineer's approval and are used to prorate the pay factor for the affected roadway section.

400.5 Payment

When materials or construction are not within the tolerances in this Specification, the Contract Price will be adjusted according to Subsection 106.03, "Samples, Tests, Cited Specifications" and Subsection 400.3.06, "Quality Acceptance."

Hot mix asphaltic concrete of the various types are paid for at the Contract Unit Price per ton (megagram) or per square yard (meter). Payment is full compensation for furnishing and placing materials including asphalt cement, hydrated lime when required, approved additives, and for cleaning and repairing, preparing surfaces, hauling, mixing, spreading, rolling, and performing other operations to complete the Contract Item.

Payment will be made under:

Item No. 400	Asphaltic concrete type Superpave, group-blend, Including bituminous materials, Gilsonite modifier, and hydrated lime	Per ton (megagram)
Item No. 400	_____ inches asphaltic concrete, type Superpave, group-blend including bituminous materials, Gilsonite modifier and hydrated lime	Per square yard (meter)
Item No. 400	Asphaltic concrete type Stone Matrix Asphalt, group-blend, including polymer-modified bituminous materials and hydrated lime	Per ton (megagram)
Item No. 400	Asphaltic concrete type OGFC, group 2 only, including bituminous materials and hydrated lime	Per ton (megagram)
Item No. 400	Asphaltic concrete type OGFC, group 2 only, including polymer-modified bituminous materials and hydrated lime	Per ton (megagram)
Item No. 400	Asphaltic concrete type Porous European Mix, group 2 only, including polymer-modified bituminous materials and hydrated lime	Per ton (megagram)

400.5.01 Adjustments

A. Materials Produced and Placed During the Adjustment Period

An adjustment period is allowed at the start of mixing operations for each type of mix placed on the Contract except for Asphaltic Concrete OGFC or PEM. The adjustment period is provided to adjust or correct the mix and to establish the construction procedures and sequence of operations.

The adjustment period consists of the tons (megagrams) of the affected mix produced and placed on the first day of operation. If this quantity is less than 500 tons (500 Mg), the Engineer may combine the tons (megagrams) produced and placed on the first day of operation with the tons (megagrams) produced and placed on the next production day of the affected mix for the adjustment period.

The material produced and placed during the mixture adjustment period is one lot. If the mix is adjusted during this period, a new lot may be necessary, but a new adjustment period will not be permitted.

This material shall be paid for at 100 percent of the Contract Unit Price provided it meets the minimum requirements for a 1.00 pay factor for asphalt cement content and a 0.90 pay factor for gradation in the Mixture Acceptance Schedule—Table 9 or 10 .

If the material placed during the adjustment period fails to meet the above requirements, it will be paid for using the applicable acceptance schedule. When the same type Superpave mixture is placed at different mix design levels and a different blend of materials is specified in the job mix formula, a new

adjustment period shall be granted. However, when a Superpave mixture with the same blend of materials specified in the job mix formula is placed at different mix design levels or when a mixture used for leveling at a spread rate of 90 lbs/yd² (50 kg/m²) or less is also used for the surface mix at a spread rate greater than 90 lbs/yd² (50 kg/m²), an additional adjustment period will be allowed for compaction only. This material will be paid for at a 1.00 pay factor provided it:

- Meets the minimum requirements for a 1.00 pay factor in the Mixture Acceptance Schedule—Table 9 or 10 for both asphalt content and gradation.
- Meets the minimum requirements for a 0.90 pay factor in Table 12 of Subsection 400.5.01C, "Calculate Mean Pavement Air Voids.

Mixture which does not meet these requirements shall be paid for using the applicable acceptance schedule.

B. Determine Lot Acceptance

Pay factor adjustments are based on control sieves and asphalt cement content. The control sieves used in the mixture acceptance schedule for the various types of mix are indicated below:

Control Sieves Used in the Mixture Acceptance Schedule	
Asphaltic concrete 25 mm Superpave	1/2 in., No. 8 (12.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 19 mm SMA	1/2 in., No. 8 (12.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 19 mm Superpave	3/8 in., No. 8 (9.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 12.5 mm Superpave	3/8 in., No. 8 (9.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 12.5 mm SMA	3/8 in., No. 8 (9.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 12.5 mm PEM	3/8 in., No. 8 (9.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 12.5 mm OGFC	3/8 in., No. 8 (9.5 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 9.5 mm Superpave	No. 4, No. 8 (4.75 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 9.5 mm SMA	No. 4, No. 8 (4.75 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 9.5 mm OGFC	No. 4, No. 8 (4.75 mm, 2.36 mm) sieves and asphalt cement
Asphaltic concrete 4.75 mm Mix	No. 8 (2.36 mm) sieve and asphalt cement

For projects which do not have milling quantities established as a Pay Item, the Department will pay for 12.5 mm OGFC and PEM placed on ramps and end of project transitions under the appropriate mixture pay item, but the mix shall be subject to the same gradation and control sieve requirements as asphaltic concrete 9.5 mm OGFC. Add polymer-modified bituminous material, hydrated lime, and stabilizing fiber to this mix.

The Department will perform the following tasks:

38. Using the Mixture Acceptance Schedule—Table 9 or 10, determine the mean of the deviations from the job mix formula per test results per lot.
2. Determine this mean by averaging the actual numeric value of the individual deviations from the job mix formula; disregard whether the deviations are positive or negative amounts.
3. Use the Asphalt Cement Content and Aggregate Gradation of Asphalt Concrete Mixture Acceptance Schedule—Table 9 to determine acceptance of surface mixes and the Mixture Acceptance Schedule—Table 10 to determine acceptance of subsurface mixes.

On Contracts involving 1,000 tons (1000 Mg) or less of asphaltic concrete, the mixture is accepted for 100 percent payment of the asphaltic concrete Unit Price provided it meets the following:

39. Minimum requirements for a 1.00 pay factor for asphalt cement content and a 0.90 pay factor for gradation in the applicable Mixture Acceptance Schedule—Table 9 or 10.

40. Minimum requirements for a 0.90 pay factor in Table 12 of Subsection 400.5.01C, "Calculate Pavement Mean Air Voids.

If the material placed on Contracts involving 1,000 tons (1000 Mg) or less of asphaltic concrete does not meet the above requirements, the material will be paid for using the applicable acceptance schedule.

C. Calculate Pavement Mean Air Voids

The Department will determine the percent of maximum air voids for each lot by dividing the pavement mean air voids by the maximum pavement mean air voids acceptable.

The Department will determine the payment for each lot by multiplying the Contract Unit Price by the adjusted pay factor shown in the following Air Voids Acceptance schedule:

Table 12 - Air Voids Acceptance Schedule

Pay Factor	Percent of Maximum Air Voids (Lot Average-5 Tests)	Percent of Maximum Air Voids (Lot Average-10 Tests) (for Reevaluations)
1.00	≤100	≤100
0.97	100.1 — 105	100.1 — 104
0.95	105.1 — 112	104.1— 109
0.90	112.1 — 124	109.1 — 118
0.80	124.1 — 149	118.1 — 136
0.70	149.1 —172	136.1 — 153
0.50	172.1 — 191	153.1 — 166

When the range tolerance is exceeded, the Department will apply a pay factor of 0.95 as described in Subsection 400.3.06.B.2.

D. Asphaltic Concrete For Temporary Detours

Hot mix asphaltic concrete placed on temporary detours that will not remain in place as part of the permanent pavement does not require hydrated lime. Hot mix used for this purpose is paid for at an adjusted Contract Price.

Where the Contract Price of the asphaltic concrete for permanent pavement is let by the ton (megagram), the Contract Price for the asphaltic concrete placed on temporary detours is adjusted by subtracting $0.75/ton ($0.85/mg) of mix used.

Where the Contract price of the mix in the permanent pavement is based on the square yard (meter), obtain the adjusted price for the same mix used on the temporary detour by subtracting $0.04/yd² ($0.05/ m²) per 1-in (25-mm) plan depth.

Further price adjustments required in Subsection 400.3.06, "Quality Acceptance," are based on the appropriate adjusted Contract Price for mix used in the temporary detour work.

E. Determine Lot Payment

Determine the lot payment as follows:

41. When one of the pay factors for a specific acceptance lot is less than 1.0, determine the payment for the lot by multiplying the Contract Unit Price by the adjusted pay factor.
2. When two or more pay factors for a specific acceptance lot are less than 1.0, determine the adjusted payment by multiplying the Contract Unit Price by the lowest pay factor.

If the mean of the deviations from the job mix formula of the tests for a sieve or asphalt cement content exceeds the tolerances established in the Mixture Acceptance Schedule—Table 9 or 10 and if the

Engineer determines that the material need not be removed and replaced, the lot may be accepted at an adjusted unit price as determined by the Engineer. If the pavement mean air voids exceed the tolerances established in the Air Voids Acceptance Schedule – Table 12, remove and replace the materials at the Contractor's expense.

If the Engineer determines that the material is not acceptable to leave in place, remove and replace the materials at the Contractor's expense.

Section 402—Hot Mix Recycled Asphaltic Concrete

402.1 General Description

This work includes producing and placing hot mix recycled asphaltic concrete that incorporates reclaimed asphalt pavement (RAP), reclaimed asphalt shingles (RAS), virgin aggregate, hydrated lime, and neat asphalt cement.

402.1.01 Definitions

General Provisions 101 through 150.

402.1.02 Related References

A. Standard Specifications

Section 400—Hot Mix Asphaltic Concrete Construction

Section 800—Coarse Aggregate

Section 828—Hot Mix Asphaltic Concrete Mixtures

B. Referenced Documents

Guidelines for RAP Stockpile Approval

402.1.03 Submittals

A. Certified Weight Tickets

Notify the Engineer before removing RAP from a stockpile that belongs to the Department. Submit to the Engineer the certified weight tickets of materials removed from the stockpile.

B. Affidavit

Submit to the laboratory an affidavit stating the sources of stockpiled materials to be used on a State project. Include the following information in the letter:

- State project number
- Location from which the material was removed
- Approximate removal dates
- Mix types removed and the estimated quantity of each type in the stockpiles
- Other available information about the stockpiled material such as percentage of local sand in the RAP

Obtain specific approval from the laboratory to use RAP or RAS stockpiles.

Adhere to Guidelines for RAP Stockpile Approval.

402.2 Materials

A. RAP Material Composition

Use RAP materials from any of the following:

- Existing roadway
- Contractor's RAP stockpile that has been approved by the Department
- Department stockpile

NOTE: The location of Department RAP material stockpiles will be given on the Plans.

Do not use RAP materials that contain alluvial gravel or local sand in any mixture placed on interstate projects except for mixtures used in shoulder construction. When used in shoulder construction, limit RAP containing local sand or alluvial gravel so that the sand or gravel contributes no more than 20% of the total aggregate portion of the mix.

42. RAP Percentage

    For non-interstate projects, limit the percentage of RAP allowed in recycled mixes so that the overall amount of alluvial gravel does not exceed 5 percent of the total mix. The percentage of alluvial gravel, local sand, and Group I material in the RAP will be determined through petrographic analysis or available records.

    RAP furnished to the Contractor but not used in the work remains the Contractor's property.

    RAP used in the recycled mixtures for mainline or ramps (if applicable) may make up from 0 to 40 percent of the mixture depending on the amount of RAP available, the production facilities, and whether the mixture meets the requirements in Section 828.

    The maximum ratio of RAP material to the recycled mixture is 40 percent for continuous mix type plants and 25 percent for batch type plants.

43. Process RAP Material

    Process RAP material to be used in the recycled mixture so that 100 percent will pass the 2 in (50 mm) sieve. Additional crushing and sizing may be required if the RAP aggregate exceeds the maximum sieve size for the mix type as shown in Section 828. Obtain representative materials from the RAP stockpile for the mix design.

B. RAS Material

RAS materials are produced as a by-product of manufacturing roofing shingles and/or discarded shingle scrap from the reroofing of buildings.

44. Limit the amount of RAS material used in the recycled mixture to no greater than 5 percent of the total mixture weight.
45. Shred the RAS material before incorporating it into the mix to ensure that 100 percent of the shredded pieces are less than 1/2 in (12.5 mm) in any dimension.
46. Remove all foreign materials such as paper, roofing nails, wood, or metal flashing.
47. Provide test results for Bulk Sample Analysis, known as Polarized Light Microscopy, if post-consumer shingles are used to certify the RAS material is free of asbestos. Test stockpiles at the rate of one test per 1000 tons (megagrams) prior to processing.

Other than as specifically stated in this Subsection, ensure that RAS material is used according to the same requirements as described for RAP material.

C. Asphaltic Concrete Removed from an Existing Roadway

Asphaltic concrete removed from an existing roadway becomes the Contractor's property unless specified otherwise on the Plans. RAP material retained by the Department is designated on the Plans, and the RAP shall be stockpiled at the location specified on the Plans.

D. Local Sand and Group I Material in RAP

Use of local sand in recycled mixes is restricted as stipulated in Section 828 for the Project. However, RAP which contains local sand may be used in surface and intermediate layers of non-interstate projects so long as the RAP percentage used does not contribute more than 5% local sand to the total aggregate portion of the mix. The amount of local sand in the RAP material shall be considered when determining the percentage of local sand in the total mix.

Where Pay Items specify that Group II only aggregate is to be used, RAP which consists primarily of Group II aggregate, but contains some Group I aggregate, shall be limited such that the Group I aggregate makes up no more than 5% of the total aggregate portion of the mix. When a Blend I mix is specified, any Group I materials in the RAP will be considered when determining the Group I portion allowed in the total mix as specified in Subsection 828.2.A.2.

E. Asphalt Cement

Using laboratory evaluations, the Department will determine the asphalt cement grade to be used in the recycled mixture. The asphalt cement shall meet the requirements of Section 820.

When the asphalt cement is blended with asphalt cement recovered from the RAP material and after tests on residue from thin film oven tests, the asphalt cement shall have a viscosity of 6,000 to 16,000 poises (600 to 1600 Pa) or as approved by the Engineer. Recover asphalt cement from the recycled mixture to verify that the specified viscosity is being met.

If the Engineer determines during construction that the selected asphalt cement grade is not performing satisfactorily, the Department may change the asphalt cement grade in the mixture, with no change in the Contract Unit Price.

F. Recycled Mixture

The recycled mixture shall be a homogenous mixture of RAP or RAS material, virgin aggregate, hydrated lime, and neat asphalt cement. Ensure that the mixture conforms to an approved mixture design outlined in Section 828.

402.2.01 Delivery, Storage, and Handling

Separate the stockpiles by Project sources and by Group I and Group II aggregate types. Erect a sign on each stockpile to identify the source(s).

If RAP material from different project sources becomes intermixed in a stockpile, only use those materials when approved by the laboratory.

The Department may reject by visual inspection stockpiles that are not clean and free of foreign materials.

402.3 Construction Requirements

402.3.01 Personnel

General Provisions 101 through 150.

402.3.02 Equipment

A. Hot Mix Plant

Use a hot mix plant for the recycling process with necessary modifications approved by the Engineer to process recycled material. Design, equip, and operate the plant so that the proportioning, heating, and mixing yields a uniform final mixture within the job mix formula tolerances.

B. Cold Feed Bin

Proportion the RAP or RAS material using a separate cold feed bin. Ensure that the material meets the size requirements in Subsection 402.2, "Materials." The ratio of the RAP or RAS to virgin aggregate shall be controlled gravimetrically.

C. Electronic Belt Weighing Devices

Use electronic belt weighing devices to monitor the flow of RAP or RAS and the flow of virgin aggregate. For batch-type plants, the RAP or RAS portion of the mix may be weighed in a weigh hopper before incorporating it into the pugmill.

D. Feeders and Conveyors

Equip plants with an interlocking system of feeders and conveyors that synchronize the RAP or RAS material flow with the virgin aggregate flow. Ensure that the electronic controls track the flow rates indicated by the belt weighing devices and develop the signal to automatically maintain the desired ratio at varying production rates. Design the RAP or RAS feeder bins, conveyor system, and auxiliary bins (if used) to prevent RAP material from segregating and sticking.

402.3.03 Preparation

General Provisions 101 through 150.

402.3.04 Fabrication

General Provisions 101 through 150.

402.3.05 Construction

Follow the requirements in Section 400 for hot mix recycled asphaltic concrete production and placement, materials, equipment, and acceptance plans except as noted or modified in this Specification.

402.3.06 Quality Acceptance

The Department may require additional quality control tests to determine the RAP stockpile consistency and the RAP aggregate quality. In this case, conduct at least three extraction/gradation tests from each individual source. Ensure that aggregate meets the quality standards in Section 800.

402.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

402.4 Measurement

Recycled asphaltic concrete mixture, complete in place and accepted, is measured in tons (megagrams). The weight is determined by recorded weights if an approved recording device is used. Or, the weight is determined by weighing each loaded vehicle on an approved motor truck scale as the material is hauled to the roadway.

402.4.01 Limits

General Provisions 101 through 150.

402.5 Payment

The work performed and the materials furnished as described in this Specification will be paid for at the Contract Unit Price per ton (megagram). Payment is full compensation for providing materials, hauling and necessary crushing, processing, placing, rolling and finishing the recycled mixture, and providing labor, tools, equipment, and incidentals necessary to complete the work, including hauling and stockpiling RAP or RAS material.

Payment will be made under:

Item No. 402	Recycled asphaltic concrete type, group-blend, including bituminous materials	Per ton (megagram)
Item No. 402	Recycled asphaltic concrete type, group-blend, including bituminous materials and hydrated lime	Per ton (megagram)
Item No. 402	Recycled asphaltic concrete type, group-blend, including polymer-modified bituminous materials and hydrated lime	Per ton (megagram)
Item No. 402	_____in (mm) recycled asphaltic concrete type, group-blend, including bituminous materials	Per square yard (meter)
Item No. 402	_____in (mm) recycled asphaltic concrete type, group-blend, including bituminous materials and hydrated lime	Per square yard (meter)
Item No. 402	_____in (mm) recycled asphaltic concrete type, group-blend, including polymer-modified bituminous materials and hydrated lime	Per square yard (meter)
Item No. 402	Recycled asphaltic concrete patching including bituminous materials	Per ton (megagram)
Item No. 402	Recycled asphaltic concrete patching including bituminous materials and hydrated lime	Per ton (megagram)
Item No. 402	Recycled asphaltic concrete leveling including bituminous materials	Per ton (megagram)
Item No. 402	Recycled asphaltic concrete leveling including bituminous materials and hydrated lime	Per ton (megagram)

402.5.01 Adjustments

General Provisions 101 through 150.

Section 802—Aggregates for Asphaltic Concrete

802.1 General Description

This section includes the requirements for fine and coarse aggregates used in asphaltic concrete.

802.1.01 Definitions

Fine Aggregate: All aggregate passing a No. 8 (2.36 mm) sieve

Coarse Aggregate: All aggregate retained on a No. 8 (2.36 mm) sieve

802.1.02 Related References

A. Standard Specifications

Section 800—Coarse Aggregate

Section 828—Hot Mix Asphaltic Concrete Mixtures

B. Referenced Documents

AASHTO T 27

AASHTO T 96

ASTM C 295

GDT 63

GDT 76

802.2 Materials

802.2.01 Fine Aggregate for Asphaltic Concrete

A. Requirements

Use the appropriate type, group, class, and grade of fine aggregate.

48. Types

Use fine aggregate made of sharp, strong, angular material meeting the required performance characteristics when combined into a mixture.

mmm. Ensure that the aggregate meets the following requirements:

- Does not contain any deleterious substances.
- Natural sand is free of organic matter, roots, or twigs.
- Aggregate is manufactured from Class A or B crushed stone, gravel, slag, or synthetic aggregate that meets the requirements of Section 800.
- A combination of natural and manufactured sands meets the requirements in Subsection 802.2.01.A.3 and Subsection 802.2.01.A.4 after being combined.

nnn. Do not use crushed alluvial gravel as virgin aggregate in any mixture.

49. Groups

Fine aggregate groups include:

ooo. Group I—Limestone, dolomite, marble, or combination thereof

ppp. Group II—Gravel, slag, granitic and gneissic rocks, quartzite, natural sand, or a combination thereof

3. Sand Equivalent

Use these sand equivalent values:

Material	Sand Equivalent Value
Group I	At least 28
Group II	At least 40
Natural sand	At least 25

Blended sand*	Natural sand at least 20; combined blend at least 25
*Blended natural sands or natural sand blended with stone screenings that meet the Group I or Group II sand equivalent limits.	

4. Mica

   qqq. Use fine aggregate with no more than 35 percent free mica in asphaltic concrete surface mixes.

   rrr. When approved by the Engineer, use fine aggregate with more than 35 percent mica if blended with natural sand or sand manufactured from Group II aggregates. Ensure the blend has no more than 35 percent free mica and meets all other requirements of this Section, Section 800 and Section 828.

5. Aggregate for Stone Matrix Asphalt

   Manufactured screenings will be considered as fine aggregate and shall contain no more than 20 percent by weight coarser than a No. 4 (4.75 mm) sieve.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

Test the fine aggregate as follows:

Test	Method
Aggregate gradation	AASHTO T 27
Sand equivalent	GDT 63
Mica content	GDT 76 or ASTM C 295

D. Materials Warranty

General Provisions 101 through 150.

802.2.02 Coarse Aggregate for Asphaltic Concrete

A. Requirements

6. Types

   Ensure coarse aggregate meets the following requirements:

   - Class A or B crushed stone, gravel, slag, or synthetic aggregate as in Subsection 800.2.
   - Have uniform quality throughout without any deleterious substances.
   - Meet the required performance characteristics when combined into a mixture.

NOTE: Do not use alluvial gravel as virgin aggregate.

7. Groups

   Coarse aggregate shall be one of either group below as specified in the composition Table in Subsection 828.2.A.2:

   - Group I—Limestone, dolomite, marble, or combination thereof
   - Group II—Gravel, slag, granite and gneissic rocks, quartzite, or combination thereof

8. Aggregate for Stone Matrix Asphalt

   Use coarse aggregate that meets requirements of this Section and Section 800 except as follows:

   - Use Class A aggregate only with percent wear of each individual size not to exceed 45 percent based on the B grading of AASHTO T 96

- Use aggregate which contains no more than 20 percent flat and elongated pieces (length greater than three times the average thickness) for that portion of the blend of all aggregate retained on the No. 4 (4.75 mm) sieve.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

Test as follows:

Test	Method
Coarse Aggregate	Subsection 800.2.01.C

D. Materials Warranty

General Provisions 101 through 150.

Section 819—Fiber Stabilizing Additives

819.1 General Description

This Section covers the general requirements for fiber stabilizing additives that are incorporated into asphaltic concrete mixtures. These fibers are generally used to stabilize the asphalt film surrounding aggregate particles to reduce drain-down of the asphalt cement. Use a cellulose or mineral fiber stabilizer listed on QPL 77, Fiber Stabilizing Additives.

819.1.01 Related References

A. Standard Specifications

General Provisions 101 through 150.

B. Referenced Documents

ASTM C612

GDT 124

QPL 77

819.2 Materials

The selected fiber shall meet the properties described below. Dosage rates given are typical ranges but the Office of Materials and Research shall approve the actual dosage rate used.

A. Cellulose Fibers

Add cellulose fibers at a dosage rate between 0.2% and 0.4% by weight of the total mix as approved by the Engineer. Fiber properties shall be as follows:

9. Fiber length: 0.25 inch (6.35 mm) maximum
10. Sieve Analysis
    sss. Alpine Sieve Method
        Passing No. 100 (150 µm) sieve: 60-80%
    ttt. Ro-Tap Sieve Method
        Passing No. 20 (850 µm) sieve: 80-95%
        Passing No. 40 (425 µm) sieve: 45-85%
        Passing No. 100 (150 µm) sieve: 5-40%
11. Ash Content: 18% non-volatiles (±5%)
12. pH: 7.5 (±1.0)
13. Oil Absorption: 5.0 (±1.0) (times fiber weight)
14. Moisture Content: 5.0 % (maximum)

B. Cellulose Pellets

Use cellulose pellets that are a blend of cellulose fiber and asphalt cement. Add them at a dosage rate between 0.4% and 0.8% by weight of the total mix. The cellulose used shall comply with requirements of Subsection 819.2.A.

- Pellet size: 1/4 cubic inch (4.093 cubic centimeters) maximum
- Asphalt: 25–80 pen.

C. Mineral Fibers

Use mineral fibers that are made from virgin basalt, diabase, or slag that is treated with a cationic sizing agent to enhance disbursement of the fiber and to increase adhesion of the fiber surface to the bitumen. Add the fiber at a dosage rate between 0.2% to 0.5% by weight of the total mix as approved by the Engineer.

15. Size Analysis:
    - Average Fiber length: 0.25 inches (6.35 mm) maximum

- Average Fiber thickness: 0.0002 inches (0.005 mm) maximum

16. Shot content (ASTM C612)
    - Passing No. 60 (250 µm) sieve: 90 - 100%
    - Passing No. 230 (67 µm) sieve: 65 - 100%
    - Degradation (GDT 124/McNett Fractionation): 30% (maximum)

D. Materials Warranty

General Provisions 101 through 150.

Section 820—Asphalt Cement

820.1 General Description

This Section includes the requirements for asphalt cements prepared from crude petroleum.

820.1.01 Related References

A. Standard Specifications

General Provisions 101 through 150.

B. Referenced Documents

Standard Operating Procedure (SOP 4)

AASHTO TP 1

AASHTO TP 3

AASHTO TP 5

AASHTO T 48

AASHTO TP 48

AASHTO T 179

AASHTO T 240

820.2 Materials

820.2.01 Asphalt Cement

A. Requirements

17. Type

    Use a material that is homogenous and water-free and that does not foam when heated to 347 °F (175 °C).

    Ensure that a blend used to produce a specified performance grade meets the following requirements:

    - Is uniform and homogeneous without separation
    - Uses PG 64-22 or PG 67-22 described below for the base asphalt
    - Consists of production materials that have not been “air-blown” to achieve the performance grade

18. Grade

    Use the various grades of asphalt cement that meet the requirements shown in the test requirements for Petroleum Asphalt Cements

    Add only Styrene-Butadiene-Styrene (SBS) or Styrene-Butadiene (SB) to neat asphalt to produce a binder that meets requirements for PG 76-22.

Test Requirements for Petroleum Asphalt Cements

Test And Method	Test Temperature				Original Binder	Residue Of Binder After:	
	PG 58-22	PG 64-22	PG 67-22	PG 76-22		Rolling Thin-Film Oven AASHTO: TP5	Pressure Aging AASHTO: PP-1
Flash Point, AASHTO: T-48 Min.					446 °F (230 °C)		
Viscosity (a), AASHTO:TP-48 Max.	275 °F (135 °C)				3Pa-S (3000CP)		
Mass Loss (%), Max. AASHTO: T-240 (b)						0.5	
Dynamic Shear, G*/sinδ, AASHTO: TP5, 10 Rad/Sec	136 °F (58 °C)	147 °F (64 °C)	153 °F (67 °C)	169 °F (76 °C) Phase Angle	≥ 1.0 kPa ≤ 75 deg.	≥ 2.2 kPa	
Dissipated Energy, Dynamic Shear, G*sinδ, AASHTO: TP5, 10 Rad/Sec	77 °F (25 °C)						≤ 5000 kPa
Creep Stiffness (c), 60 sec. AASHTO TP1	10 ° F (- 12 °C)						S ≤ 300 000 kPa m ≥ 0.300
Direct Tension, 1.0 mm/min. AASHTO: TP3, Failure Strain	10 ° F (- 12 °C)						Report

a. The Department may waive this requirement if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.
b. Heat loss by AASHTO T 179 may be accepted in lieu of mass loss by AASHTO T 240.
c. If the creep stiffness is below 300 000 kPa, the direct tension test is not required. If the creep stiffness is ≥300 000 kPa, report the Direct Tension Failure Strain value. Satisfy the m-value requirement in either case.

If modification is required, thoroughly blend the composite materials at the supply facility prior to being loaded into the transport vehicle. Ensure all blending procedures, formulation, and operations are approved by the Office of Materials and Research.

3. Certification: Provide certified test results from an approved, certified laboratory of blends for proposed PG asphalt for each specification characteristic of the asphalt cement proposed for shipment. Provide the certified results to the State Materials and Research Engineer as required in Standard Operating Procedure (SOP 4).

   In the event there is reason to suspect a sample will be outside specification limits, the State Materials and Research Engineer may interrupt production until test results are known.

B. Materials Warranty

General Provisions 101 through 150.

Section 828—Hot Mix Asphaltic Concrete Mixtures

828.1 General Description

This specification includes the requirements for hot mix asphaltic concrete mixtures, including:

- Open-graded surface mixtures
- Stone Matrix Asphalt mixtures
- Superpave asphaltic concrete mixtures
- Fine-graded mixtures

828.1.01 Definitions

Nominal Maximum Sieve Size: One standard sieve size larger than the first sieve to retain more than ten percent.

828.1.02 Related References

A. Standard Specifications

Section 800–Coarse Aggregate

Section 802–Aggregates for Asphaltic Concrete

Section 820–Asphalt Cement

Section 831–Admixtures

B. Referenced Documents

AASHTO TP 4

AASHTO PP 2

AASHTO TP 8-94

AASHTO T 112

AASHTO T 209

AASHTO T 305

Standard Operating Procedure (SOP) 2 SP–Control of Superpave Bituminous Mixture Designs

GDT 4

GDT 56

GDT 66

GDT 115

GDT 125

QPL 26

QPL 41

828.2 Materials

A. Requirements

All mixtures are designated based on the Nominal Maximum Sieve Size. Determine the amount finer than No. 200 (75 µm) by washing (See GDT 4) or by the correlation procedure described in GDT 125.

Use hot mix asphaltic concrete mixtures that meet the following requirements:

19. Ensure the materials used to prepare the mixtures are approved by the Engineer before incorporating into the Work.
20. Use aggregate groups and blends that meet the following pay item designations, as indicated in the Proposal and Plans:

Pay Item Designation	Allowable Aggregate Groups
Group I or II	100% of Group I, Group II, or Blend I.
Group II only	Only 100% Group II.
Blend I	Either 100% Group II material or a blend of Group I and Group II. Do not use Group I material for more than 60% by weight of the total aggregates, nor more than 50% by weight of the coarse aggregate portion.

21. Use Group I, Group II, or a blend of both aggregate groups, for patching or leveling. Mixes are listed in Subsection 828.2.03 and Subsection 828.2.04.
22. Design mixes using the Superpave System for Volumetric Design (AASHTO TP 4 and AASHTO PP 2) unless stated otherwise. Designs shall be performed by qualified and approved laboratories and technicians as specified in SOP-2 SP - Control of Superpave Bituminous Mixture Designs.
23. Ensure individual test results meet Mixture Control Tolerances
24. Include hydrated lime in all paving courses except where noted. For a list of hydrated lime sources, see QPL 41.

    uuu. Add lime to virgin aggregate mixtures at a minimum rate of 1 percent of the total dry aggregate weight.

    vvv. Add lime to recycled mixtures at a minimum rate of 1 percent of the virgin aggregate portion, plus a minimum of 0.5 percent of the aggregate in the reclaimed asphalt pavement (RAP) portion.

    www. Add more lime and an approved heat-stable, anti-stripping additive that meets the requirements of Subsection 831.2.04, "Heat Stable Anti-Stripping Additive," if necessary, to meet requirements for mixture properties. However, the Department will not pay for the additional required materials. For a list of Heat Stable Anti-Stripping Additive sources, please see QPL 26.

    xxx. On PR, LARP, airport, bridge replacement, and parking lot projects designated at Mix Design Level A, asphalt cement may include an approved, heat-stable, anti-stripping additive that meets the requirements of Subsection 831.2.04, "Heat Stable Anti-Stripping Additive" instead of hydrated lime, unless specified in the Pay Item.

    1) Add at a minimum rate of 0.5 percent of the AC portion.
    2) Ensure the additive treated mix meets the minimum tensile splitting ratio:

Tensile Splitting Ratio	Type of Asphaltic Concrete
0.4	4.75 mm mix
0.6	All other mixes

25. Use performance grade PG 67-22 asphalt cement in all mixtures except as follows:

    yyy. For RAP mixtures, the Engineer will determine the performance grade to be used.

zzz. On PR, LARP, airport, bridge replacement, and parking lot projects, PG 64-22 may be substituted for PG 67-22.

aaaa. Use only performance grade PG 76-22 for all mixtures that specify polymer-modified asphalt in the pay item designation.

26. Use of local sand is restricted as follows:
    a. No more than 20 percent, based on total aggregate weight, may be used in mixtures for shoulder construction and on projects designed at Mix Design Level A.
    b. For mixtures placed on the mainline traveled way of projects designed at Mix Design Level B, C, or D (except interstate projects), local sand may be used only in the 25 mm Superpave and shall not exceed 20 percent based on total aggregate weight.
    c. Do not use local sand in any mixture placed on the traveled way of Interstate mainline or ramps. No more than 20 percent local sand, based on total aggregate weight, may be used in mixtures for shoulder construction.
    d. Do not use local sand that contains more than 7 percent clay.
    e. Do not use local sand that contains any clay lumps as determined by AASHTO T 112.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

Ensure the mix design has been reviewed and approved by the Department prior to beginning production.

27. Rutting Susceptibility Testing
    a. Fabricate three beams or six cylindrical specimens from each asphalt mix for the test using GDT 115.
    b. Design mixtures which meet the following criteria for rutting where tested using GDT 115:
    c. Mix Design Level A – 0.3 in (7 mm) maximum
    - Mix Design Level B – 0.25 in (6 mm) maximum
    - Mix Design Level C & D – 0.2 in. (5 mm) maximum

    Mixtures designed prior to July 1, 2001 which do not exceed 0.2 in (5 mm) rutting when tested at 120 ºF (49 ºC) using GDT 115 may be acceptable.

    Tests will not be required for mixtures designed exclusively for trench widening nor for the 4.75 mm mix, nor for open-graded surface mixtures.

2. Fatigue Testing

    The Department may perform the test according to AASHTO TP 8-94 or other Department approved procedure.

D. Materials Warranty

General Provisions 101 through 150.

828.2.01 Open-Graded Surface Mixture

A. Requirements

28. Use the information in the following table for job mix formulas and design limits:

Mixture Control Tolerance	Asphaltic Concrete	9.5 mm OGFC	12.5 mm OGFC	12.5 mm PEM
	Grading Requirements	Percent Passing		
±0.0	3/4 in (19 mm) sieve		100	100

±6.1	1/2 in (12.5 mm) sieve	100*	85-100	80-100
±5.6	3/8 in (9.5 mm) sieve	85-100	55-75	35-60
±5.7	No. 4 (4.75 mm) sieve	20-40	15-25	10-25
±4.6	No. 8 (2.36 mm) sieve	5-10	5-10	5-10
±2.0	No. 200 (75 µm) sieve	2-4	2-4	1-4
	Design Requirements			
±0.4	Range for % AC	6.0-7.25	5.75-7.25	5.5-7.0
	Class of stone (Section 800)	"A" only	"A" only	"A" only
	Coating retention (GDT-56)	95	95	95
	Drain-down, AASHTO T 305 (%)	<0.3	<0.3	<0.3

* Mixture control tolerance not applicable to this sieve for this mix.

29. Use only PG 76-22 (specified in Section 820) in the 12.5 mm OGFC and 12.5 mm PEM mixtures.
30. Use a stabilizing fiber, which meets the requirements of Section 819 in 12.5 mm OGFC and 12.5 mm PEM mixtures. The dosage rate will be as recommended by the Engineer and shall be sufficient to prevent excessive drain-down.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

General Provisions 101 through 150.

D. Materials Warranty

General Provisions 101 through 150.

828.2.02 Stone Matrix Asphalt Mixtures

A. Requirements

Use the information in the following table for the job mix formula and design limits.

Mixture Control Tolerance	Asphaltic Concrete	9.5 mm SMA	12.5 mm SMA	19 mm SMA
	Grading Requirements	**Percent Passing**		
±0.0	1- in (25 mm) sieve			100
±7.0	3/4 in (19 mm) sieve		100*	90-100
±6.1	1/2 in (12.5 mm) sieve	100*	85-100	44-70
±5.6	3/8 in (9.5 mm) sieve	70-100	50-75	25-60
±5.7	No. 4 (4.75 mm) sieve	28-50	20-28	20-28
±4.6	No. 8 (2.36) mm sieve	15-30	16-24	15-22
±3.8	No. 50 (300 µm) sieve	10-17	10-20	10-20
±2.0	No. 200 (75 µm) sieve	8-13	8-12	8-12
	Design Requirements			
±0.4	Range for % AC	6.0-7.5	5.8-7.5	5.5-7.5

	Design optimum air voids (%)	3.5 ±0.5	3.5 ±0.5	3.5 ±0.5
	% aggregate voids filled with AC (VFA)	70-90	70-90	70-90
	Tensile splitting ratio after freeze-thaw cycle GDT-66	80%	80%	80%
	Drain-down AASHTO T 305 (%)	<0.3	<0.3	<0.3

* Mixture control tolerance not applicable to this sieve for this mix.

1. Compact SMA mixtures at 50 gyrations with the Superpave Gyratory compactor or 50 blows with the Marshall compactor.
2. A Tensile splitting ratio of no less than 70% may be acceptable so long as all individual test values exceed 100 psi (690 kPa).
3. Stone Matrix Asphalt mixtures shall contain asphalt cement, mineral filler, and fiber stabilizing additives which meet the following requirements:
   a. Use asphalt cement that meets requirements of PG 76-22 of Section 820.
   b. Use mineral filler that meets requirements of Section 883 and has been approved by the Engineer. Local sand shall not be used in lieu of mineral filler.
   c. Treat these mixes with a fiber-stabilizing additive, which meets the requirements of Section 819. The dosage rate will be as recommended by the Engineer and shall be sufficient to prevent excessive drain-down.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

See Subsection 828.2.C.

D. Materials Warranty

General Provisions 101 through 150.

828.2.03 Superpave Asphaltic Concrete Mixtures

A. Requirements

Use the information in the following table for job mix formula and design limits:

Mixture Control Tolerance	Asphaltic Concrete	9.5 mm Superpave Level A	9.5 mm Superpave Level B,C,D	12.5 mm Superpave	19 mm Superpave	25 mm Superpave
	Grading Requirements	Percent Passing				
	1-1/2 in (37.5 mm) sieve					100
± 8.0	1- in (25.0 mm) sieve				100*	90-100
±8.0	3/4 in (19.0 mm) sieve			100*	90-100	55-89
±6.0**	1/2 in (12.5 mm) sieve	100*	100*	90-100	60-89	50-70
±5.6	3/8 in (9.5 mm) sieve	90-100	90-100	70-85	55-75	

±5.6	No. 4 (4.75 mm) sieve	65-85	55-75			
±4.6	No. 8 (2.36 mm) sieve	53-58	42-47	34-39	29-34	25-30
±2.0	No. 200 (75 µm) sieve	4.0-7.0	4.0-7.0	3.5-7.0	3.5-6.0	3.0-6.0

* Mixture control tolerance not applicable to this sieve for this mix.

**Mixture control tolerance shall be ± 8.0% for this sieve for 19 mm Superpave.

Superpave mixtures shall also meet the following requirements:

1. The Mixture Control Tolerance for asphalt cement shall be ± 0.4%.
2. Volumetric Criteria

Design Parameter	Design Criteria
a. Percent of Maximum Specific Gravity (%G_{mm}) at the design number of gyrations, (N_d) (See Note 1)	96%
b. % G_{mm} at the initial number of gyrations, (N_i)	Level A <91.5% Level B <90.5% Level C & D <89%
c. Percent voids in mineral aggregate (VMA) at N_d	See Table 828.2.03.A.3
d. Percent voids filled with asphalt (VFA) at N_d	See Table 828.2.03.A.4
e. Fines to effective asphalt binder ratio (F/P_{be})	
1) Asphaltic concrete 9.5 mm Superpave (Level A)	0.6-1.2
2) All Superpave mixtures excluded in Item 1	0.8-1.6
f. Tensile strength (GDT 66)	
1) Ratio (See Note 2)	80% min.
2) Stress	60 psi (414 kPa) min.
g. Retention of Coating (GDT 56)	95% min.

Note 1: Maximum specific gravity (G_{mm}) determined in accordance with AASHTO T 209.

Note 2: A tensile splitting ratio of no less than 70% may be acceptable so long as all individual test values exceed 100 psi (690 kPa).

3. VMA Criteria

Nominal Maximum Sieve Size	Minimum % VMA*
1 in (25 mm)	12
3/4 in (19 mm)	13
1/2 in (12.5 mm)	14
3/8 in (9.5)	15

* VMA is to be determined based on effective specific gravity of the aggregate (G_{se}).

4. VFA Criteria

	RANGE % VFA

MIX DESIGN LEVEL	Minimum	Maximum
A	67	80
B	65	78
C	65	76
D	65	75

5. Superpave Gyratory Compaction Criteria

MIX DESIGN LEVEL	NUMBER OF GYRATIONS	
	N_i	N_d
A	6	50
B	7	75
C	8	100
D	9	125

Use mix Design Level A for all Superpave mixes used as shoulder surface mixture, trench widening, temporary detour, or sub-base mixture under Portland cement concrete pavement unless specified otherwise in the plans.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

See Subsection 828.2.C.

D. Materials Warranty

General Provisions 101 through 150.

828.2.04 Fine Graded Mixtures

A. Requirements

Use the following table for the job mix formula and design limits:

ASPHALTIC CONCRETE - 4.75 mm Mix		
MIXTURE CONTROL TOLERANCE	GRADING REQUIREMENTS	% Passing
±0.0	1/2 in (12.5 mm) sieve	100*
±5.6	3/8 in (9.5 mm) sieve	90-100
±5.7	No. 4 (4.75 mm) sieve	75-95
±4.6	No. 8 (2.36 mm) sieve	60-65
±3.8	No. 50 (300 μm) sieve	20-50
±2.0	No. 200 (75 μm) sieve	4-12
	DESIGN REQUIREMENTS	
±0.4	Range for % AC	6.00-7.50
	Design optimum air voids (%)	4-7

	% Aggregate voids filled with AC	50-80
	Tensile splitting ratio after freeze-thaw cycle (GDT 66)	80% minimum

* Mixture control tolerance not applicable to this sieve for this mix.

Design this mixture at Superpave Mix Design Level A.

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

General Provisions 101 through 150.

D. Materials Warranty

General Provisions 101 through 150.

Section 883—Mineral Filler

883.1 General Description

This section covers mineral filler added as a separate ingredient for use in bituminous paving mixtures. Use mineral filler that consists of finely divided mineral matter such as rock dust, slag dust, hydrated lime, hydraulic cement, fly ash, or other suitable mineral filler. Ensure that at the time of use it is sufficiently dry, flows freely, and is free from lumps.

883.1.01 Related References

A. Standard Specifications

General Provisions 101 through 150.

B. Referenced Documents

AASHTO PP 1

AASHTO T 90

AASHTO T 240

AASHTO TP 1

AASHTO TP 5

GDT 4

883.2 Materials

883.2.01 Mineral Filler

A. Requirements

Mineral filler shall be graded within the following limits:

Sieve Size	Percent Passing
No. 30 (600 μm)	100
No. 50 (300 μm)	95-100
No. 200 (75 μm)	55-100

Ensure that the mineral filler is free from organic impurities and has a plasticity index not greater than 4. Plasticity index limits are not appropriate for hydrated lime and hydraulic cement.

Thoroughly blend mineral filler to be used in Stone Matrix Asphalt mixtures with asphalt cement and fiber stabilizing additives into a homogenous mixture. The total fine mortar shall then meet the following requirements:

Test	Specification
Unaged DSR, G*/sinδ(kPa)	5 minimum
RTFO Aged DSR, G*/sinδ(kPa)	11 minimum
PAV Aged BBR, Stiffness (MPa)	1500 maximum

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

Test as follows:

Sieve Analysis of Mineral Filler	GDT 22*
Plasticity Index	AASHTO T 90
* A laser diffraction particle size distribution analyzer may be used in lieu of this test.	

Mortar Properties to be based on NCAT procedure for Laboratory Preparation and Testing of HMA Mortars using AASHTO T240, AASHTO PP1, AASHTO TP1, and AASHTO TP5.

D. Materials Warranty

General Provisions 101 through 150.

DOT and QCT's Technicians

Plant Check List

Testing Management Field Technician

QCT CHECK LIST

Project # _____ County _____ Contractor _____

Contract ID#_____ Mix ID# _____ Plant Location _____

QCT Name _____ QCT # _____ Level _____

YES NO

_____ _____ 1. Is a QCT at the plant at the beginning of production until the end of production (excluding lunch or break time)?
_____ _____ 2. Are random numbers being selected before production begins?
_____ _____ 3. Is the load selected by random number being sampled and the ticket being signed?
_____ _____ 4. Is the diary, QC Rating & Flow chart being properly maintained daily?
_____ _____ 5. Is the referee and comparison portions of the sample being saved and labeled as required.
_____ _____ 6. Is the sample size correct for the type of mix being produced?
_____ _____ 7. Is the temperature being monitored and recorded?
_____ _____ 8. Is the thermometer being calibrated each week and recorded as required?
_____ _____ 9. Are haul vehicles being properly inspected (tarps, strapping, insulation, releasing agent)?
_____ _____ 10. Are T.M.S. and T.S.E.being notified of any test out of Section 828?
_____ _____ 11. Does QCT have an approved JMF for project?
_____ _____ 12. Are correct materials being added to mix (aggregates, lime, additives, AC and Rap Stockpile)?
_____ _____ 13. Is the QC rating being forwarded to District lab by the 2nd working day of each month?
_____ _____ 14. Are the interlocks working (additive, RAP, Fiber, Mineral filler, etc.)?
_____ _____ 15. Are AC, Lime and Miscellaneous samples being taken and submitted to the lab as required?
_____ _____ 16. Are lime calibration checks being performed and recorded twice per week as required?
_____ _____ 17. Are Asphalt plant scale certifications current (AC, Aggregate, platform, batch, etc.)? Date? _____ by _____
_____ _____ 18. Are 159's being up-loaded per Lot daily as required?
_____ _____ 19. Is testing equipment in proper working condition (scales, sieves, oven, extractor, etc)?

Any Problems observed? _____
_____
Remarks: _____
_____
Date: _____` DOT Inspector:_____

OMR-TM-143
(REV. 04/14/01)

DEPARTMENT OF TRANSPORTATION – OFFICE OF MATERIALS AND RESEARCH
QCT PLANT CHECK LIST

CONTRACTOR_____LOCATION:_____
_____
Make of Plant _____Type Plant:_____Plant Code:_____Week of _____/_____/_____ District: _____ Inspected By:_____(Print Name)_____

YES NO

_____ _____ 1. Is CPW Certificate and Renewal document displayed in the control room in full view?
_____ _____ 2. Is a copy of SOP-15 posted in control room?
_____ _____ 3. Is CPW using his or her own seal?
_____ _____ 4. Are all scales zeroed daily or when necessary?
_____ _____ 5. Is CPW maintaining sufficient checks on all vehicle weights to assure that trucks exceeding
the gross weight limits are not dispatched?
_____ _____ 6. When were aggregate, asphalt, and truck scales last inspected and by whom?
Date:____/____/____ DOT:_____ AGR.:_____ PRV.:_____
_____ _____ 7. Are aggregate stockpiles visually inspected for proper construction, segregation,
contamination and proper handling procedures?
_____ _____ 8. Do cold aggregate feeders and bins appear to be in good mechanical condition?
_____ _____ 9. Are cold aggregate feeders maintaining a uniform feed?
_____ _____ 10. Are dryer, dust collector and/or bag house visually inspected for problems?
_____ _____ 11. Is Liquid asphalt heated to proper temperature?
_____ _____ 12. Does temperature indicating device function properly?
_____ _____ 13. Is mixture temperature maintained in accordance with specified temperature?
_____ _____ 14. Do any valves or gates leak?
_____ _____ 15. Is the mix segregated?
_____ _____ 16. If silo is used as surge bin, is material maintained well above the cone level?
_____ _____ 17. Do silo indicators operate properly?
_____ _____ 18. Are Truckers using a QPL approved releasing agent?
Source:_____
_____ _____ 19. Are truck beds being inspected for excess releasing agents before being loaded?
_____ _____ 20. Are trucks visually inspected for proper cover, temperature holes, identification Numbers
and the use of diesel fuel?
_____ _____ 21. Is the aggregate, liquid AC and lime from an approved source?
Aggregate Source
_____
Liquid AC Source
_____
Lime Source
_____
_____ _____ 22. Does contractor have an adequate quality control program and information pertaining to this
program posted in the lb?
_____ _____ 23. Are Testing Management Operations Supervisor, Technical Service Engineer and Quality
Control Technician Level II Manager notified when an acceptance sample fails?
_____ _____ 24. Are DOT Personnel submitting Compaction Reports in two days?
(If you check “NO”, contact TMOS immediately.)
_____ _____ 25. Are Daily Lime check, Master Lime Check and Interlock System Check procedures posted
in control room of Asphalt Plant? (If you check “NO”, notify TSE)
_____ _____ 26. Are loaded and unloaded weight checks being performed by DOT personnel and
documented in plant diary?
_____ _____ 27. Are paper files established on all projects and all 159-5’s, worksheets and random number
sheets placed in these files daily?

_____ _____ 28. Is a file for incomplete 159-5's set up in full view for incomplete 159-5's?
_____ _____ 29. Is incomplete 159-5's reported to Testing Management Operations Supervisor within two
working days

Signature of Quality Control Technician:
_____

DOT FORMS

OMR-TM-591

(REV. 12/4/01)

ROLLING DENSIFICATION REPORT

GEORGIA DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH

PROJECT_____**LOT #** _____

COUNTY_____DIST._ _____

CONTRACTOR_____ _____

FIRST ROLLER SETTING

AMPLITUDE_____

TYPE MATERIAL_____% A.C. _____

FREQUENCY_____

ASPHALT PLANT_____

ARE CONTRACTOR REPRESENTATIVES AWARE OF SETTING ON THE VIBRATORY ROLLER?

LOCATION_____

DATE_____

Check One: Yes □ No

NUCLEAR GAUGE NUMBER_____

IS THIS A CHANGE FROM THE FIRST ESTABLISH ROLLING PATTERN

Check One: Yes □ No □

ROLLERS / COVERAGE

1ST TYPE ROLLER_____NUMBER COVERAGES (Vibes)_____(Static)_____

2ND TYPE ROLLER_____ NUMBER COVERAGES_____

3RD TYPE ROLLER_____ NUMBER COVERAGES_____

4TH TYPE ROLLER_____ NUMBER COVERAGES_____

5TH TYPE ROLLER_____ NUMBER COVERAGES_____

PERSONNEL PRESENT DURING ROLLING DENSIFICATION

NAME _____ COMPANY_____

NAME _____ COMPANY_____

NAME _____ COMPANY_____

NAME _____ COMPANY_____

ROLLERS SUMMARY

NUMBER OF COVERAGE	1	2	3	4	5	6	7	8	9	10
1ST ROLLER VIBES										
1ST ROLLER STATIC										
2ND ROLLER										

3RD ROLLER										
4TH ROLLER										
5TH ROLLER										

CONTRACTORS REPRESENTATIVE SIGNATURE: _____
This report is not considered as part of the plans.
DOT Representative Initial: _____
REMARKS:

DOT 170			SAMPLE CARD FOR ALL MATERIALS			
	Sample Type: Control		Independent Assurance			
Project No.	EDS-84(4)-01		County	THOMAS		
Material	Unconsolidated Limerock Base			Size or Type		45 lbs
Date Sampled	6/6/2002			Sample No.		4I520
Sampled From	Stockpile		Sample Represents		1 per 1500	Tons
Producer or Property Owner		Denali				
Location	Cabbage Grove, Florida					
Contractor	Reeves Construction					
Examined For	815.01		Pay Item No.		310	
Used In			Submitted By	R. Greene		
Remarks:	B30116-000-00-0					

DOT 170			SAMPLE CARD FOR ALL MATERIALS			
	Sample Type: Control		Independent Assurance			
Project No.	EDS-84(4)01		County	Thomas		
Material	Group I Agg			Size or Type		45 lbs
Date Sampled	5/3/2002			Sample No.		4I500
Sampled From	Stockpile		Sample Represents		20,000	Tons
Producer or Property Owner		Martin Marietta				
Location	Ruby, Georgia					
Contractor	Reeves Construction					
Examined For	815.01		Pay Item No.		310	
Used In			Submitted By	R. Greene		
Remarks:	B30116-000-00-0					

DOT 170			SAMPLE CARD FOR ALL MATERIALS			
	Sample Type: Control		Independent Assurance			
Project No.	EDS-84(4)01		County	Thomas		
Material	Group II Agg.			Size or Type		45lbs
Date Sampled	5/3/2002			Sample No.		4I510
Sampled From	Stockpile		Sample Represents		20,000	Tons
Producer or Property Owner		Martin Marietta				
Location	Ruby, Georgia					
Contractor	Reeves Construction					
Examined For	815.01		Pay Item No.		310	
Used In			Submitted By.	R. Greene		
Remarks:	B30116-000-00-0					

DOT 170			SAMPLE CARD FOR ALL MATERIALS			

TESTING MANAGEMENTGUIDELINES FOR ESTABLISHING ROLLING DENSIFICATION AND GAUGE CALIBRATION FOR ASPHALTIC CONCRETE

(Voids Specification)

A. ROLLING DENSIFICATION

1. Testing Management Field technicians will be available for assistance during the first day of the adjustment period or until acceptable voids are achieved.

2. Contractors shall be responsible for ensuring that the asphalt plant mixture is within the allowable tolerance specified in Section 828 (Standard Specification) prior to beginning the Rolling Densification on the mixture.

3. Rolling Densification will be established based on gauge information, to achieve maximum densification of mix by contractor.

4. Testing Management personnel will provide the service of nuclear gauge reading.
   1. During the adjustment period,
   2. Job Mix Formula Changes
   3. Change of rollers due to emergency breakdown

5. It shall be the contractor's decision to determine the number of passes, the amplitude and the frequency setting that the compaction equipment will use to obtain the best compactive effort possible.

6. It will be the responsibility of the DOT field technician to prepare the TM-591 (Rolling Densification Report) and obtain a signature from the contractor's representative
   that established or made the decision on the number of passes, the amplitude, and the frequency setting it will take to obtain the maximum pavement means air voids possible.

7. After the Rolling Densification has been established, it will be DOT Field Technician's
   responsibility to give a copy of the (Rolling Densification Report) form to both the Project Engineer and the Contractor Representative, to keep the original for the project file and a copy for his/her personal file.

B. GAUGE CALIBRATION SECTOR

1. Ensure that the mixture is within the allowable tolerance of Section 828 (Standard Specification).

2. Move to another section from where rolling densification was established.

3. Minimum of 100 feet.

4. Observe rollers to make sure rolling densification is being followed.

5. After completion of the rolling operation, divide the selected area into three or five equal longitudinal sublots and select one transverse sector at each sublot. Obtain a minimum of one nuclear density reading within each longitudinal sublot. Mark selected areas where gauge readings was taken and core the areas to determine the (GDT-39) Bulk Specific Gravity.

6. Correlation of the nuclear gauge to cores. N/G calibration – asphaltic concrete
   - Cores (Bulk Specific Gravity GDT-39)
   - Prepare Proper Gauge Calibration Worksheet and OMR-TM-150 Compaction Report.
   - Inform Project Engineer, Contractor Representative and Technical Service of final results.
   - Place all test reports in project file for future references.

Note: Testing Management will obtain calibration test results as quickly as possible and the information will be reported directly to the Contractor, Project Engineer and Technical Service Engineer within 24 hours after the Rolling Densification has met the criteria established by the Department.

FREQUENCIES FOR ROADWAY TESTING
(ASPHALT)

ROLLING PATTERN

Testing Management will assist Contractor with Rolling Densification. They should be established:

1. At beginning of first lot on each mix.
2. On each lift of mix in 2 lift construction.
3. Any time there is a significant change in the Job Mix Formula.
4. Upon request of Contractor, Inspector or Area BCE.

DETERMINATION OF MEAN AIR VOID CONTENT (determined through compaction test)

1. Five Air Void Contents should be recorded and filed for each lot.
2. Lots containing less than 500 tons require one Void Contents per 100 tons of mix.
3. If Void Contents are to be obtained with a nuclear gauge, gauge calibration is required.
4. E-mail Branch Lab and Asphalt Plant to report Void Contents on each lot.
5. Void Contents to be taken and reported next working day after lot completed.
6. Maximum acceptable mean air void content on "On- System" is $\leq$ 7.8% or "Off-System" is $\leq$ 8.3%

ROADWAY ADJUSTMENT PERIOD FOR MEAN AIR VOID CONTENT

"On-System"

1. Contractor allowed 3 Lots or "Production" days to correct mix exceeding 7.8% Mean Air Void for Compaction
2. Contractor allowed 1 Lot or "Production day to correct mix out of tolerance on AC and gradation
3. Mean Voids must meet a 90% Pay Factor during Adj. Period to receive 100% pay.
4. If Voids are below 90% pay, then penalty is applied
5. "Range" penalties do not apply during Adjustment period.

"Off-System"

1. Contractor allowed 3 "Production" days to correct mix exceeding 8.3% Mean Air Void

2. After Adjustment period if Mean Air Voids exceed 8.3%, BCE shall stop production
   And allow up to a 1000' test strip until problem is corrected.
3. Range Penalties do not apply on "Off-System" Projects

ROADWAY TESTING
(ASPHALT continued)

DEPTH CHECKS

1. Depth checks must be obtained on all projects where depth is specified on the plans.
2. Depth checks not required on projects where a "Spread-Rate" is specified in the plans.
2. If 25MMSP and 19MMSP mix depth is specified on plans but surface mix is paid for by the spread rate, then depth check cores should be cut prior to surface mix placement.
3. Depth check frequency is 1 per 1000 feet per 2 lanes (12-feet lane width).

NOTE: If lane width is other than 12-feet wide, pro-rate accordingly. For example, 4 foot shoulder frequency is 1 per 6,000 feet per two lanes.

INTERDEPARTMENT

CORRESPONDENCE

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE OFFICE **Materials and Research**
Forest Park, Georgia
DATE February 14, 2005

FROM Rick Douds, Testing Management Branch Chief

TO Distribution

SUBJECT Field Data Collection System

Due to previous problems we have encountered with 159's in the Field Data Collection System, I am writing this explanation on the proper procedure if 159's are uploaded with incorrect information.

Since the system will not to allow for duplicate 159's to be uploaded, there are specific procedures that should be followed when it is discovered that a corrected 159 must be uploaded.

Before you upload a corrected 159, the District TMOS, Field Supervisor. Or Area Coordinator must be notified so they can un-verify the report in the DATA Base.

Make sure that the corrected portion of the 159 is marked corrected copy.

Make a notation in the plant diary as to what happened and when the report was re-uploaded.

STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE **OFFICE** Materials and Research
Forest Park, Georgia
DATE October 15, 2002

FROM Rick Douds, Testing Management Branch Chief

TO Distribution

SUBJECT **SEQUENCE OF LOTS FOR DIFFERENT LEVELS OF ASPHALT**

All Lots of asphaltic concrete mixtures of the same mix type and paid for under the same line item (in the contract) will run in sequence. We will not begin with Lot one again, regardless of design level, rap vs. virgin and regardless of how the mix is used (shoulder, leveling, surface…etc.)

EXAMPLE:

Same Line Item – Lots continue in consecutive numbers –

- 12.5mm Level A Lots 1-5
- 12.5mm Level B Lots 6-45

However, if the AC content changes (gradation is the same) when the production changes from a 12.5mm Superpave Level A to a 12.5mm Superpave Level B, there will be a new three day adjustment period for compaction only.

If the same mix type is paid for under separate line items in the contract, then the Lots will begin again, starting with Lot number one.

Different Line Item – Lots start over with Lot Number One

- 12.5mm Superpave Level B with 67-22 – Lots 1……thru end of project
- 12.5mm Superpave Level D with Polymer Modified Asphalt – Lots 1…..thru end of project

Since we have two different line items and we begin with Lot one again, we would allow another three day adjustment period on the roadway (compaction), but we would not have another one day adjustment period at the plant since the gradation did not change (**Section 400.05.01). Also, if a contractor begins a project with RAP in the mix and changes back to virgin mix by choice, there is no new adjustment period. The mix change was the contractor's choice.

****Standard Specifications 2001 Edition – Section 400.05.01 Adjustments**

A. Materials Produced and Placed during the Adjustment Period – When the same type Superpave Mixture is placed at different mix design levels and a different blend of materials is specified in the job mix formula, a new adjustment period shall be granted. However, a Superpave mixture with the same blend of materials specified in the job mix formula is placed at different mix design levels or when a mixture used for leveling at a spread rate of 90lbs/yd^2 (50kg/m^2) or less is also used for the surface mix at a spread rate greater than 90lbs/yd^2 (50kg/m^2), an additional adjustment period will be allowed **for compaction only.**

DEPARTMENT OF TRANSPORTATION

STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE **OFFICE** Materials and Research
Forest Park, Georgia
DATE July 3, 2001

FROM Georgene M. Geary, P.E., State Materials and Research Engineer

TO Distribution

SUBJECT Sampling and Testing Procedure – Range Penalty

The following changes have been made to our sampling and testing procedure for a range penalty. Distribute this information to our field personnel within your District.

1) If a range penalty is indicated from the initial readings, the sub-set with the lowest average density within the Lot should be rechecked by repositioning the nuclear gauge 1.0' ± at each check point across the roadway and re-calculating an average density for that location. If the new average would eliminate the penalty, the new readings should be substituted for the initial readings in that particular location.

   If a range penalty is still indicated from the gauge readings, the entire Lot would be cored in accordance with normal policy. If a range penalty is indicated from the core results, the penalty will be applied to the Lot.

   The previous test method required that another core be cut at the location where the lowest density result was obtained. This part of the procedure has been eliminated. We will continue to recheck the lowest nuclear gauge reading as stated in the first paragraph, but will not recheck core results.

   If you have any questions concerning the above information, please call Rick Douds at 404 363 7621.

cc: Don Watson, Testing Management Operations Supervisors, Peter Wu

Standard

For

GDOT Hot Mix Asphalt Technician Training and Qualification Program

Developed from AASHTO DESIGNATION: R 25-00

Table of Contents

Approval is provided as to form and contents:

Approved for the Contracting Industry by:

Roger Dill, Reeves Construction, Joint GDOT/GHCA Asphalt Technical Committee Chairman

Approved for the Georgia Department of Transportation by:

Georgene Geary, State Materials and Research Engineer, TQP Manager

1. SCOPE AND LIMITATION

1.1 This document communicates the evaluation and qualification procedures for personnel engaged in sampling and testing of hot-mix asphalt for the Georgia Department of Transportation (GDOT).

1.2 The terms QCT Level I and QCT Level II identify a Quality Control Technician (QCT) at Level I and Level II.

1.3 This guideline does not purport to address all possible events and procedures inherent in the administration and use of a Technician Qualification Program (TQP).

2. REFERENCE DOCUMENTS

2.1 "Guidelines for Establishing Technician Training and Certification Program" National Quality Initiative Steering Committee, September 1997.

2.2 "Quality Control/Quality Assurance - Technician Training and Certification/Qualification," June 1997, National Task Group for Technician Training and Certification, sponsored by FHWA.

2.3 *Implementation Manual for Quality Assurance*, AASHTO
2.4 *Quality Assurance Guide Specification,* AASHTO
2.5 *Georgia DOT Sampling, Testing and Inspection Manual (STI).*
2.6 *QCT Level I Reference Guide and Study Guide*, GDOT, May 2000

3. INTRODUCTION

3.1 This guideline is provided to:

(a) Describe the adopted procedures for the GDOT hot mix asphalt TQP.

(b) Describe the activities and organizational needs for the operation of a technician qualification program that provides a flexible and effective means for ensuring qualified personnel perform sampling and testing.

(c) Describe coverage for QCT Levels I & II tests, the basic tests performed to identify material or product characteristics, for acceptance and/or payment under project contracts incorporating hot-mix asphalt. The basic tests that are included under Levels I & II are shown in Appendix A.

(d) QCT Level III is not currently covered by this guideline but is considered to address the function of mix design and is available through the National Center for Asphalt Technology (NCAT), Auburn, Alabama.

A successful TQP requires the full support and commitment from agencies and industry that have a vested interest in technician training and qualification. Involvement of all those with a common interest in technician training and qualification helps in understanding the multiple perspectives of the team members, and this in turn helps develop policies and procedures that will be supported by their respective organizations.

Consideration of reciprocal agreements between states, and where feasible regions, regarding materials technician qualification acceptance will be addressed as the Regional program is developed. GDOT is currently a member of the Southeast Task Force for Technician Training and Qualification (SETFTTQ).

3.2 *Background:*

Historic roles and responsibilities of industry and agencies have changed for sampling and testing activities under QA specifications. GDOT QA specifications allow the use of contractor test results in making acceptance decisions for materials and construction quality control in hot mix asphalt construction.

Qualification programs and associated training have been shown to be an effective tool for improving the quality of construction by verifying that essential knowledge and skills are possessed by agency or industry personnel who monitor, inspect, and control construction operations. Qualification programs for personnel have proven to be useful, common "yardsticks" for measuring expertise and performance among public transportation agencies, private construction contractors, and independent materials laboratories.

The need for TQPs as an equitable means for test result comparison and credibility between contract parties has become apparent. Provisions requiring the use of qualified technicians involved in construction project testing and inspection activities are included in GDOT's QC/QA specifications for hot mix asphalt.

4. PROGRAM ORGANIZATIONAL STRUCTURE AND MANAGEMENT

4.1 *Joint Sponsorship. Key to Success* -- A successful TQP works best with the full support and commitment from all parties (agency and industry) that have a vested interest in technician training and qualification. The endorsement of this document provides the basis for a partnership agreement of the HMA TQP between GDOT and industry.

4.2 *HMA TQP Oversight Committee* -- Members from the GDOT/GHCA Asphalt Technical Committee shall serve as the HMA TQP Oversight Committee. The HMA TQP Oversight Committee shall be composed of 3 Contractor members, 3 GDOT members, 1 Consultant and 1 FHWA representative. The TQP Manager will chair the HMA TQP Oversight Committee. Program oversight should be a joint effort of all the entities represented on the Oversight Committee.

4.3 *TQP Manager*-- The TQP Manager will be the GDOT State Materials and Research Engineer. The TQP Manager or their designee will coordinate the activities of the HMA TQP Oversight Committee.

4.4 *Location* - All correspondence related to the HMA TQP should be directed to the State Materials and Research Engineer, 15 Kennedy Drive, Forest Park, Georgia 30297.

4.5 *Funding* **-** Course fees, when necessary, will be reasonable but adequate to enable the program to become self-sufficient. Areas where operational support may be available include the following:

(a) Continued financial support from the agency and industry;
(b) Continued use of contributed facilities, equipment, etc, from the agency and industry.

4.6 *Organizational Task Groups* -- Task groups will be established and used to develop programs, plans, and policies for presentation and approval from the Oversight Committee as needed.

5. TRAINING AND QUALIFICATION POLICIES

5.1 In developing GDOT's TQPs, the following guiding principles will be followed:

5.1.1 *Focus* - In order to support the overall objective of improving the quality of the construction of highways through the improved work performance of those involved with the construction project, the TQP *must be directly work related*. The scope and content of all qualification testing must be based on realistic and practical work needs. Because the TQP focuses on work performance, everyone involved - managers, supervisors, program administrators, and participants- should treat qualification activities as natural extensions of their work duties and responsibilities.

5.1.2 *Leveraging and Aligning Activities and Programs Between States and Regions* - GDOT is a member of SETFTTQ and whenever possible, consideration will be given to developing state technician qualification requirements in tandem with SETFTTQ. Participation in a regional program has the positive benefit of pooling and leveraging state resources and also of allowing qualified technicians to work across state boundaries without having to retrain and requalify. Gaining these benefits will lower the states' and contractors' cost of doing business while still ensuring that high-quality testing is performed.

GDOT will develop a written policy regarding reciprocity based on the work of SETFTTQ.

5.1.3 *Consideration of Prerequisites* - In addition to any required training, work experience may be used as an integral part of the qualification process to ensure technicians have the required knowledge, skills, and abilities. This assurance may be accomplished by establishing pre-qualification relevant work experience or education requirements, establishing work experience criteria pre-requisites for participation in advanced qualification levels, or requiring relevant work experience to maintain and validate the requalification process.

6. TRAINING

6.1 A well-planned and supportive training program is needed for a successful qualification program. A good training program will ensure qualified technicians will be performing inspection on construction projects.

6.1.1 TEMPORARY CERTIFICATION: Temporary certification may be granted to a technician trainee who is given direct oversight by a certified Level I or II QCT while performing acceptance testing duties during the first 5 days of training. The trainee must complete certification requirements for Level I within 30 production days after being granted temporary certification. A trainee who does not become qualified within 30 production days will not be re-eligible for temporary certification.

6.1.2 LEVEL I: Level I training will be accomplished by on-the-job training supplemented by GDOT Engineering Skills Development Workbooks and the *QCT Level I Reference Guide and Study Guide*. ESD self-study texts are available on the GDOT website at: http://www.dot.state.ga.us/homeoffs/training/training_ext/schedule.html

6.1.3 LEVEL II: A training/review class is currently provided by the GDOT for Level II certification.

6.1.4 Development and maintenance of future training programs will be determined by the TQP Oversight Committee. Training materials may be developed solely for the TQP or developed with another state/region. Program administration will identify the following:

(a) Funding and fees;
(b) Staffing (instructors, coordinators, proctors, etc.);
(c) Training facilities;
(d) Materials (manuals and equipment);
(e) Record keeping;
(f) Governing Board/Advisory Committee; and
(g) Organizational Task Groups.

6.1.5 Qualified technicians will need to be kept aware of specification, equipment, or administration changes in the training program. This need will be satisfied by requalification training, update courses, or special training efforts conducted by GDOT in conjunction with industry partners. Future training programs will be offered to individuals who are responsibly involved in QC/QA testing as well as those involved in the acceptance decision process including those from GDOT, local agencies, contractors, producers, or consultants. The program will be administered the same for all individuals.

7. EXAMINATION AND METHODS

7.1 A successful qualification program must have documented policies and procedures for examination methods to ensure consistent and fair administration by all examiners and proctors.

The TQP manager or their designee shall direct and coordinate all qualification examination activities. This includes scheduling of examinations; registration of applicants; maintaining and ensuring of security of examination materials; notifying participants of their success or failure in their examination; and maintaining all completed examination materials.

Written and performance examinations will be given to determine if the applicants possess the knowledge and skills necessary to satisfy the established qualification requirements.

7.2 *Examination Controls and Integrity* – To avoid conflicts of interest, the examiner should not be the immediate supervisor of those being qualified. Examination procedures are as follows:

(a) GDOT will be responsible for the development of and revision of qualification exams including updating or changing exams when there is a change in a test method or specification. GDOT currently administers the Level I and Level II QCT exams. Available dates and times for exams can be requested through the TQP Manager or the District Laboratory Supervisors.

(b) Applicants will be allowed no more than 4 hours for the Level I written examination and no more than 6 hours for the Level II written examination.

(c) Cheating on an exam will result in permanent revocation of any QCT Certification and the inability to apply for any QCT certification in the future.

(d) Examinations for Level I will be proctored at the District Labs or the Central Lab and examinations for Level II will be proctored at the Central Lab. A proctor will be present in the room at all times while administering the test.

(e) Examinations will be given on an as-needed basis, but no less than twice a year.

(g) Applicant must pass field portion of exam before taking the written portion of exam. Passing the field portion is considered to be a grade of 80 or higher. Passing the written portion is considered to be a grade of 80 or higher. If applicant passes field portion but fails written section, applicant is required to retake the written portion only (if the retest is done within 60 days of first exam).

(h) Individuals will be notified of examination results by mail.

7.3 *Examination Methods* – Written and performance examinations should be given to ensure that applicants have a complete understanding of the materials and calculations as well as the ability to perform test procedures. Care and good judgment are needed in developing fair and impartial written and performance examinations.

Prior to the examinations, the proctors should thoroughly explain to the applicants the examination process and rules noted in 7.2 above including:

(a) Time limits
(b) What the exams will be comprised of
(c) Minimum score necessary to pass
(d) Penalty for cheating; and
(c) The retesting policy.

7.3.1 *Written Examination* – The written examination will be open-book and will have a designated time limit. Examinations may consist of various types of questions, including true/false, multiple choice, essay, fill-in-the-blank, word problems, and calculations. To protect examination integrity, course participants cannot retain a copy of their completed written examinations. The TQP will maintain several equivalent versions of the test and alternately present different versions to examinees.

7.3.2 *Performance Examination* – Performance examinations measure the applicants' ability to properly perform the prescribed test methodology. All proctors and examiners should evaluate each applicant's proficiency by using standardized checklists that identify specific test method steps or tasks. The degree of detail of the performance checklists will be influenced by whether the performance examination is open- or closed-book. Inspection checklists are in Appendix B. Time limits will be set for the complete performance of each test method. The examinee may be asked to explain various steps of the procedure to reduce the full test time.

7.4 *Re-Examination Policy-Written/Performance* – Whenever a participant fails a written/performance qualification examination, an allowance will be provided for retesting. The policy is as follows:

- After first failed exam-QCT must wait 30 days before retaking Level I or Level II exam.
- After second failed exam- QCT must wait 90 days before retaking Level I or Level II exam
- After third failed exam-QCT must wait 12 months before retaking Level I or Level II exam.

The number of retests allowed and the time limits are needed to avoid frivolous, trial-and-error attempts and encourage the participants to properly prepare for testing.

7.5 *Notification of Results* – Notification of an applicant's successful or unsuccessful completion of the qualification requirements will be mailed to the applicant promptly after completion of the examination. If the applicant is unsuccessful, the procedure for re-examination will be explained in the letter.

7.6 *Confidentiality of Records* – Personal information and records of the examination are generally considered to be confidential and not to be released publicly. Confidential information includes:

(a) Personal and professional information provided by the participants applying for testing and qualification; and

(b) Specific test results and scores for participants.

7.7 *Examination Materials Security* – Proctors are to maintain the security of exam materials at all times. No copying of portions of the exam is acceptable. After the performance test, examiners and proctors may inform the applicants of their weaknesses and the details of correct procedures.

7.8 *Examiner and Proctor Qualifications* –Examiners for the performance examination must be qualified in that examination area. Examiners will be Testing Management Operations Supervisors, Bituminous Technical Services Engineers, or others deemed appropriate by the TQP Manager.

7.9 *Examination Appeals* – An applicant wishing to register a complaint or protest regarding an examination or examiner must do so in writing to the TQP Manager within 14 days of the incident. The written complaint must specify the examination date, the examiner, and the nature of the complaint or protest.

Complaints and protests should be reviewed and a recommendation made to the Chairman of the Appeal Board. All complaints and protests will be promptly answered in writing.

8. QUALIFICATION

8.1 This document serves as the written policy for administration of the GDOT HMA TQP. Each Qualifying Agency that issues through their TQP the status of qualification or certification must maintain a written policy for administration of their TQP.

8.2 GDOT will maintain a registry of trained technicians who have successfully completed a training program. The registry will include:

(a) Name, Social Security number or qualification identification number and address;
(b) Courses, and dates completed;
(c) Course content:

Test methods included;
Lecture or laboratory;
Written examination; and
Performance examination.

8.3 GDOT shall provide the qualified technician with documentation of the qualification in the form of a registration card and certificate. The document will include an expiration date.

The Qualifying Agency requires the registered technician to maintain a current address on file as a condition of registration. Send change of address notice to: TQP Manager, Georgia Department of Transportation, 15 Kennedy Drive, Forest Park, GA 30297.

8.4 Recertification for Levels I and II will be required 3 years after initial certification. The re-qualification process may include refresher courses, observations, and/or re-testing.

9. CONFLICT RESOLUTION

9.1 Incorrect Procedures- QCTs will be made aware of incorrect sampling and testing methods or failure to comply with QCT responsibilities at the time the incorrect procedure is identified. The QCT Level II Manager will be made aware of these discrepancies at the same time. The QCT will be instructed on how to correct discrepancies. (See Diagram 1 for description of process)

9.2 Discussion meeting - If the QCT continues to fail in performing the duties as required, a meeting will be held at the District Lab in the District where the discrepancies occurred. The QCT and the QCT Manager will be invited to discuss the discrepancies in an attempt to alleviate the problem or communicate the correct procedure. The meeting will be formally documented and possible future disciplinary action will be noted in the follow-up letter.

9.3 Progressive Actions- If further problems are encountered:

A. The QCT will be required to re-take the performance and/or written certification exam (at their existing Level) for failing to demonstrate the abilities of a Level I or Level II QCT.
B. Certification may be suspended for a period of time.

9.4 Intentional Falsification of Records: Falsification of records or acceptance test results will result in permanent revocation of QCT Certification. A certified letter will be sent to the QCT, the QCT Manager, and the Corporate Head of the company that employs the QCT providing notification of permanent revocation and the appeal process.

9.5 Appeal Process- The QCT will have the right to appeal any adverse action which results in suspension or permanent revocation of certification by responding to an Appeal Board within 10 calendar days after receiving notice of the proposed adverse action. Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified in the notice. Failure to appeal within the time specified will result in a waiver of all future appeal rights regarding the adverse action taken. The QCT may appeal in writing or in person to the Chairman of the Appeal Board at: Director of Construction, Georgia Department of Transportation, Room 134, No. 2 Capitol Square, Atlanta, GA 30334. The Director of Construction may be reached by phone at 404-656-5207 between the hours of 8 a.m. and 4 p.m. (Monday through Friday) in order to schedule an appointment. The QCT may continue working during the appeal process. An Appeal Board meeting will be called as needed by the Chairman of the Appeal Board. There will be five members on the Appeal Board, called by the Chairman:

An Appeal Board meeting will be scheduled as needed by the Chairman of the Appeal Board within 10 days of receiving the appeal notice. There will be five members on the Appeal Board, called by the Chairman:

GDOT Division Director of Construction-(Chairman of the Appeal Board)
GDOT Construction Liaison (not from affected District)
Consultant (nominated by the Consultant community)
Contractor (other than the QCT's company- nominated by the Contracting Industry)
FHWA Resource Center Material Engineer or designee

The Appeal Board will hear the appeal and make a decision within 5 days of hearing the appeal. Decisions of the Appeal Board shall be final and shall be made in writing to the QCT.