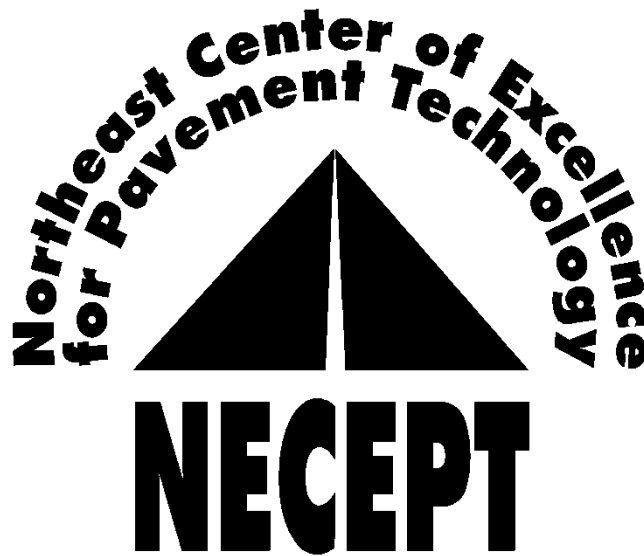


PENNDOT ASPHALT TECHNICIAN CERTIFICATION PROGRAM

FIELD TECHNICIAN PROGRAM
COURSE MATERIAL
2022



PENN STATE UNIVERSITY
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PennState

NECEPT Asphalt Field Technician Review & Certification Course

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NECEPT Frequently Asked Questions Asphalt Technician Certification Program

1. Which publication covers the initial certification, certification renewal, and application procedures? **PennDOT Publication 351**
2. Where can I find Publication 351? **It can be downloaded from the PennDOT web site (www.PennDOT.gov/) by clicking on the link for “Forms, Pubs & Maps”, then click the search button and type “Pub 351”, then click the magnifying glass, and then select “Publication 351” from the search results. It is also available on the NECEPT website under training: <http://www.superpave.psu.edu/Training/>.**
3. The initial certification and subsequent certification renewal periods will be for how many years? **Five (5) years**
4. In order to qualify for a Level 1 Plant Technician – Initial Certification, the applicant must have how many hours of documented experience in asphalt testing? **A minimum 500 hours obtained within the past three (3) years.**
5. What are the requirements for certification renewal of a Field Technician or Level 1 Plant Technician? **The applicant must have 500 hours of documented technician experience in asphalt paving within the previous five (5) years of certification. The applicant must also have attended one (1) NECEPT Update/Refresher Course and one (1) PennDOT approved asphalt-related annual conference, seminar, or workshop within the previous five (5) years or received a Certificate of Training from NECEPT’s Technician Update/Refresher Course for two (2) out of the previous five years. Then, submit either an online registration or a completed and PennDOT signed Certification Renewal Application Form after all requirements have been met.**
6. How many retests is each applicant allowed before they have to repeat the corresponding 2-1/2 day review and certification course? **One (1)**
7. I lost my card. What do I do? **Submit a request in writing to NECEPT and include your name, NECEPT ID#, mailing address, and type of certification.**
8. I do not have the 500 hours of documented experience in asphalt paving required for certification renewal. Will I get certification renewal? **No, you will have to apply and attend the appropriate Asphalt Field Technician or Level 1 Plant Technician Initial Review & Certification Course.**
9. This is my one and only Update/Refresher Course. My certification expires in a few months. What do I do? **Attend a PennDOT approved asphalt-related conference, seminar, or workshop before your certification expires or you have to apply and attend the appropriate Asphalt Field Technician or Level 1 Plant Technician Initial Review & Certification Course and meet the requirements for the Review and Certification Course.**
10. What counts as continuing education? **Please refer to PennDOT Publication 351.**
11. How do I document my 500 hours and who is responsible for maintaining those records? **Keep a diary of projects, time & locations, and if possible, have it documented/signed by a Project Supervisor. The individual certified technician is responsible for maintaining their own records.**
12. Who checks my 500 hours? **PennDOT**
13. No one has ever checked my certification on the job site. Why do I need this? **PennDOT may check it tomorrow; however, one of the reasons you may not have been checked is because the District knows your history.**
14. I am the Lead Inspector and I never get out near the paver. What do I do for 500 hours experience? **It is your responsibility to make sure PennDOT works with you to meet the requirements. If not, you have to start the certification process over.**
15. What do I do with my paper certification renewal application after I get it signed by PennDOT? **Submit the signed application, record of hours, list of training, and payment for NECEPT fees to NECEPT c/o PSU/The Larson Transportation Institute, 201 Transportation Research Bldg, University Park, PA 16802.**

Excerpts from
PennDOT Pub 351

**BITUMINOUS OR ASPHALT
PLANT AND FIELD TECHNICIANS**

**Initial Certification Requirements
Certification Renewal Requirements
Registration Procedures
Performance Review and Code of Ethics
Course Administration**

XI. BITUMINOUS FIELD TECHNICIAN – INITIAL CERTIFICATION

A. Field Technician Initial Certification Requirements

1. Applicant must have a minimum of 500 hours of documented experience in asphalt mixture paving or paving inspection. This experience may consist of any combination of asphalt mixture paving QC or QA inspection experience from surface preparation before asphalt mixture paving, asphalt mixture paving, asphalt mixture compaction, asphalt pavement ride quality measurement or analysis, longitudinal joint density measurement or analysis, or other asphalt mixture related field activities. The experience must come from any combination of experience from PennDOT ECMS projects, PennDOT maintenance projects, PennDOT HOP projects, PennDOT EMA projects, PTC construction or maintenance projects, Pennsylvania municipal government projects which used PennDOT Liquid Fuels Funds, or from projects in other State DOTs participating in MARTCP. Experience must have been obtained within the last three (3) years prior to applying for a certified Bituminous Field Technician.

*Note: If applicant has a certificate of completion from an annual **Hot-Mix Asphalt (HMA) 101 Course** sponsored by The Asphalt Institute which the applicant attended within the last three (3) years before applying for a Bituminous Field Technician –Initial Certification, the HMA 101 Course can substitute for 100 hours of the minimum required 500 hours of experience in asphalt mixture paving or paving inspection.*

*Note: The minimum 500 hours of documented experience is waived if applicant previously received sign-off as a **Bituminous Field Technician in Training** and then subsequently received sign-off from an ACE, ACM, or their designate, or a PTC Materials Representative to be temporarily assigned as a Bituminous Field Technician. Both the sign-offs must have occurred on the same Form CS-351F. Submit or attach a copy of the completed and signed-off Form CS-351F when registering for a Bituminous Field Technician – Initial Certification as proof.*

2. Applicant must have a sign-off from a certified Bituminous Field Technician or a Company Field Superintendent.
3. Applicant must have a sign-off from a PennDOT ACE, ACM, or their designee. Alternatively, if the applicant will be performing a majority of their Bituminous Field Technician work for PTC projects, applicant can have a sign-off from a PTC Materials Representative. If the applicant is a PennDOT employee from the BOPD/CMD/CQAS, applicant must have a sign-off from the PennDOT BOPD/CMD/CQAS Section Chief or their designee. If the applicant is a PennDOT employee from the BOPD/CMD/LTS, applicant must have a sign-off from the PennDOT BOPD/CMD/LTS Engineer of Tests or their designee. Applicant is to obtain the sign-off from the PennDOT Organization or the PTC where applicant will be performing a majority of their bituminous field technician project work.

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Note: If applicant is an ACE or ACM, sign-off must be from the ACE's or ACM's supervisor. If applicant is a PTC Materials Representative, sign-off must be from the PTC Materials Representative's supervisor.

4. Applicant must attend and pass NECEPT's "Bituminous Field Technician Review and Certification" course. The minimum passing certification exam score is 75%.

*Note: A **Bituminous Field Technician in Training** may temporarily be assigned as a Bituminous Field Technician. This temporary assignment is by sign-off from a PennDOT ACE, ACM, or their designee on the same Form CS-351F where applicant received sign-off from a PennDOT ACE, ACM, or their designee as a Bituminous Field Technician in Training. Alternatively, if the applicant will be performing a majority of their Bituminous Field Technician work for PTC projects, this sign-off for temporary assignment as a Bituminous Field Technician on a Form CS-351F can be from a PTC Materials Representative. Refer to the Bituminous Field Technician in Training Initial Registration requirements.*

B. Field Technician Initial Certification Registration Procedures

1. Using the Online Registration Form:
 - a) Using the Internet, go to <http://www.superpave.psu.edu/>.
 - b) From the "TRAINING" menu and listed under "Bituminous", select the "Field Technician Certification" dropdown menu item. Then, from the "Initial Certification" section of webpage, select the link for the "Review & Certification Course Online Registration".
 - c) Select the radio button for the specific course date for the Bituminous Field Technician course the applicant is registering to attend. If no radio buttons are available for selection, no courses are currently available or scheduled.
 - d) Enter the Quantity of applicants being registered for the selected radio button. If quantity is blank and cannot be selected, it means the course date is full and no further registrations are accepted.
 - e) Select the "ADD SELECTED ITEMS" box, then select the "VIEW CART AND CHECKOUT" box, and then select the "ENTER REGISTRATION INFORMATION AND CHECKOUT" box.
 - f) Read the Bituminous Plant and Field Technician Certification Program Requirements and then select the "I HAVE READ THE REQUIREMENTS, PROCEED TO REGISTRATION" box.
 - g) If applicant already has a NECEPT Certification ID number from a different certification (e.g., certified Aggregate Technician), select the "RECERTIFICATION BOX" and then enter applicant's NECEPT Certification ID number and password. If applicant does not have a NECEPT Certification ID, select the "NEW CERTIFICATION" box and then select the "START REGISTRATION" box.

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- h) Complete the online registration form including the applicant's selected course, first and last name, affiliation, company/agency name, job title, home address, phone number(s), and e-mail address. For PennDOT employee applicants, ensure the company/agency name is entered as the appropriate "District #" (e.g., District 1-0 or District 12-0) or Central Office Bureau acronym (e.g., BOPD or BOMO).
- i) On the online registration form where it indicates to "Select PennDOT District", select the most appropriate PennDOT District and sign-off name, PennDOT Bureau\Section and sign-off name, or the PTC and sign-off name from the dropdown menu. The selected person will receive, review, and sign-off on the applicant's online registration form.
- j) On the online registration form and in the form's "Immediate Supervisor Name" and "Immediate Supervisor E-mail" fields, enter the name and email address of either a certified Bituminous Field Technician or the applicant's immediate Supervisor from the applicant's Company, Organization or Agency that can sign-off on the applicant. Ensure that the person entered in this field completes the sign-off on the applicant's registration form.
- k) On the online registration form, enter the applicant's work experience, start and end dates, work performed, total hours, and the applicant's immediate Supervisor for the listed work experience where applicant obtained the minimum required hours of technician experience.
- l) Upon completion of above information on the registration form, select the "SAVE APPLICANT INFORMATION" box.
- m) After applicant information has been saved, select the "EDIT" box to edit any information on the applicant registration form and resave the information. Or, select the "DELETE" box to remove an applicant registration form. Or, scroll down to the Add Applicant section to add additional applicants for this course and course date. The number of additional applicants that can be added is limited to the total Quantity entered when the course radio button is selected [see Step d) above]. After all editing, deleting, or adding of applicant registration forms has been completed, select the "CONFIRM ORDER" box to complete the order for the listed applicant(s) and to make payment.
- n) After confirming the order, the course registration is complete. For course fee payment, select either the "PAY WITH CREDIT CARD" box under Option 1 or select the "SELECT" box under Option 2 to open and print the completed registration form to pay with check or money order.
 - (1) PennDOT applicants who want NECEPT to direct bill the PennDOT District/Bureau by invoice should select the "SELECT" box under Option 2, print off their course registration form(s) for their records, and then exit from the online registration system.
- o) If the "PAY WITH CREDIT CARD" box under Option 1 was selected, enter and submit the credit card information for payment for the course registration fee and then exit from the online registration system.

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- p) If the “SELECT” box under Option 2 was selected, the completed registration form will open. Print the completed registration form for each applicant. Obtain required sign-off from Supervisor or from Company Field Superintendent. Submit the printed registration forms with sign-off signatures along with check or money order to NECEPT at the address on the registration form.

2. Using the Paper Application Registration Form:

- a) From NECEPT’s Internet website at <http://www.superpave.psu.edu/> and under the “TRAINING” menu and listed under “Bituminous”, select the “Field Technician Certification” dropdown menu. Then, from the “Initial Certification” section of webpage, select the link for “Review & Certification Course Paper Application”. Print the paper application registration form from NECEPT’s website or obtain a paper hardcopy of the appropriate registration form from the annual Bituminous Field Technician packet that is distributed by NECEPT or PennDOT.
- b) Complete the NECEPT Paper Application Registration Form indicating the application is for a Bituminous Field Technician. Ensure all applicable blank spaces on the registration form have been completed. NECEPT will reject and return incomplete registration forms. For PennDOT employee applicants, ensure the company/agency name is entered as the appropriate “District #” (e.g., District 1-0 or District 12-0) or Central Office Bureau acronym (e.g., BOPD or BOMO).
- c) List applicant’s applicable work experience including start and end dates, the work performed, the project locations, total hours, and the name of applicant’s immediate Supervisor for the listed work experience where applicant obtained the minimum required hours of asphalt mixture paving or paving inspection experience.
- d) Have a certified Bituminous Field Technician or applicant’s Company, Field Superintendent sign-off and date the registration form.
- e) Contact a PennDOT ACE, ACM, or their designee in a District where the applicant will be performing a majority of their bituminous field technician work. Make arrangements with the ACE, ACM, or their designee to have them sign-off and date the Registration Form. Alternatively, if the applicant will be performing a majority of their Bituminous Field Technician work for PTC projects, contact a PTC Materials Representative to sign-off and date the Registration Form. If the applicant is a PennDOT employee from the BOPD/CMD/CQAS, applicant must contact the PennDOT BOPD/CMD/CQAS Section Chief or their designee to sign-off and date the registration form. If the applicant is a PennDOT employee from the BOPD/CMD/LTS, applicant must contact the PennDOT BOPD/CMD/LTS Engineer of Tests or their designee to sign-off and date the registration form.
- f) Submit the completed Paper Application Registration Form to NECEPT as instructed on the registration form. Submit payment by check or money order for the registration fee as instructed on the registration form.

XIV. BITUMINOUS FIELD TECHNICIAN – CERTIFICATION RENEWAL

A. Field Technician Certification Renewal Requirements (Option A – Learning Activities)

1. Applicant must apply for certification renewal within the normal winter training season (typically January to April) of the same calendar year of their certification expiration date. Certification renewal applications submitted in a calendar year prior to the calendar year of the applicant's certification expiration date will be rejected.

Note: If a certified technician has a certification expiration date with a month and day from January 1 to April 30, the certified technician will be considered certified until April 30 of their expiration date year to allow the technician to attend the necessary technician certification program courses in the last year of their certification period. (e.g., a technician with a certification expiration date of February 22 will still be considered certified until April 30 of the same calendar year. After April 30 of the same calendar year, the technician's certification is expired unless the technician has documented proof that they completed the necessary technician certification program renewal requirements and submitted the certification renewal application to NECEPT before or on April 30 of their certification expiration date year, and is waiting to receive their new certification card.

Note: If a certified technician has a certification expiration date with a month and day from May 1 to December 31, the certified technician will be considered not certified or expired beyond their certification expiration date unless the technician has documented proof that they completed the necessary technician certification program renewal requirements and submitted the certification renewal application to NECEPT before or on their certification expiration date (as determined by U.S. Mail postmark, overnight delivery pickup or shipment date, or online registration submittal date), and is waiting to receive their new certification card.

Note: Attendance to a Bituminous Field Technician Annual Update/Refresher Course in the same calendar year as the technician's certification expiration date year does not automatically renew a technician's certification. The technician must submit the appropriate application registration form for certification renewal along with the certification renewal fee.

2. Applicant must have been a certified Bituminous Field Technician for the previous five (5) years prior to application for certification renewal.
3. Applicant must have a minimum of 500 hours of documented technician experience in asphalt mixture paving or paving inspection since date of last certification. This experience may consist of any combination of QC or QA inspection experience from surface preparation before asphalt mixture paving, asphalt mixture paving, asphalt mixture compaction, asphalt pavement ride quality measurement or analysis, longitudinal joint density measurement or analysis, or other asphalt mixture related field activities. This experience must come from any combination of experience from PennDOT ECMS projects, PennDOT maintenance projects, PennDOT HOP projects,

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PennDOT EMA projects, PTC construction or maintenance projects, Pennsylvania municipal government projects which used PennDOT Liquid Fuels Funds, or from projects in other State DOTs participating in MARTCP.

4. Applicant must have a sign-off from their immediate Supervisor in their Company, Organization or Agency.
5. Applicant must have a sign-off from a PennDOT ACE, ACM, or their designee confirming applicant's satisfactory performance during the 500 hours of technician experience. Alternatively, if the applicant performed a majority of their Bituminous Field Technician work for PTC projects, applicant can have a sign-off from a PTC Materials Representative. If the applicant is a PennDOT employee from the BOPD/CMD/CQAS, applicant must have sign-off from the PennDOT BOPD/CMD/CQAS Section Chief or their designee. If the applicant is a PennDOT employee from the BOPD/CMD/LTS, applicant must have sign-off from the PennDOT BOPD/CMD/LTS Engineer of Tests or their designee. Applicant is to obtain the sign-off from the PennDOT Organization or PTC where applicant performed a majority of their project work.

Note: If applicant is a PennDOT ACE or ACM, sign-off must be from the ACE's or ACM's supervisor. If applicant is a PTC Materials Representative, sign-off must be from the PTC Materials Representative's supervisor.

6. Applicant must have attended and received a Completion Certificate from NECEPT's Annual Field Technician Update/Refresher Course for two (2) out of the previous five (5) years or, applicant must have attended and received a Completion Certificate from NECEPT's Annual Field Technician Update/Refresher Course for one (1) out of the previous five (5) years plus attended one (1) asphalt-related learning activity (annual conference, seminar, workshop, or training course) within the previous five (5) years.
 - a) Acceptable asphalt-related learning activities are as follows:
 - (1) Annual Associated Pennsylvania Constructors (APC) Conference.
 - (2) Annual Pennsylvania Asphalt Pavement Association (PAPA) Conference.
 - (3) Annual Pennsylvania Asphalt Pavement Association (PAPA) Regional Technical Meeting (Eastern Regional, Central Regional, or Western Regional).
 - (4) Annual Asphalt Pavement Association (APA) Conference from another State participating in MARTCP.
 - (5) Mid-Atlantic States Quality Assurance Workshop (QAW).
 - (6) Nationally recognized conferences or courses [i.e., conferences or courses from the National Asphalt Pavement Association (NAPA), the Asphalt Institute (AI), the National Center for Asphalt Technology (NCAT), the Northeast Asphalt User/Producer Group (NEAUPG), the National Highway Institute (NHI), etc.].
 - (7) Department or Industry sponsored training pre-approved by a PennDOT DME or DMM or a PTC Materials Representative.

(8) NECEPT Maintenance Paving Training Course.

b) Unacceptable asphalt-related learning activities are as follows:

(1) PennDOT/NECEPT Bituminous Plant Technician Review and Certification Course.

(2) PennDOT/NECEPT Bituminous Plant Technician Annual Update/Refresher Course.

(3) PennDOT/NECEPT Superpave Volumetric Mix Design Workshop.

(4) The Hot Mix Asphalt (HMA) 101 Course sponsored by The Asphalt Institute.

B. Field Technician Certification Renewal Requirements (Option B – Repeat Initial Certification)

Applicant must meet and follow all the requirements for *Bituminous Field Technician - Initial Certification*, except revise the first requirement completely as follows:

1. Applicant must have a minimum of 200 hours of documented experience in asphalt mixture paving or paving inspection. This experience may consist of any combination of QC or QA inspection experience from surface preparation before asphalt mixture paving, asphalt mixture paving, asphalt mixture compaction, asphalt pavement ride quality measurement or analysis, longitudinal joint density sampling or evaluation, or other asphalt mixture related field activities. The experience must come from any combination of experience from PennDOT ECMS projects, PennDOT maintenance projects, PennDOT HOP projects, PennDOT EMA projects, PTC construction or maintenance projects, Pennsylvania municipal government projects which used PennDOT Liquid Fuels Funds, or from projects in other State DOTs participating in MARTCP. Experience must have been obtained within the last five (5) years prior to applying for a certified Bituminous Field Technician.

Note: Applicant cannot substitute any of the minimum required hours by attendance and completion of any courses.

C. Field Technician Certification Renewal Registration Procedures (Option A – Learning Activities)

1. Using the Online Registration Form:

a) Using the Internet, go to <http://www.superpave.psu.edu/>.

b) From the “TRAINING” menu and listed under “Bituminous”, select the “Field Technician Certification” dropdown menu item. Then, from the “Certification Renewal - Certification Card Only” section, select the link for “Certification Card Renewal Online Registration”.

c) Select the radio button representing the current date for the Bituminous Field Technician.

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- d) Enter the Quantity of applicants being registered for the selected radio button.
- e) Select the “ADD SELECTED ITEMS” box, then select the “VIEW CART AND CHECKOUT” box, and then select the “ENTER REGISTRATION INFORMATION AND CHECKOUT” box.
- f) Read the Bituminous Plant and Field Technician Certification Program Requirements and then select the “I HAVE READ THE REQUIREMENTS, PROCEED TO REGISTRATION” box.
- g) Enter applicant’s NECEPT Certification ID number and password and select the “LOGIN” box or select the “GROUP REGISTRATION” box if a company administrator is registering the technician or multiple technicians. For administrator or Group Registrations, enter the applicant’s NECEPT Certification ID number and last name.
- h) Complete the online registration form including the applicant’s selected Bituminous Field Technician Certification Renewal Card, first and last name, affiliation, company/agency name, job title, home address, phone number(s), and e-mail address. For PennDOT employee applicants, ensure the company/agency name is entered as the appropriate “District #” (e.g., District 1-0 or District 12-0) or Central Office Bureau acronym (e.g., BOPD or BOMO).
- i) On the online registration form, where it indicates to “Select PennDOT District”, select the most appropriate PennDOT District and sign-off name, PennDOT Bureau\Section and sign-off name, or the PTC and sign-off name from the dropdown menu. The selected person will receive, review, and sign-off on the applicant’s online certification renewal registration form.
- j) On the online registration form and in the form’s “Immediate Supervisor Name” and “Immediate Supervisor E-mail” fields, enter the name and email address of the applicant’s immediate Supervisor from the applicant’s Company, Organization or Agency.
- k) On the online registration form, enter and list the applicant’s work experience, start and end dates, work performed, total hours, and the applicant’s immediate Supervisor for the listed work experience where applicant obtained the minimum required hours of technician experience since date of last certification.
- l) On the online registration form, enter and list the applicant’s two (2) required asphalt-related learning activities including the single date or start and end dates, location, and name of each learning activity since date of last certification.
- m) Upon completion of above information on the registration form, select the “SAVE APPLICANT INFORMATION” box.
- n) After applicant information has been saved, select the “EDIT” box to edit any information on the applicant registration form and resave the information. Or, select the “DELETE” box to remove an applicant registration form. Or, scroll down to the Add Applicant section to add additional applicants for this certification renewal and certification renewal date. The number of additional applicants that

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can be added is limited to the total Quantity entered when the course radio button is selected [see Step d) above]. After all editing, deleting, or adding of applicant registration forms has been completed, select the "CONFIRM ORDER" box to complete the order for the listed applicant(s) and to make payment.

- o) After confirming the order, the certification renewal registration is complete. For certification renewal fee payment, select either the "PAY WITH CREDIT CARD" box under Option 1 or select the "SELECT" box under Option 2 to open and print the completed registration form to pay with check or money order.
 - (1) PennDOT applicants who want NECEPT to direct bill the PennDOT District/Bureau by invoice should select the "SELECT" box under Option 2, print off their certification renewal registration form(s) for their records, and then exit from the online registration system.
- p) If the "PAY WITH CREDIT CARD" box under Option 1 was selected, enter and submit the credit card information for payment for the certification renewal registration fee and then exit from the online registration system.
- q) If the "SELECT" box under Option 2 was selected, the completed registration form will open. Print the completed registration form for each applicant. Obtain required sign-off from Supervisor. Submit the printed registration forms with sign-off signatures along with check or money order to NECEPT at the address on the registration form.

2. Using the Paper Application Registration Form:

- a) From NECEPT's Internet website at <http://www.superpave.psu.edu/> and under the "TRAINING" menu and listed under "Bituminous", select the "Field Technician Certification" dropdown menu item. Then, from the "Certification Renewal - Certification Card Only" section of webpage, select the link for "Certification Card Renewal Paper Application". Print the paper application registration form from NECEPT's website. Or, obtain a paper hardcopy of the appropriate registration form ["Bituminous Certification Renewal or Bituminous Level 2 Plant Initial Certification (Card Only)"] from the annual Bituminous Field Technician packet distributed by NECEPT or PennDOT.
- b) Complete the NECEPT Paper Application Registration Form indicating the application is for certification renewal of a Bituminous Field Technician. Ensure all applicable blank spaces on the registration form have been completed. NECEPT will reject and return incomplete registration forms. For PennDOT employee applicants, ensure the company/agency name is entered as the appropriate "District #" (e.g., District 1-0 or District 12-0) or Central Office Bureau acronym (e.g., BOPD or BOMO).
- c) On the paper application registration form, include the applicant's certification ID number.
- d) On the paper application registration form, include the applicant's last exam date or last certification renewal date for a Bituminous Field Technician.

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- e) On the paper application registration form, include the applicant's first and last name, affiliation, company/agency name, job title, home address, phone number(s), and e-mail address.
- f) On the paper application registration form, list the applicant's applicable work experience including start and end dates, the work performed, projects, total hours, and the name of applicant's immediate Supervisor for the listed work experience where applicant obtained the minimum required hours of field technician experience since date of last certification.
- g) On the paper application registration form, list the applicant's two (2) required asphalt-related learning activities including the single date or start and end dates, location, and name of each learning activity since date of last certification. Include copies of any completion certificates received through any of these learning activities.
- h) Have the applicant's immediate Supervisor from the applicant's Company, Organization, or Agency sign-off and date the Registration Form.
- i) Contact a PennDOT ACE, ACM, or their designee in a District where the applicant performed a majority of their field technician work. Make arrangements with the ACE, ACM, or their designee to sign-off and date the Registration Form. Alternatively, if the applicant performed a majority of their field technician work for PTC projects, contact a PTC Materials Representative to sign-off and date the Registration Form. If the applicant is a PennDOT employee from the BOPD/CMD/CQAS, applicant must contact the PennDOT BOPD/CMD/CQAS Section Chief or their designee to sign-off and date the registration form. If the applicant is a PennDOT employee from the BOPD/CMD/LTS, applicant must contact the PennDOT BOPD/CMD/LTS Engineer of Tests or their designee to sign-off and date the registration form.

Note: If applicant is an ACE or ACM, sign-off must be from the ACE's or ACM's supervisor. If applicant is a PTC Materials Representative, sign-off must be from the PTC Materials Representative's supervisor.
- j) Submit the completed Paper Application Registration Form to NECEPT as instructed on the registration form. Submit payment by check or money order for the registration fee as instructed on the registration form.

D. Field Technician Certification Renewal Requirements (Option B – Repeat Initial Certification)

1. Same procedure as for initial certification of a Bituminous Field Technician.

XX. BITUMINOUS TECHNICIAN CODE OF ETHICS.

The Bituminous Technician Certification Board (BTCB) has found that the following rules are necessary to establish and maintain the high standard of integrity and dignity in the bituminous technician profession and are necessary in the public interest to protect the public against unprofessional conduct on the part of the bituminous technician. Certified Bituminous Technicians are put on notice that an ethical violation by themselves or by an individual rendering or offering to render bituminous technician services under their supervision, as provided by this Publication, may result in disciplinary procedures against them in accordance with Department Publication 351, Section XIX.B.2.

A. Principle 1. Beneficence/autonomy.

A certified bituminous technician will demonstrate a concern for the welfare and dignity of the recipients of the services, including PennDOT, PTC, and other Owner Agency personnel.

1. A certified bituminous technician will provide services without discriminating on the basis of race, creed, national origin, sex, age, handicap, disease, social status, financial status, or religious affiliation.
2. A certified bituminous technician will act for his client or employer in professional matters as a faithful agent or trustee, and will not accept a direct fee for services rendered as a certified bituminous technician from other than the technician's employer.
3. A certified bituminous technician will not attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects, or business of anyone.
4. A certified bituminous technician will not attempt to supplant another bituminous technician after definite steps have been taken toward his employment.
5. A certified bituminous technician will not compete with another bituminous technician for employment by the use of unethical practices.
6. A certified bituminous technician will not review the work of another bituminous technician for the same client, except with the knowledge of such bituminous technician, or unless the connection of such bituminous technician with the work has terminated.
7. A certified bituminous technician will not attempt to obtain or render technical services or assistance without fair and just compensation commensurate with the services rendered: Provided, however, the donation of such services to a civic, charitable, religious, or eleemosynary organization will not be deemed a violation.
8. A certified bituminous technician will not advertise in self-praising language, or in any other manner, derogatory to the dignity of the profession.
9. A certified bituminous technician will not create or participate in a threatening, intimidating or hostile environment toward any recipients of services, including PennDOT, PTC, or other Owner Agency personnel.

B. Principle 2. Competence.

A certified bituminous technician will maintain high standards of professional competence.

1. A certified bituminous technician will not attempt to practice in work in which the bituminous technician is not proficient or practice in work outside the standards of the profession.
2. A certified bituminous technician will consult with other service providers when additional knowledge and expertise is required.
3. A certified bituminous technician will accurately record and report information related to bituminous technician services provided to the Department.
4. A certified bituminous technician will require those whom the technician supervises in the provision of bituminous technician services to adhere to this Code of Ethics.

C. Principle 3. Public Information.

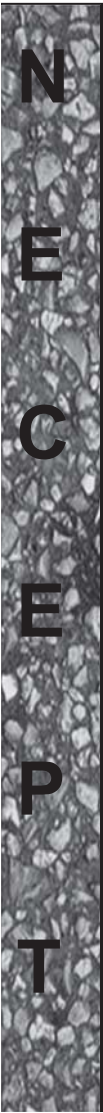
A certified bituminous technician will provide accurate information about bituminous technician services.

1. A certified bituminous technician will accurately represent their competence and training.
2. A certified bituminous technician will not use or participate in the use of a form of communication that contains a false, misleading, or deceptive statement or claim.
3. A certified bituminous technician will not use or permit the use of their signature on work over which the technician was not in responsible charge.

D. Principle 4. Professional Relationships.

A certified bituminous technician will function with discretion and integrity in relations with colleagues and other professionals.

1. A certified bituminous technician will report illegal, incompetent or unethical practice by colleagues or other professionals to the appropriate authority.
2. A certified bituminous technician who employs or supervises colleagues will provide appropriate supervision as necessary to provide bituminous technician services in conformance with this Code of Ethics.



Asphalt Pavement Construction Program

**Certified Asphalt Field Technician
Course of 2022**

Module 1 – Field Technician & Superpave Overview



HMA Construction Program

Certified Asphalt Field Technician

Module 1 – Field Technician & Superpave Overview




1

Module 1 will serve as an introduction to the course with defining the job and responsibilities of a Certified Asphalt Field Technician followed by an overview of Superpave. Course participants should be aware of Superpave asphalt mixes that are now specified for Pennsylvania projects. This overview will provide essential information and provide time for questions and clarification.

Module 1 - Objectives

- The Technician Certification Program
 - What is a Certified Asphalt Field Technician?
 - What are his/her responsibilities?
- Superpave: An Overview
 - What is Superpave?
 - What elements of Superpave do you need to know?



2

Technician Certification Program


- PennDOT Pub 351
 - Background on Certification
 - Certification & Recertification Requirements
 - Application Procedures
 - Exam Review & Retest
 - Code of Ethics



**BITUMINOUS OR ASPHALT
TECHNICIAN CERTIFICATION
PROGRAM**

**BITUMINOUS OR ASPHALT
PLANT AND FIELD TECHNICIANS**

Initial Certification Requirements
Certification Renewal Requirements
Registration Procedures
Performance Review and Code of Ethics
Course Administration

 **pennsylvania**
DEPARTMENT OF TRANSPORTATION
www.pennstate.gov

PUB 351 (11-18)


Frequently Asked Questions

Handout in Binder



**NECEPT Frequently Asked Questions
Asphalt Technician Certification Program**


1. Which publication covers the initial certification, certification renewal, and application procedures? **PennDOT Publication 351**
2. Where can I find Publication 351? **It can be downloaded from the PennDOT web site (www.PennDOT.gov) by clicking on the link for "Forms, Pubs & Maps", then click the search button and type "Pub 351", then click the magnifying glass, and then select "Publication 351" from the search results. It is also available on the NECEPT website under training: <http://www.superpave.psu.edu/Training/>.**
3. The initial certification and subsequent certification renewal periods will be for how many years? **Five (5) years**
4. In order to qualify for a Level 1 Plant Technician – Initial Certification, the applicant must have how many hours of documented experience in asphalt testing? **A minimum 500 hours obtained within the past three (3) years.**
5. What are the requirements for certification renewal of a Field Technician or Level 1 Plant Technician? **The applicant must have 500 hours of documented technician experience in asphalt paving within the previous five (5) years of certification. The applicant must also have attended one (1) NECEPT Update/Refresher Course and one (1) PennDOT approved asphalt-related annual conference, seminar, or workshop within the previous five (5) years or received a Certificate of Training from NECEPT's Technician Update/Refresher Course for two (2) out of the previous five years. Then, submit either an online registration or a completed and PennDOT signed Certification Renewal Application Form after all requirements have been met.**
6. How many retests in each applicant allowed before they have to repeat the corresponding 2-1/2 day review and certification course? **One (1)**
7. I lost my card. What do I do? **Submit a request in writing to NECEPT and include your name, NECEPT ID#, mailing address, and type of certification.**
8. I do not have the 500 hours of documented experience in asphalt paving required for certification renewal. Will I get certification renewal? **No, you will have to apply and attend the appropriate Asphalt Field Technician or Level 1 Plant Technician Initial Review & Certification Course.**
9. This is my one and only Update/Refresher Course. My certification expires in a few months. What do I do? **Attend a PennDOT approved asphalt-related conference, seminar, or workshop before your certification expires or you have to apply and attend the appropriate Asphalt Field Technician or Level 1 Plant Technician Initial Review & Certification Course and meet the requirements for the Review and Certification Course.**
10. What counts as continuing education? **Please refer to PennDOT Publication 351.**
11. How do I document my 500 hours and who is responsible for maintaining those records? **Keep a diary of projects, time & locations, and if possible, have it documented/signed by a Project Supervisor. The individual certified technician is responsible for maintaining their own records.**
12. Who checks my 500 hours? **PennDOT**
13. No one has ever checked my certification on the job site. Why do I need this? **PennDOT may check it tomorrow; however, one of the reasons you may not have been checked is because the District knows your history.**
14. I am the Lead Inspector and I never get out near the paver. What do I do for 500 hours experience? **It is your responsibility to make sure PennDOT works with you to meet the requirements. If not, you have to start the certification process over.**
15. What do I do with my paper certification renewal application after I get it signed by PennDOT? **Submit the signed application, record of hours, list of training, and payment for NECEPT fees to NECEPT c/o PSU-The Latour Transportation Institute, 201 Transportation Research Bldg, University Park, PA 16802.**



5

PennDOT Publication 351 - FAQs

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PennDOT Publication 351 - FAQs

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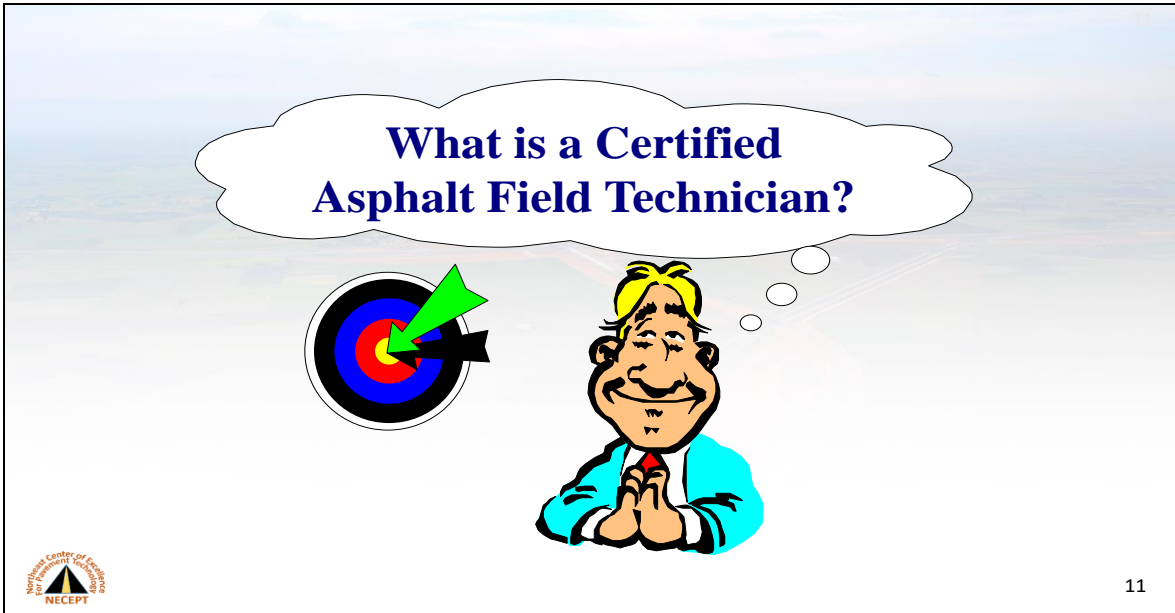
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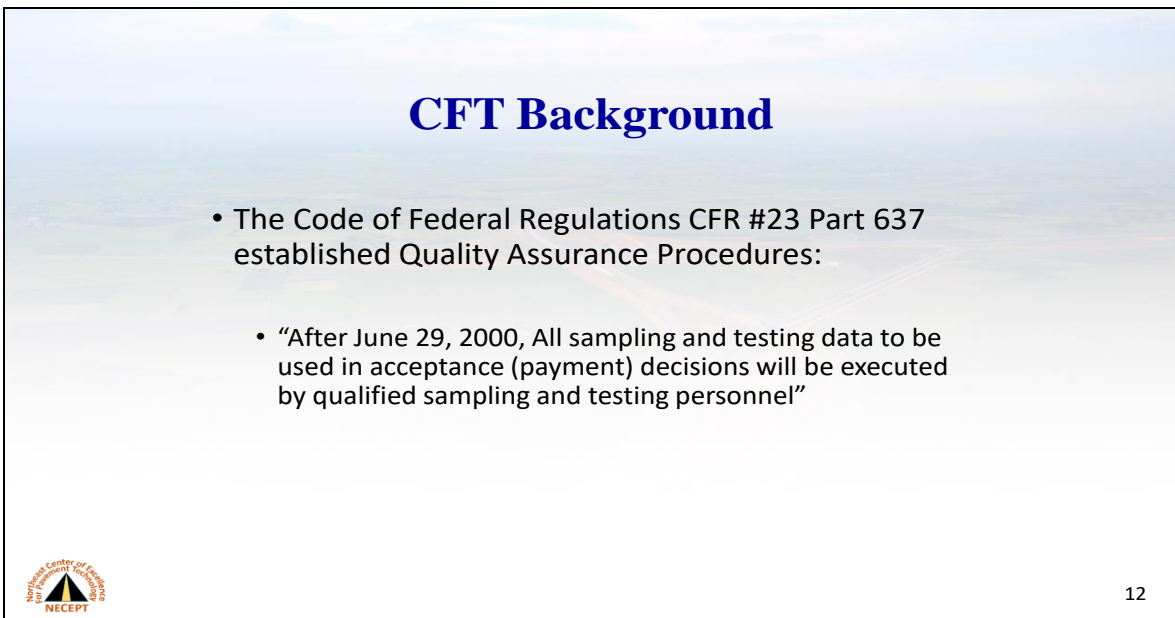
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What is a Certified Asphalt Field Technician?

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A Certified Asphalt Field Technician is an individual with at least 500 hours experience in the placement or construction of Asphalt Paving Mixtures. They have to have an understanding of asphalt mixes and asphalt terminology. Their goal is to ensure that a quality pavement is placed on the roadway.




CFT Background


- The Code of Federal Regulations CFR #23 Part 637 established Quality Assurance Procedures:
 - “After June 29, 2000, All sampling and testing data to be used in acceptance (payment) decisions will be executed by qualified sampling and testing personnel”

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**What are my duties?
If I work for....**



PennDOT
Contractor
Consultant



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If the technician works for PennDOT it is his responsibility to make sure the Contractor fulfills all of the requirements spelled out in the contract. This includes meeting all the applicable specifications, material quality requirements, and quantity of material called for in the contract. It is his responsibility to ensure that the contractor follows his quality control plan. Failure to meet all these conditions will lead to the loss of his certification and the possible loss of his position.

**What are my duties?
If I work for the....**



PennDOT
Contractor
Consultant



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If he is employed by the Contractor, he may answer to the foreman, the superintendent, the person in charge of quality control, or he may have the authority to make changes. His job is to ensure that the company fulfills the requirements of the contract and follows the quality control plan. If problems occur it is his responsibility to inform the proper individual who then can initiate corrective action, or if it is his responsibility move to correct the problem. Failure to react in an acceptable manner can lead to loss of certification and/or be deemed fraudulent.

What are my duties? If I work for the....



PennDOT
Contractor
Consultant




15

In most cases, the certified technician working for the Consultant will be on the project representing PennDOT, however, he could be representing the Contractor. Once again depending on who he is representing will govern his actions. The goal of all technicians on a project is to ensure that a quality product is being produced.

What are your responsibilities ?

A Certified Technician shall:



1. Know the specifications
2. Know the PTMs needed to ensure quality control
3. Be familiar with paving operations
4. Recognize mix and paving deficiencies
5. Be able to recommend corrective action
6. Adhere to the four principals of the code of ethics

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The duties of a certified field technician (CFT) may vary depending on his employer, however his responsibilities as a CFT should remain the same, to ensure a quality paving project. In order to function, the CFT must have a working knowledge of the Specifications and the field PTM's that are used to check and ensure a quality project. The CFT must be familiar with all stages of the paving operation; must be able to recognize mix and paving defects; and should also be able to RECOMMEND any needed corrective action.

What are the four principals of the code of ethics ?



A Certified Technician shall:

1. Demonstrate a concern for the welfare and dignity of the recipients of the services, including Department personnel.
2. Maintain high standards of professional competence.
3. Provide accurate information about asphalt technician services.
4. Function with discretion and integrity in relations with colleagues and other professionals.

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The CFT should at all times adhere to the four principles of the code of ethics which are stated in Pub 351 with expanded discussion on each one. The basic four principles as stated in Pub 351 are shown on the slide.

Example of Responsibilities:

- Pre-placement meeting
- Pre-Pave Set up
- Start of Paving Operation
- Paving Operation



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The following few slides are an illustration of one companies certified technician's duties. It also illustrates the commitment the company has made to quality. Remember that this example will vary from company to company and also within the Department.

Pre-placement Meeting Ref Pub 408 Sec. 413.3 (a) 2 Effective April 6, 2012

Pre-Placement Meeting

- Section 413.3(a)2
- 2 weeks prior to placing asphalt mixture
- Review at a MINIMUM: specifications, QC Plan, Sequence of Operations, Acceptance Procedures, Care and Custody of Samples



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This meeting should also cover monolithic paving of shoulders/mainline, non-testable areas, AET sampling procedures, and any other issues that experience has shown to be problematic.

Pre-Pave Set Up

- Review Surface Preparation
- Review Job Mix Formula
- Review Project Quality Control Plan & Special Provisions CS-413
- Ensure proper preparation of the Nuclear Gauge or Electrical Impedance Gauge as per PTM 402 or 403
- Review PTMs 1, 729, and 746
- Check Compaction Equipment
- Set Up Initial Rolling Pattern
- Check Box Sample and/or Core Locations



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Each field technician should have a basic understanding of the information provided on a job mix formula. This will provide him with a starting point in the compaction process as well as giving a hint as to how the mix might behave in general and what type of appearance to expect. This is information the technician needs to know if he is going to successfully manage the mix and, if necessary, troubleshoot a problem. The technician could keep a correlation Log where he could check if the material being used, had been placed before. How did it react, how did the core results compare to the gauge.

Review the project Quality Control Plan and the Project Item Summary Sheet and any Special Provisions, as necessary.

Regarding the nuclear or electrical impedance gauges; check gauge, clean and lubricate if necessary; run standard count if necessary and record in log; fill out Report (ambient and surface temperature, subgrade or road surface condition, equipment in use, field Inspector in charge); plug density number into gauge.


Check over compaction equipment (or make sure the operator or mechanic has): water systems; amplitude settings; drums, scrapers and pads; on pneumatic rollers check tire pressure, scrapers and pads, ballast if applicable, water/soap if applicable

Set up initial rolling pattern with operators: number of passes, distance from paver or other rollers/rolling zone/temperature zone, overlap, speed, frequency/amplitude settings, vibratory/static, both drums/one drum.

Make the necessary arrangements if someone other than you is pulling box samples. Complete the necessary paperwork, checking locations for box samples and cores.


Surface Preparation

- Paving notches according to RC-28
- All base repairs completed
- All surfaces clean
- Tack Distributor calibrated (PTM 747)



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Job-Mix Formula



JOB MIX FORMULA REPORT																																																																									
TR-48BA (6-15) pennsylvania Department of Transportation					Supplier Code: pave 123 Material Class: SR25BC Design ESAL Range: 0.3 to < 3 Million Aggregate Skid Resistance Level: Non-Applicable Measure Final Asphalt Binder Grade: PG5422 Asphalt Mix Type: HMA Gradation Classification: Coarse-Graded Original Approval Date: Approved JMF Status: Approved																																																																				
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22

Here is an example of a Job Mix Formula Report. It has several sections and we will focus on the blocked section shown. A full-size version is available at the end of this module.

Job-Mix Formula

MIX CHARACTERISTICS (GYRATORY)								
Design ESAL Range	Mold Diameter (mm)	# Gyration at Ninitial	# Gyration at NDesign	# Gyration at NMaximum	Voids in Mineral Aggregate (VMA) %	Theoretical Max. Sp. Grav. (Gmm)	Bulk Sp. Grav. of Mixture (Gmb)	
0.3 to < 3 Million	150	7	75	115	13.8	2.537	2.436	
Bulk Sp. Grav. of Combined Aggr.(Gsb)	Mixture Mass to Compact (g)	% Air Voids at Ninitial	% Air Voids at NDesign	% Air Voids at NMaximum	Voids filled with Asphalt (VFA) %	Theoretical Max. Density (lbs/ft3)	Bulk Density of Mixture (lbs/ft3)	
2.701	4,740.0	14.5	4.0	2.6	71.0	157.9	151.6	

Note that the Theoretical Maximum Density (157.9 lbs/ft³) = 62.24 X Theor. Max. Sp. Gr. (2.537). The value is noted on the JMF and is the number to be entered into the nuclear density gauge.

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This portion of the report shows the gyratory mix characteristics which indicate the mix was designed for a project with traffic loads of 0.3 million to less than 3 million ESALS and 75 gyrations. The Ndes 75 is the number of gyrations required to produce a density in the mix that is equivalent to the expected density in the field after the indicated amount of traffic. In the mix design process, an asphalt content is selected that will provide 4 percent air voids when the mix is compacted to design number of gyrations

Form CS-413 Quality Control Plan

CS-413 (4-20)

**MINIMUM QUALITY CONTROL PLAN FOR
FIELD ASPHALT PAVING OPERATION**

(Attach additional sheets as necessary)

Project # _____ State Route (S.R.) _____ Section _____ County _____

Project Name _____ Specification _____ Change _____

I. **ORGANIZATIONAL CHART** Contractor _____

Personnel	Full Name	Responsibilities
A. Company Representative	_____	Oversees entire project
B. Superintendent	_____	Oversees paving operations
C. Paving Foreperson	_____	Oversees placement of material and related operations.
D. Certified Nuclear Gauge Operator	_____	Develops rolling pattern and compaction data and acts as a point of contact for PennDOT personnel for all field testing and sampling. (Nuclear Gauge Operator does not need to be NECEPT Certified)
Operator's Certification No.	_____	
E. Asphalt Field Technician	_____	Expiration Date: _____
NECEPT Certification No.	_____	

Note: Problems related to asphalt mixture or paving operations shall be directed to the paving foreperson. If problems are still unresolved they will be elevated to the superintendent then directed to the company representative if needed.

24

A Quality Control Plan is required by the specifications. Form CS-413 is used to provide the Quality Control Plan. If field operations or personnel deviate from the plan, changes should be noted and initialed by both the contractor and the Department representatives. A full-size version is included in the course material.

Form CS-413 Quality Control Plan

Equipment List	Quantity	Manufacturer and Model
A. Distributer Truck	_____	_____
B. Paver	_____	_____
C. Breakdown Roller	_____	_____
D. Intermediate Roller	_____	_____
E. Pneumatic-Tire Roller	_____	_____
F. Finish Roller	_____	_____
G. Material Transfer Vehicle (As specified)	_____	_____

II. TESTING PLAN

A. Compaction Control

1. Compaction will be controlled in accordance with Section 413.3(i).
 - a. Pneumatic-tire rollers will be used for compacting scratch courses.
 - b. Mechanical tampers will be utilized in areas inaccessible to rollers.

B. Temperature Control

1. Temperature will be controlled in accordance with Section 413.2 (e) Table A, by checking the first three trucks or until control is established, and a minimum of every fifth truck thereafter. The first three trucks will be tested after any plant breakdowns or production stoppages.
2. The plant will be contacted when any single check reaches within 5 degrees of the specification limits and the testing frequency will be increased to every load until control is reestablished.

Page 1

C. Segregation will be addressed in accordance with Section 413.3(h)3.

D. Tests for Depth in accordance with Section 413.3(m) and 313.3 (m).


E. The inspector and the contractor's representative will both measure the depth of each sublot according to PTM 737 using the density acceptance samples.

1. For courses with a designed course depth and accepted by non-movement or optimum rolling pattern, the inspector and the contractor's representative will both calculate the weight per square yard for yield.

F. Density cores will be extracted as soon as possible but no later than the day following the placement in the presence of the inspector. Mat density will be accepted in accordance with 413.3(j).

G. Mixture Acceptance

1. Lot Acceptance will be performed in accordance with Section 413.3 (h)2.
2. Certification Acceptance will be in accordance with Section 413.2(i).


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Equipment to be used throughout the whole operation must be listed including the details as required in the form. Testing Plan and Acceptance procedures for ALL materials are to be discussed at the pre-placement meeting. Crucially important if shoulders and mainline are paved at the same time with same material. Lot sizes can also be established at this time using plan quantity.

CS-413 Quality Control Plan

III. MIX DELIVERY

- A. Trucks will be clean of all foreign materials.
- B. No petroleum oils, solvents, or other materials will be used as a release agent in the haul vehicles. The release agent used will be supplied by _____ having a trade name of _____.
- C. Delivery of material will be protected in accordance with 413.3(d)
- D. Material will be released for the day's operation according to the details discussed at the pre-pave meeting.
- E. An adequate number of trucks will be utilized to facilitate paving continuity.
- F. All delivery trucks will be cleaned out at a designated location, not on the roadway in advance of the paving train.
- G. Trucks will be loaded, unloaded and handled using practices and procedures that will help prevent segregation.

IV. SURFACE PREPARATION


- A. All areas will be cleaned of surface debris.
- B. Existing vertical and horizontal surfaces will be treated according to 413.3(g)1., or contract requirement.
- C. Certification of asphalt materials will be provided as specified.
- D. _____ will be used and applied in accordance with Section 460 or unless indicated otherwise.

<u>Application Rates for Tack Coat</u>		<u>Residual Rates for Tack Coat</u>	
New Asphalt Paving	_____	New Asphalt Paving	_____
Existing Asphalt Paving	_____	Existing Asphalt Paving	_____
Milled Surface	_____	Milled Surface	_____
Portland Cement Concrete	_____	Portland Cement Concrete	_____

E. Asphalt mixture will not be placed until the tack coat has adequately cured.

V. MIX PLACEMENT

- A. Pavers will comply with the requirements of Section 413.3(e) and will be used and operated in accordance with same.
- B. Automatic screed controls capable of producing a finished surface of specified evenness and texture will also be used in accordance with Section 413.3(e).


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CS-413 Quality Control Plan


VI. COMPACTION
 A. A sufficient quantity and type of rollers and compaction equipment will be used in accordance with Sections 413.3(f) and 413.3(i).

VII. JOINT CONSTRUCTION AND COMPACTION
 A. Joints will be offset by approximately 150 mm (6") from the previously placed layer.
 B. Surface course longitudinal joints will be placed at the approximate centerline of the roadway for 2 lane roadways and within 300 mm (12") of lane lines for roadways with more than 2 lanes.
 C. When specified or otherwise used notched wedge joints will be constructed according to RC-28M of the standard drawings.
 D. All transverse joints will be constructed perpendicular to the centerline of the roadway.
 E. All joints will meet the required surface tolerances as specified in Section 413.3(l).
 F. The entire area of all joint faces will be painted with a coating of the appropriate asphalt material. In accordance with Section 413.3(k)1 & 2.

Page 2

G. Joints will be compacted by the following means: (E. g. - Rolling Hot to Cold Side, etc.)

VIII. SPECIAL PAVING CONDITIONS
 A. Method of placement and traffic control for intersections and other incidental work will be discussed and agreed upon by the project IIC and paving foreperson no less than 3 days prior to the start of work.
 1. List those work items and agreements as discussed (Attached on a separate sheet).
 B. Safety Edge required (RC-25) for binder and wearing courses in accordance with Section 413.3 (h)1e.


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CS 413 Quality Control Plan

IX. PROTECTION OF THE COURSES
 Traffic will not be placed on fresh material unless the temperature is 60° C (140 °F) and stable or lower, as determined by surface thermometers.

X. AMENDMENTS
 If at any time during the course of the project a change to this quality control plan is agreed necessary by Company Representative () and the Project IIC, it can be amended by strike out and replacement followed by signatures in initial form. A description of the change and reason for amendment should be noted in the Inspector's field diary for confirmation.


XI. PRE-PAVE MEETING
 Conduct a preplacement meeting with department, contractor and supplier, as well as any other appropriate parties at least two weeks prior to placing asphalt paving mixtures.

Check All That Apply:

<input type="checkbox"/> MTV Required	<input type="checkbox"/> Saw and Seal Joints	<input type="checkbox"/> Heavy Duty Membranes	<input type="checkbox"/> PWL - LTS
<input type="checkbox"/> Pavement Ride Quality (Section 404)	<input type="checkbox"/> Longitudinal Joint Density (Section 405)	<input type="checkbox"/> PWL - HOLA	

Complete "Item Number and Mix Designs / Placement and Sampling Details" form on page 4 (additional sheets provided if needed). This form provides details of asphalt placements, mix designs to be used and other valuable information such as proposed Mixture and Density acceptance.

Submitted By: _____ Date: _____
 Reviewed By: _____ Date: _____


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Start of Paving Operation

- Check Mix Temperature
- Initial Density Readings
- Check Mat Temperature
- Check Mat Appearance
- Check Joint- placement and density
- Make Adjustments as Required
- Record Initial Roller Pattern



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The Technician should be familiar with the specifications that establish the delivery temperature and check the delivery ticket. Check temperature at paver initially and whenever necessary throughout the day. Check temperature of the mat in the rolling zones and correlate with temperature at paver.

Check initial gauge readings behind primary breakdown roller, check for compacted depth, check for roll out or roll down at free edge of pavement. Work with foreman to consistently achieve the specified depth and width of pavement.

Check mat's general appearance and any irregularities: Excessive movement, creasing, segregation, flushing, screed marks, etc.

Check Transverse and Longitudinal Joints: Make adjustments as necessary in rolling procedures to provide a tight, consistent joint or report to paving foreman when changes are necessary.

Witness construction of joints, ensuring proper procedures are followed.

Make any adjustments as required for appearance or compaction purposes or inform the person in charge if the problem is related to paving techniques or equipment. Inform the plant if the problems appear to be material related and do not correct themselves within a reasonable time. If part of the chain of command, inform the Quality Control Manager of any problems encountered during the days production. Always make notes of problems and any corrective action taken, inform QC manager if applicable immediately if corrective actions are not taken or if the problem persists after action has been taken.

Record initial rolling pattern and equipment used.

Paving Operation

- Monitor Startup Operations.
- Monitor Truck Exchange.
- Monitor Compaction.
- Check with Plant.
- Check Finished Product.
- Specify Coring Locations for Acceptance.
- Maintain Good Communications.



30

Continue to monitor the startup operations as necessary and monitor truck exchanges. Continue to monitor compaction and record readings. Take readings following breakdown rolling. Experience has shown that taking readings at more locations in your rolling zone yields better information than taking multiple readings in one spot. Experience and past correlations become an important factor and your confidence in your experience is important. Record any changes in initial rolling pattern and note possible reason for change: ambient temperature, paving speed, etc. Note any equipment problems and inform the proper person. Monitor Paver speed if necessary and note stoppages. Check with plant for change in theoretical density (morning and mid-day). Check finished product, behind the finish roller. As applicable, determine acceptance coring locations, and make sure acceptance cores are properly taken and packaged for shipment. Good communications are imperative in making informed decisions in the field. Seek information and communicate with: plant technicians, paving foremen, mechanics, roller operators, QC manager, and the field inspector.

**Your Effort Towards
Achieving A Quality
Paving Job Makes The
Difference Between
A Great Job And A
Mediocre One.**

MAKE THE EFFORT!



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HMA/WMA Construction Program

Certified Asphalt Field Technician

Superpave: An Overview




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Superpave represents an improved system for specifying asphalt binders and mineral aggregates, developing asphalt mixture design, and analyzing and establishing pavement performance predictions. Although it is a giant step forward in mix design, it is not the end point in our efforts to achieve a better asphalt mixture. We will probably be modifying Superpave for many years to come.

Problems with Asphalt Mixture Behavior

- Permanent Deformation
- Low Temperature Cracking
- Fatigue Cracking


Brought research leading to Superpave technology

33

The research that led to the Superpave technology was conducted due to a nationwide problem with rutting and premature cracking of asphalt pavements.

Superior PERforming asphalt PAVement

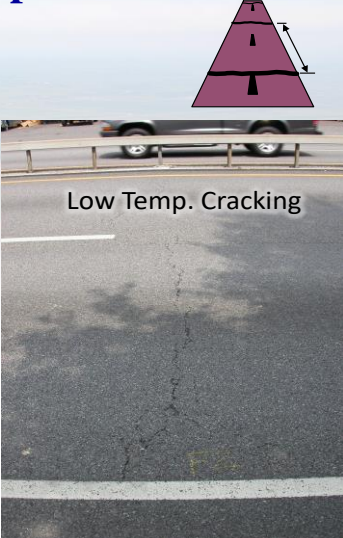
- Durability - Provides proper binder film coating of asphalt around each piece of aggregate, performing within temperature ranges to resist cracking
- Rutting Resistance - Provides a greater % of larger aggregate to create a stone-on-stone contact to resist rutting of the pavement

34


Superpave – Superior Performing Asphalt Pavement – gives us increased durability by providing the proper binder film coating of asphalt around each piece of aggregate with enhanced performance within specified temperature ranges. Superpave also resists rutting by providing a greater percent of larger aggregate to create more of a stone-on-stone contact.

Superpave resists Low Temperature (Shrinkage) Cracking

- Environmental Distress
- Stresses/Strains Induced by Temperature Change
- Transverse Cracks
- PG binders based on grading systems relating to temperature conditions in the area of use



Low Temp. Cracking

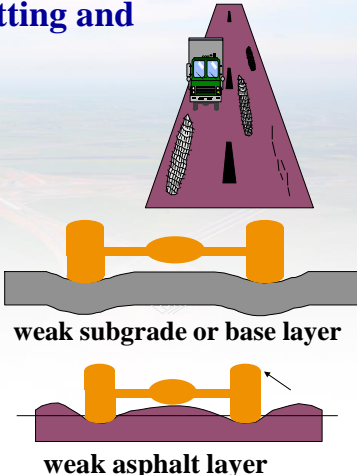


35

Superpave provides for an asphalt binder that must maintain stiffness during extended periods of hot weather and remain flexible during very cold temperatures in order to resist low temperature cracking of the pavement. Superpave PG binders are selected based on grading systems that relate to the temperature and traffic conditions of the specific project.


Superpave resists Rutting and Fatigue Cracking

- Distress in Wheel path
- Progressive Damage
 - longitudinal cracking
 - alligator cracking
 - Potholes
- PG binders are tested for fatigue properties
- Mixes have a higher % of larger aggregates with stone-on-stone contact



weak subgrade or base layer

weak asphalt layer



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Rutting can occur due to a weak subgrade or base, or it can occur in the top layer over a strong base. We will look at this in more detail later. Proper type and amount of binder and aggregate in the mixture can help alleviate rutting. PG binders are tested for fatigue properties, and Superpave mixes tend to have a good rock-to-rock contact to resist rutting. Fatigue cracking also depends on the pavement thickness and will continue to be in the hands of traffic engineers with their ability to predict future traffic loads. Engineers determine the thickness of a given pavement based on vehicle and truck traffic estimates using Equivalent Single Axle Loads (ESALs), subgrade stiffness values and environmental factors.



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“Plastic flow” due to high loading and high ambient temperatures.

Superpave Asphalt Binder Specification

- Grading System Based on Climate & Traffic

PG 64S -22

↑
Performance Grade

↑
Average 7-day Max. pavement design temp

Traffic Level	Designation in Grade
Standard	S
Heavy	H
Very Heavy	V
Extreme	E

↑
Min. pavement design temp

↑
Traffic Level

38

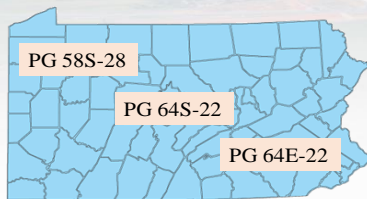
The standard PG (Performance Grade) binder used in Pennsylvania is a PG 64-22 which is similar to the old AC 20. The PG of binder is defined in degrees Celsius. Below is a conversion of degrees Celsius (°C) to Fahrenheit (°F). For example, -22C is equivalent to -7.6F.

- 64 -22C = 147.2-7.6°F**
- 58-28C = 136.4-18.4 °F**
- 76-22C = 168.8-7.6 °F**

Superpave Asphalt Binder Specification

• Grades available

3 Standard Performance Grade (PG) Binders



PG 58S-28 ≈ AC - 10

PG 64S-22 ≈ AC - 20

PG 64E-22 (PG 76-22)

≈ Polymer

Modified Asphalt
Cement for High Traffic
Volume Highways



***Note: Other grades available per PennDOT special provision**

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In the colder regions of the state a PG58-28 can be used to help with the temperature changes. This material is softer than PG 64-22 and is for **non-heavy duty** traffic situations. The PG 64E-22 binder is an asphalt on steroids that can be used in areas with heavier truck traffic to alleviate rutting. This is a polymer modified asphalt binder that can increase cost of material but is needed for enhanced performance with heavy truck traffic and high-volume highways.

Superpave Mix Design Considers Essential Aggregate Properties

- Consensus Properties
 - coarse aggregate angularity (CAA)
 - fine aggregate angularity (FAA)
 - flat, elongated particles
 - clay content
- Source Properties
 - toughness
 - soundness
 - deleterious materials
 - ROCK CARRIES THE LOAD



40

With aggregates, the consensus and source properties are necessary for building a good aggregate interlock into the structural skeleton of the asphalt mixture. The level of these requirements varies with the amount of traffic, again making the ESAL estimates for the pavement extremely important. Source properties can be specified based on local experience and availability.

Superpave Specifications: ESALS

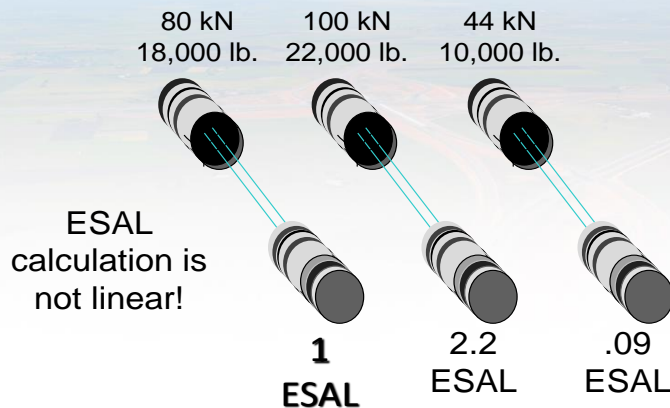
- ESAL levels are related to traffic, particularly the amount of truck traffic.
- ESALS are used to determine the amount of asphalt in the mix.
- Rutting is greatly reduced when the correct PG grade and asphalt content are utilized.



41

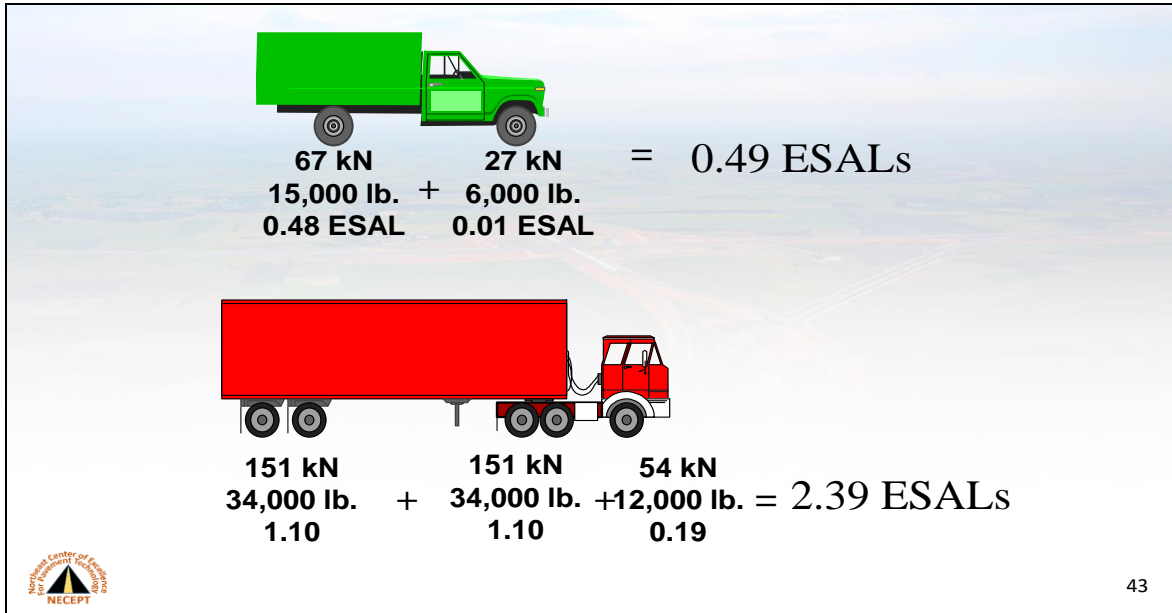
ESAL Comparison

1 Equivalent Single Axle Load (ESAL) is 18000 lbs.



42

An ESAL is an (18,000 pound) Equivalent Single Axle Load.
DO NOT TRY TO DUPLICATE THE MATH !!!!!!!!!!!!!!!




Not all trucks are the same. A typical 80,000-pound tractor trailer would have 2.39 ESALs while the box truck shown at the top would be 0.49 ESALs.

ESAL Comparison

- In road design, for a 20-year pavement life, one fully loaded tractor-trailer per day would equal approximately 17,450 ESALs
 (To get this value, it is assumed that growth rate is 0%)

Typical ESAL ranges for Asphalt Mixes

▪ 0.0 – 0.3 million	~0 to 17 trucks	light
▪ 0.3 – 3.0 million	~17 to 172	medium
▪ 3.0 – 10.0 million	~172 to 573	high
▪ 10.0 – 30.0 million	~573 to 1720	heavy

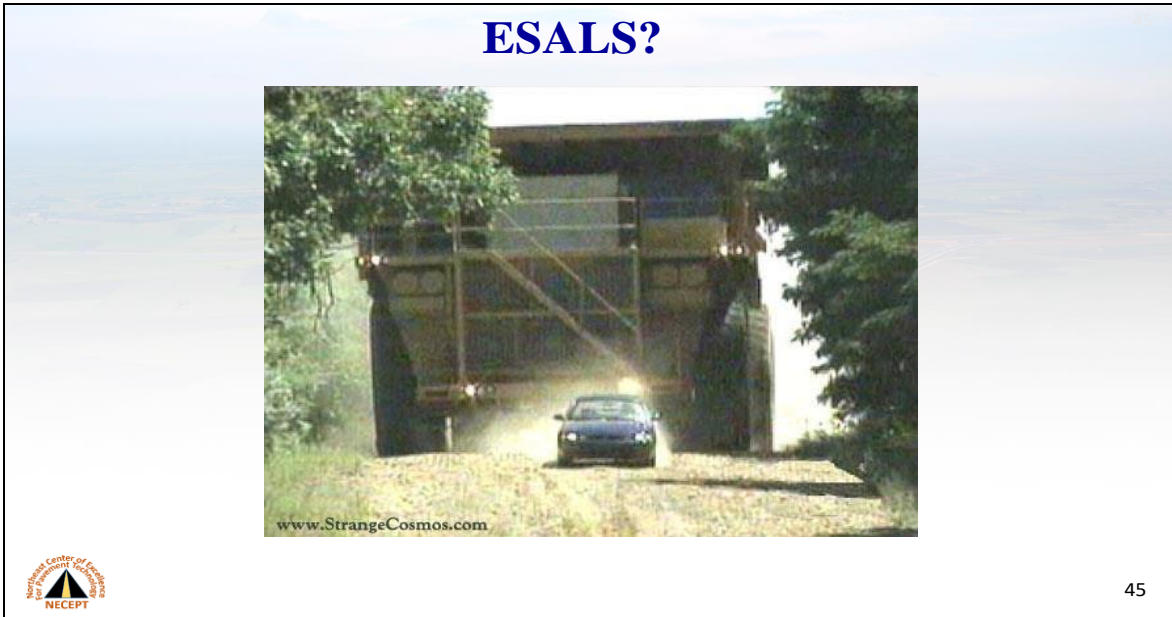

44

The higher the ESAL count the less binder is in the mixture for the stone-on-stone contact to prevent rutting. The mix designer also uses the ESAL count to determine the specifications for the required level of angularity of the aggregate in the mix.

Do not substitute mixes with different ESAL counts. More is not necessarily better due to the variance in the binder content.

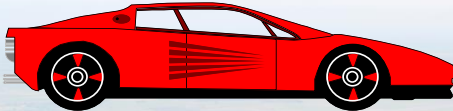
20 years X 365 days X 2.39 ESALS per truck = 17,447 ESALS

17 trucks per day X 17,477 = 296,599 ESALS during the 20-yr service life. This gives a traffic level under 0.3 million (300,000), which will be considered light traffic.



How many cars to equal the ESALS from one semi mounted tractor trailer???


1 Auto = 0.0002 ESAL



1,000 lb.	2,000 lb.
.00001 ESAL	.00019 ESAL

1 Truck @ 2.39 ESAL = 11,950 Autos

Cars do not count !!!!



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Cars do not count when calculating ESALS. However, they do count when determining the SRL of the aggregate used in the mix.



Superpave uses the Nominal Maximum Aggregate Size

Aggregate Size Definitions

- **Nominal Maximum Aggregate Size**

One size larger than the first sieve to retain more than 10% of the sample and is the “name” of the mix.

- **Maximum Aggregate Size**

One size larger than nominal maximum size



In definition of maximum aggregate size in Superpave, we must distinguish between maximum aggregate size and nominal maximum aggregate size. Nominal maximum aggregate size is defined as one size larger than the first sieve to retain more than 10% of aggregate. Maximum aggregate size is defined as one size larger than the nominal maximum size. MAXIMUM size is LARGER than nominal maximum size!

NOTE: NMAS is now the reference term in most asphalt sections in Pub 408.

Sieving

Individual Sieve




Stack in Mechanical Shaker



Superpave Mixes: Size Designations

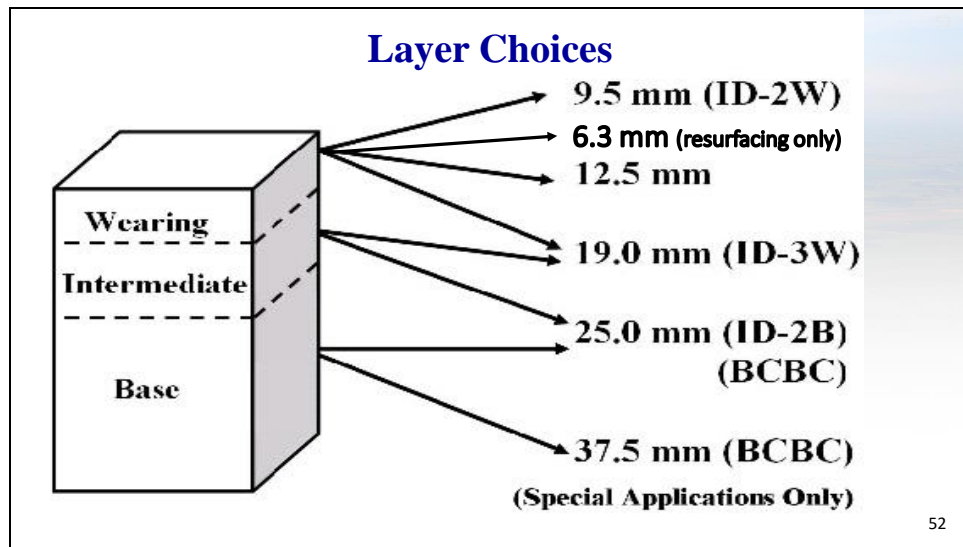
Superpave Designation	Nominal Max Size mm (inches)	Max Size mm (inches)
37.5 mm (1.5")	37.5 (1.5)	50.0 (2)
25.0 mm (1.0")	25.0 (1.0)	37.5 (1.5)
19.0 mm (3/4")	19.0 (3/4)	25.0 (1.0)
12.5 mm (1/2")	12.5 (1/2)	19.0 (3/4)
9.5 mm (3/8")	9.5 (3/8)	12.5 (1/2)
6.3 mm (1/4")	6.3 (1/4)	9.5 (3/8)
4.75 mm (1/5")	4.75 (1/5)	9.5 (3/8)

PennDOT



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This chart shows the nominal maximum aggregate size of the aggregate in the Superpave mix (which is equivalent to the mix designation) along with the maximum aggregate size in the mix. A US quarter (25 cents) is approximately 25 mm (1 inch) in diameter.



This slide shows a comparison of Superpave mix designation compared to the PennDOT old conventional ID mixes in layer choices. The 12.5-mm surface coarse is similar to a coarse graded ID-2 Wearing course. The 25-mm Base course is similar to a typical BCBC (Bituminous Concrete Base Course), while the 37.5-mm base course is similar to a Coarse-Graded heavy duty BCBC.

Module 1 - Review

- The Technician Certification Program
 - What is a Certified Asphalt Field Technician?
 - What are his/her responsibilities?
- Superpave: An Overview
 - What is Superpave?
 - Do you know what you need to know?



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PennState

Discussion



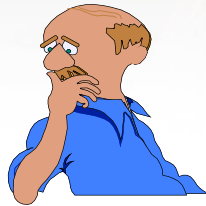
pennsylvania
DEPARTMENT OF TRANSPORTATION



Quiz

Module 1

Introduction/Superpave Overview



1. Who can the Certified Field Technician represent?

- a. PENNDOT**
- b. Contractor**
- c. Consultant**
- d. All of the above**

Answer:



2. A Certified Field Technician has to renew his/her certification every

- a. 3 years**
- b. 4 years**
- c. 5 years**
- d. 6 years**

Answer:



3. To become recertified, the Field Technician has to have how many documented hours?

- a. 50**
- b. 100**
- c. 500**
- d. 1000**

Answer:



4. The Certified Field Technician should

- a. Know the specifications & PTMs needed to ensure quality control
- b. Be familiar with paving operations
- c. Recognize mix and paving deficiencies and recommend corrective actions
- d. All of the above

Answer:



5. How many times is the applicant for certification allowed to retake the test before they have to repeat the 2-day course?

- a. 1
- b. 2
- c. 3
- d. 4

Answer:



6. Superpave mixes were developed because of nation-wide asphalt pavements problems of

- a. rutting and premature cracking
- b. corrugations and potholes
- c. surface drainage and sub drainage
- d. raveling and bleeding

Answer:



7. Superpave mixes all use

- a. ID binders
- b. FJ binders
- c. PG binders
- d. FB binders
- e. None of the above

Answer:



8. Superpave mix design is based on

- a. Aggregate size**
- b. Geographic Location**
- c. ESALS**
- d. All of the Above**

Answer:



9. 12.5 mm aggregate is the largest size acceptable in a 9.5 mm wearing course.

- a. True**
- b. False**

Answer:



10. Which ESAL range may be substituted in place of a 0.3 to 3 million ESAL design mix?

- a. 10.0 to 30.0 million ESALS**
- b. 0.0 to 0.3 million ESALS**
- c. None of the above**

Answer:



PennDOT Mix Design Designation

Year Number
2015 5220R

Design ESAL Range 0.3 to < 3 Million

Aggregate Skid Resistance Level Non-Applicable

Mixture Final Asphalt Binder Grade PG6422

Asphalt Mix Type HMA

Gradation Classification Coarse-Graded

Original Approval Date

JMF Status Approved

Supplier JMF/Design Number (Optional)

Supplier Pave , Inc

Location anywhere

ECMS Number

PO No.-Line Item No.

408 Spec

Mix Time

SR &

Plant Type AB

Plant 10

Dry(s)

Contractor

Location

5 35

Material Supplier

Material Code - Class

Product Name

%

Spec.

%

HAP41A14	207 (Aggregate Fine) - A	Sand A1	4.100	2.568	1.72
HAP41B14	207 (Aggregate Fine) - B3	B3 (W)	16.400	2.663	1.37
HAP41B14	203 (Aggregate) - A467	A467	17.400	2.724	0.89
HAP41B14	203 (Aggregate) - A57	A57	36.100	2.710	1.33
HAP41B14	203 (Aggregate) - A8	A8	7.300	2.698	1.27
NOBLT 14	17 (Hot Rap Design) - RAP	RAP	15.000	2.740	0.00
UNRC0 15	1 (Asphalt Cement) - PG6422	AC	3.700	1.031	

JOB MIX FORMULA AND DESIGN

A.C. / Sieve Size	A.C.%	#200	#100	#50	#30	#16	#8	#4	3/8"	1/2"	3/4"	1"	1 1/2"	
Design Target	4.4	4.0	5	7	12	17	25	37	53	66	86	96	100	
% Virgin A.C.		3.7		% Reclaimed A.C. from RAP				0.70		Total % Asphalt (Pb)			4.4	
Virgin A.C. PG Binder Grade		PG6422		% Reclaimed A.C. from RAS				% Eff. Asphalt Binder			4.1			
Calc. Asp. Film Thickness		11.20		Total Reclaimed Binder Ratio				0.16		Fines / Asphalt (F/A) Ratio			1.0	

MIX CHARACTERISTICS (GYRATORY)

Design ESAL Range	Mold Diameter (mm)	# Gyration at Ninitial	# Gyration at NDesign	# Gyration at NMaximum	Voids in Mineral Aggregate (VMA) %	Theoretical Max. Sp. Grav. (Gmm)	Bulk Sp. Grav. of Mixture (Gmb)
0.3 to < 3 Million	150	7	75	115	13.8	2.537	2.436
Bulk Sp. Grav. of Combined Aggr.(Gsb)	Mixture Mass to Compact (g)	% Air Voids at Ninitial	% Air Voids at NDesign	% Air Voids at NMaximum	Voids filled with Asphalt (VFA) %	Theoretical Max. Density (lbs/ft3)	Bulk Density of Mixture (lbs/ft3)
2.701	4,740.0	14.5	4.0	2.6	71.0	157.9	151.6

ASPHALT CONTENT TEST METHOD

A.C. Test Method	External Party Oven Make/Model	Furnace Temp (°C)	Sample Size for C.F.	Asphalt	200 C.F.
PTM No. 757	Thermolyne/NCAT AP-20x	538.0	2,000.0	0.47	0.00

MOISTURE SUSCEPTIBILITY DATA

A.C. Supplier	Name	Dry PSI Strength	Wet PSI Strength	TSR Value	Date of TSR	Date of Boil Test
UNRC0 15	AC	105.7	100.4	0.95	11/9/09	11/9/09

COMBINED AGGREGATE CONSENSUS PROPERTIES

AASHTO T 176 Sand Equivalency (%)	AASHTO T 304 Fine Aggr. Angularity Uncompacted Voids (%)	ASTM D5821 - Coarse Aggregate Angularity		ASTM D4791 Flat / Elongated Particles		Total % Reclaimed Agg. From RAP and / or RAS
		% 1 Face Crush	% 2 Face Crush	5:1	3 SMA	
89.6	45.9	100.0	100.0	1.6		14.3

Designed By : designer

Designed By Certification ID : ROBIN

Designed 4/1/11

Submitted By : submitter

Submitted By Certification ID : BATMAN

Submitted 7/21/15

Approved By : approver

Approved By Certification ID : Materials Engineer

Approved 7/21/15

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Page 1 of 1

Asphalt Pavement Construction Program

Certified Asphalt Field Technician
Course of 2022

Module 2:

PennDOT Specifications



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Asphalt Construction Program

**Certified Asphalt
Field Technician - 2022**

**Module 2:
PennDOT Specifications**



1

Module 2 – Objectives

- **PennDOT Specifications**

- Which specifications are the most significant?
- Review relevant specifications



2

The specifications that govern you and your current project are the most important! Be aware of Changes to all Pubs and their effective dates.

What you need to know...

- PennDOT Specifications Publication 408
- Sections covering Asphalt & the important aspects of these specifications
- PennDOT website: www.penndot.gov/

3

PennDOT Asphalt Specifications are found in Publication 408. Changes, which include new Sections, updates and corrections are issued twice yearly.

PennDOT Specifications (Publication 408)

**Pub 408/2020:
Initial Edition (IE)**

(Effective April 10, 2020)

4

This is what you will see on PennDOT’s website for the 2020 edition. The PennDOT Project will specify the version of the PennDOT Publication 408 Specifications that applies. Make sure you know which version refers to your project as that is the version to use.

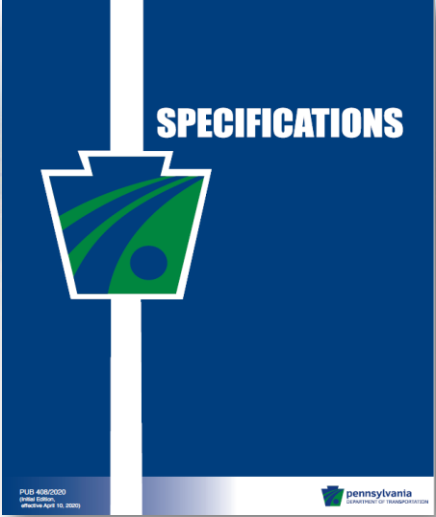
PennDOT Specifications (Publication 408)

**Pub 408/2020:
Change No. 3**

(Effective October 8, 2021)

Go to: https://www.dot.state.pa.us/public/PubsForms/Publications/Pub_408/PUB%20408.pdf


Then, click on 2020 Version
Then, click on Change No. 3



5

PennDOT Specifications (Publication 408)

Version	Effective Date
Initial Edition	April 10, 2020
Change No. 1	October 2, 2020
Change No. 2	April 9, 2021
Change No. 3	October 8, 2021
Change No. 4	April 1, 2022
Change No. 5	October 7, 2022
Change No. 6	April 14, 2023
Change No. 7	October 6, 2023




2020

6

At the time of this course, Change No. 3 is in Effect.

Pub 408 Table of Contents

Section	Title	
100	General Provisions	←
200	Earthwork	
300	Base Courses	←
400	Flexible Pavements	←
500	Rigid Pavements	
600	Incidental Construction	
700	Material	←
800	Roadside Development	
900	Traffic Accommodation & Control	
1000	Structures	
1100	Manufactured Material	
1200	Intelligent Transportation System (ITS) Devices	




7

The Certified Field Technician should be familiar with the 408 Specifications section that govern their project. The arrows call attention to the sections most relevant to asphalt construction. Section 100 covers: abbreviations and terms, control of work and materials and measurement of quantities and payments. Section 300 Base Course and Section 400 Flexible Pavements contains the Specifications for Superpave projects and also refer to the Materials Section 700.

Pub 408 Asphalt Specifications

106	Control of Material
313	Superpave Asphalt Mixture Design, Standard Construction, Base Course
314	Asphalt Rich Base Course (ARBC)
316	Flexible Base Replacement
344	Full Depth Reclamation
360	Asphalt Treated Permeable Base Course
404	Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive
405	Evaluation of Asphalt Pavement Longitudinal Joint Density And Payment of Incentive/Disincentive




8

This slide and the next contain a listing of the Sub-Sections of Publication 408 that cover the requirements for Superpave projects. The Certified Field Technician should be very familiar with these specifications. Note: Section 108.05(c) also covers equipment requirements.

Pub 408 Asphalt Specifications


410	Superpave Mixture Design, Standard & RPS Construction of Plant-Mixed Fine-Graded Courses
412	Superpave Mixture Design, Construction of Plant-Mixed 6.3 mm Thin Asphalt Overlay Courses
413	Superpave Mixture Design, Standard & RPS Construction of Plant-Mixed Courses with PWL and LTS Testing
419	Stone Matrix Asphalt Mixture Design, RPS Construction of Plant-Mixed Wearing Courses
420	Pervious Asphalt Pavement System
460	Asphalt Tack Coat
483	Polymer-Modified Emulsified Asphalt Paving System (Microsurfacing)
489	Ultra-Thin Bonded Wearing Course
496	Asphalt Concrete Pavement, 60-Month Warranty



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Asphalt Standard Special Provisions

a10650	Minimum Effective Asphalt for 9.5 mm or 12.5 mm Superpave Mixtures
c0411	Item 4411-0010 Superpave Asphalt Mixture Design, WMA Binder Course (Leveling), High RAP
b04003 and b04004	Superpave Asphalt Mixture Design, Standard and RPS Construction of Asphalt Pavements with Department Local Acceptance, and Payment by Percent Within Tolerance (PWT-HOLA)



10

In addition to the standard specifications, a number of special provisions exist that relate to paving. While there are many potential special provisions, this is to highlight some that are common to projects or are new. The minimum effective asphalt special provision applies to any project with 9.5 mm or 12.5 mm mixes and modifies mix design requirements. The High RAP 19 mm binder leveling course was introduced in the summer of 2018. The special provisions relating to percent within tolerance (PWT) were introduced in projects for 2016 construction and are broken out by where the testing is performed (LTS vs. local) and whether federal funds are involved. The nature of the work is not changed, but the payment mechanism allows incentives or disincentives for the work. The last SSP for specific gravity involves additional field sampling to verify the specific gravity of the mix on federally funded projects that do not have a PWT special provision.

Other Related Pub 408 Specifications

210	Subgrade
350	Subbase
450	Manual Asphalt Patching
461	Asphalt Prime Coat
469	Asphalt Joint & Crack Sealing
491	Milling of Asphalt Paving Surface
492	Profile Milling of Asphalt Paving Surfaces



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These specifications apply to the surface preparation for a Superpave project, whether that be a new subgrade and/or subbase or an existing surface in need of repairs or reconditioning.

Remember...


- Keep familiar with Pub 408 specifications and project special provisions.
- Learn where to find particular specifications in Pub 408 and contract specific details.
- Be sure that you are utilizing the appropriate version of spec (Change No.) for your project.



It is important that you are very familiar with PennDOT 408 and how to use it effectively to find details. We will review the more significant aspects of the Specifications dealing with Superpave asphalt projects.

Section 106: Control of Materials

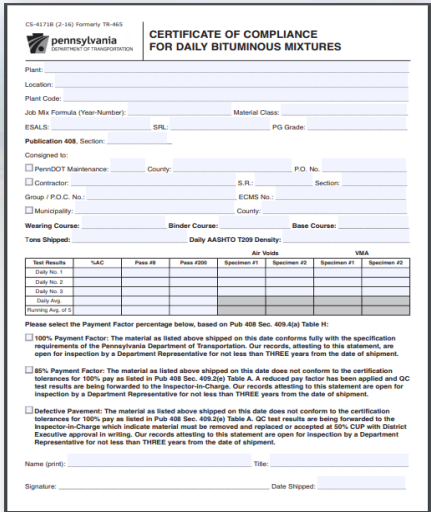
- General Requirements
- Test and Acceptance of Material
 - Form **CS-4171** Certificate of Compliance
- Storage of Material
- Handling and Transportation of Material
- Unacceptable Material
- Several Other Subsections.



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Section 106 covers: acceptance and approval of materials, preapproved sources, material inspection, testing, and documentation (CS-4171 Certificate of Compliance). Also covers Department’s responsibility to determine the acceptability of material and construction and contractor’s responsibility for the quality control (QC) of the material and construction. The section also furnishes instructions as to the purchase, storage, and handling of materials and the disposition of failed materials.

Form CS-4171B Certificate of Compliance



See full-size sheet at end of Module

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A full-size copy of the instructions and form can be found in your handout at the end of this module. ANY material *incorporated* into a PENNDOT project must be certified.

Merging Specification Sections

- Sections 309 (hot mix) and 311 (warm mix) of Spec 408/2016 were merged into **Section 313** in Spec 408/2020 Edition.
- Sections 409 (hot mix) and 411 (warm mix) of Spec 408/2016 were merged into **Section 413** in Spec 408/2020 Edition.
- Sections **313** and **413** are applicable to projects with PWL and LTS testing.



15

Warm Mix Asphalt (WMA) & Warm Mix Asphalt Technologies

Before we start reviewing asphalt related specifications, we will briefly review WMA as almost all asphalt mixes in PA use some type of WMA technology in the mix.



16

THIS MATERIAL NOT ON TEST

Warm Mix Asphalt

- A generic term for various technologies allowing asphalt paving materials to be produced and placed at lower temperatures.



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Warm-mix asphalt is the generic term for a variety of technologies that may allow the producers of hot-mix asphalt pavement material to lower the temperatures at which the material is mixed and placed on the road. New Specification (2020 Edition) refers to asphalt mixes in general, to cover both hot mix and warm mix asphalt. Both are merged under the same section number.

What are WMA Technologies?

Broken down into 3 classes:

- Non-Foaming Additives (Organic Additives, Wax)
- Foaming Processes (Water)
- Chemical Additives (Emulsions)



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These 3 classes may be combined in some of the processes, especially when using higher RAP content.

How do Warm Mix Asphalt Technologies Work?

- A chemical package or water is added to the aggregate/asphalt mixt at the plant (chemical additive can also be incorporated into the liquid asphalt binder at the refinery).
- The additive reduces the viscosity and increases the workability of the binder at a lower temperature.
- This allows lower mixing and placement/compaction temperatures.



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WMA Technologies have been shown to be a definite aid to compaction and assist with achieving density.

Foaming Process

- Water and perhaps other additives
- Water may be contained in the additive
- May be injected into the asphalt binder supply line or added to drum or pugmill
- Plant modification involves installation of additional equipment
- One quart of water for each ton of mix (approx.)



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WMA produced by the foaming process has been used in majority of applications.

Non-Foaming Additives

- May be liquid or solid (such as wax pellets)
- May be pre-blended at refinery or added at plant to liquid binder
- May be introduced at the mixing drum
- Usually, minor plant modifications to batch or drum plant required



21

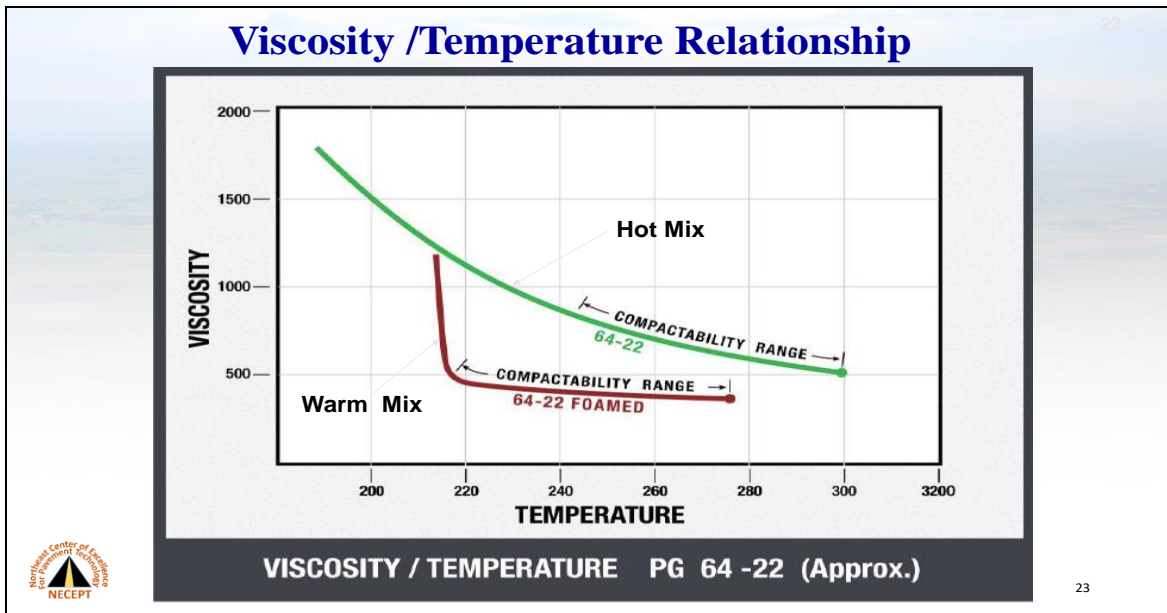
Chemical Additives or Surfactants

- May be added at refinery or WMA plant directly to liquid asphalt.
- Can be teamed with foaming process
- Usually minor or no plant modifications required.



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These additives may be mixed at the refinery or asphalt terminal and be delivered right in the tanker.



This chart shows the viscosity-temperature relationship of a PG 64 -22 asphalt binder in hot mix asphalt compared to a foamed PG 64 -22 binder in warm mix asphalt (WMA). Notice the greater temperature range for workability with the WMA mix. As the viscosity increases, workability decreases, and compaction becomes much more difficult.

**Review & Discussion of
Asphalt Related Specifications**

In the following slides, we will discuss asphalt related sections of 408 Construction Specification.

Section 413 is the main section and the most comprehensive of all.

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THIS MATERIAL NOT ON TEST

Section 313: Superpave Asphalt Mix Design, Stand. Construction, Base Course

- **313.3 Construction – follows 413.3 for Standard construction, except:**
 - (b) Weather Limitations: Do not place when
 - prepared surfaces are wet or
 - air or surface temperature is **35°F or below**.
 - (h) 1.b Spreading & Finishing:
 - For 25.0 mm base, if compacted depth is > 6", place in two or more ≈ equal lifts, with **no lift < 3" or > 6"**.
 - For 37.5 mm base, if compacted depth is > 8", place in two or more ≈ equal lifts, with **no lift < 4" or > 8"**.



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All Superpave construction will generally follow Section 413, with exceptions as noted, including weather limitations, and spreading and finishing specific Superpave mixes as shown.

Section 313: Superpave Asphalt Mix Design, Base Course

- **313.3 Construction – follows 413.3 for Standard construction, except:**
 - (l) Surface Tolerance: Pavement defective if irregularities are more than **1/4 inch**
 - (m) Tests for Depth:
 - One random core using PTM No. 1 on top lift in each 3000 sq. yds., with additional cores if deficiency suspected
 - Measure depth according to PTM No. 737. Pavement is defective if depth deficient by **1/2 inch** or more.




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Section 314: Rich Base Courses

- Asphalt Rich Base Course (ARBC)
- Max. RAP ≤ 20% by weight of mix
- No RAS Allowed
- Mix Design Requirements for ARBC for all Traffic Levels:


**New Section
In 408 (Change 4 of 2020
Edition). Will be published
in April 2022.**

Volumetric Mix Design Property	25 mm NMAS
N _{design}	50
Design Air Void	2.5
VMA for all Production QC Samples	13.0
VFA	80-85



Section 316 Flexible Base Replacement

- Ref: RC 28M, RC 30M for Drawings
- SAW or MILL perimeter of area to be replaced
- Vertical Edges clean and coated with PG 64S-22
- Material placed to minimize segregation



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Saws may be handheld, motorized on wheels, or vermeer wheel type mounted on skid-steer.

Section 341: Cold Recycled Asphalt Base Course, Cold-In-Place

- **Can use**
 - Emulsified asphalt, or
 - Foamed asphalt stabilizing agents
- **Mix Design**
 - For emulsified asphalt, follow Bulletin 27
 - For foamed asphalt, follow AASHTO MP 38



Section 344 Full Depth Reclamation (FDR)

- **344.1** In-place pulverizing and mixing of existing roadway materials, stabilizing additives and imported aggregate or RAP as required to specified depths—to form a new pavement base layer upon which an asphalt overlay or surface treatment is applied.



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This method came into wide use during the Marcellus Shale gas activity. Over 500 miles of road were rehabilitated with FDR in two years in only two counties. Drainage upgrades were of primary importance, as the hydration of the roadway must be carefully controlled.


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Section 344 FDR

- **344.2**
- 95% of reclaimed existing material and incorporated RAP must pass **2-Inch** sieve.

- Stabilizing Additives are in two categories:
 - **Emulsified Asphalt**
 - **Chemicals**

All Projects must have an approved mix design.




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Design strength will vary on each project and will be meticulously tested.

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Section 344 FDR –Additives

- **344.2**
- **Emulsified Asphalt Material:**
 - CMS-2, SS-1h, CSS-1h, SS-1hP, HFMS-2, CSS-1hPM
- **Chemicals**
 - Portland Cement Slurry and Admixtures
 - Hydrated Lime
 - Lime Pozzolan
 - Calcium or Magnesium Chloride
- **Water**



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Daily applications of water, or a surface treatment of emulsified asphalt may be a project requirement.

Section 344 FDR- Compaction

- 20-ton pneumatic tire roller for 8" depth or less, and for final compaction of depths > 8"
- Vibratory pad foot roller for depths > 8"
- 12 to 14-ton static steel drum roller for finish rolling
- Allowed to cure until 7-day design strength is met



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Section 344 FDR— Compaction and Acceptance

- One test for each 3,000 sq. yd.— must be 95% of lab results using PTM 402
- Not to exceed 3/4 inch of irregularity for line, grade, or cross slope
- Surface tolerance shall not exceed 1/2 inch under 10-foot straight edge.
- Acceptance by surface tolerance and project density specs.



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Profile and grade of the completed FDR must be carefully monitored to prevent varying depths of asphalt mat in the finished courses.

Section 360: Asphalt Treated Permeable Base Course

- **360.1 Description:** construction of an asphalt treated permeable base course (ATPBC) on a prepared surface.
- **360.2(a) Asphalt Material:** Asphalt Cement, Class PG 64-22



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ATPBC is designed to be a stable platform layer that dramatically increases drainage.

Section 360: Asphalt Treated Permeable Base Course



This ATPBC material has a load transfer unit (dowel bars) staked in place, ready for the rigid concrete pavement to be constructed on top.

Section 360: Asphalt Treated Permeable Base Course (ATPBC)



In this photo you can see the open texture of the ATPBC mix which allows water to drain through and travel to the subsurface drains.

Section 360: Asphalt Treated Permeable Base Course

- **360.3 Construction: follows 413.3 for construction, except:**
 - (b) Weather Limitations: Placement prohibited when prepared surfaces are unstable, frozen, or when air or surface temperature is below **35°F**
 - (c)4. Preparation of Mixture: Produce ATPBC below **320°F** providing suitable viscosity for adequate coating; do not stockpile; place within 8 hours



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Construction of this base course again follows Section 413 with exceptions noted.
NOTE: *Construction* specifications are in the “.3” section for any item in Pub 408

Section 360: Asphalt Treated Permeable Base Course

- 360.3 (f): Use steel-wheel power rollers with manufacturer's certified metal weight of 8 to 10 tons.
- Perform rolling as soon as the mat has cooled sufficiently to avoid shoving or lateral movement.



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Section 360: Asphalt Treated Permeable Base Course

- **360.3 Construction: follows 413.3 for construction, except:**
 - (h) Spreading & Finishing: Maximum **4"** compacted lifts, mixture to cool to **100°F** before placing subsequent layers or pavement courses
 - (i) Compaction: Seat ATPBC with 8- to 10-ton steel wheeled rollers (static mode only). Compact by 4 roller passes. Do not over compact.



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ATPBC must be free draining after compaction. Do not compact the material to the point that the compacted material is no longer free draining or the aggregate is crushed.

Section 360: Asphalt Treated Permeable Base Course

- **360.3 Construction: follows 413.3 for construction, except:**
 - (j) Mat Density Acceptance: No Density Requirements
 - (l) Surface Tolerance:
 - Testing with 10-foot straightedge in stages of 5 linear feet.
 - Pavement irregularities **more than ½ inch** need correction
 - DO NOT mill or grind the ATPBC



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For irregularities developed after compaction is completed, correction must be by a method that does not produce contaminating fines or damage the base.

Section 360: Asphalt Treated Permeable Base Course

- **360.3 Construction: follows 413.3 for construction, except:**
 - (m) Tests for Depth:
 - Dig or drill one 6" diameter test hole in each 3,000 sq. yds. or less, with additional cores if deficiency suspected
 - Measure depth, remove & replace if depth deficient by **½ inch or more**
 - (n) Protection of Courses: Traffic not permitted on ATPBC except to place next layer



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Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.1 Description – Evaluate an asphalt pavement surface profile & determine ride quality incentive

- 404.1(a) General Requirements
 - Measure surface profile using PTM No. 428 to determine payment based on the IRI (International Roughness Index)
 - Various exclusions to be measured separately – ramps less than 1,500 feet in length, tapers, shoulders, transition areas, bridge approaches, etc.



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The International Roughness Index (IRI) is a close determination of how the motor public decides if the new pavement smoothness (ride) is good or bad. THE PAVING QUALITY CONTROL PLAN should include surface testing procedure, the evaluation procedures, the frequency of testing, and action points to initiate corrective measures.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.1(a) General Requirements

- IRI values and payment data will be verified on random projects
- PENNDOT data to be forwarded to BOMO
- An FHWA Requirement



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This spec will be project specific, be aware.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.1(b) Lot Size

- Full lot = 528 feet of a single lane of pavement
- Lots start at beginning of paving and continue to end of paving for each pavement lane and ramp that is 12 feet or wider.
- Partial lot is designated at end of paving or at an excluded area and evaluated as a percentage of a full lot.



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Example (500ft/528ft x bonus = partial lot payment). Lots are measured in the direction of traffic and include both wheel paths.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.3 Construction

- (a) Equipment & Operator
 - Provide pavement surface profile measuring equipment according to PTM No.428
 - Calibrate distance sensor, check profile system calibration daily in presence of Inspector
 - Provide Department **certified operator**



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Both the equipment and the operator must be certified.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive



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Photo of a lightweight profiler. Note the PennDOT sticker on the front of the vehicle showing that it has been certified.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.3(b) Testing

(1) Lots

- Provide traffic control, clean pavement as necessary.
- Determine surface profile of each lot according to PTM No. 428, in presence of Inspector.

(2) Excluded Areas

- Measure with 12-foot straightedge, parallel to centerline.
- Advance in five-foot increments.



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Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.3(c) Acceptance

1. Lots. Lot IRI compared to Table A in Section 404.4
 - Perform corrective action if indicated by the Table, or if any individual bump (irregularity) is greater than 3/16 inch tested with a 12-foot straightedge.
2. Excluded Areas. Not included for incentive payment
 - To be corrected if irregularities more than 3/16 inch



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Acceptance of Lots:

Acceptance is conducted lot by lot and will be determined by the average of two wheelpath measurements within the lot and will be evaluated for compliance with the requirements of Table A in Section 404.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.3(d) Corrective Action

- Perform **before** testing for pavement depth.
- Use carbide grinding, diamond grinding, or remove & replace.
- Produce surfaces that are neat, of uniform texture, with not more than 1/8-inch deviation with existing pavement.



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Corrective action retest must produce an acceptable IRI (Section 404, Table A), and results are eligible for bonus.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.3(e) Defective Work:

- Lot is defective if:
 - IRI exceeds maximum acceptable IRI specified in Table A Schedule A or B
 - Any individual bump with irregularity of more than 3/16 inch
 - Surface adjacent to another lot deviates more than 1/8 inch
- Remove & replace defective areas and retest lot



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Remove and replace the full lane width of pavement determined defective unless otherwise directed in writing by the District Engineer.

Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive

404.4 Measurement & Payment

- Payment:
 - Lots not defective will be paid according to IRI using Table A Schedule A or B
 - On defective lots, payment based on retest for IRI after corrective action.
 - Remove & replace defective areas and retest lot



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Payment determined on the final IRI (retest) after performing any corrective work.

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Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive


Table A

Schedule for Ride Quality Incentive

Schedule A

For Expressway Work Using Three Operations

IRI inches/mile/lot	Amount
≤ 35	\$600
≤ 50	\$300
≤ 60	\$150
≤ 70	\$0
>70	Corrective Action Required



53

The IRI is a roughness index – the higher the number, the rougher the pavement and the lower amount of incentive to be paid, the smaller the number the smoother the pavement and the higher amount of incentive. Smoothness expectations increase with the number of operations (layers).

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Section 404: Evaluation of Asphalt Pavement Ride Quality and Payment of Incentive


Table A

Schedule for Ride Quality Incentive

Schedule B

For Expressway Work Using Two Operations And Non-Expressway Work Using Two or More Operations

IRI inches/mile/lot	Amount
≤ 45	\$600
≤ 55	\$300
≤ 70	\$150
≤ 90	\$0
>90	Corrective Action Required




54

55

Section 405

Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **Usage:** For use on any project meeting ALL of the following criteria:
 - RPS (regardless of network) or Standard pavements on the National Highway System (NHS)
 - Density acceptance by cores
 - Length of testable longitudinal joint >12,500 feet



55


Reference Section 405 and PTM 729 for further information.

56

Section 405

Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **405.1 Description:** Evaluating longitudinal joint samples on the surface wearing course for determining densities and the incentives/disincentive, including necessary corrective actions required as result of evaluation.



56

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **405.3 Construction:**

- (a) General Requirements: Lots for this spec completely independent from lots defined in other sections of the Specs for pavement acceptance



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Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **405.3 (b) Lot Size**

- Full lot is 12,500 feet of longitudinal joint
- 5 sublots of 2500 feet per full lot
- One joint core drilled per subplot as paving progresses until full lot obtained
- Single lot need not be contiguous & may include multiple joints within project



58

The Representative will determine the payment addition or deduction along with any necessary corrective actions for each longitudinal joint lot based on the test results of the density cores.

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

• 405.3 (c) Quality Control Strip

- On first day paving of longitudinal joint, in addition to incentive/disincentive payment subplot joint cores, obtain 5 randomly located core samples on longitudinal joint for QC density testing
- Cores to be tested and results supplied within 24 hours in order to make any adjustments to ensure adequate in place density is achieved



59

QC cores are to be tested by the contractor for the first day that a joint is constructed to ensure that necessary adjustments to procedures are accomplished ASAP.

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

• 405.3 (d) Excluded Areas. Following joint areas excluded from lots:

- Joints where one or both sides pavement were accepted for density by other means
- Joints where one side is formed by existing pavement not constructed under this project
- Areas within 1 foot longitudinally of an obstruction
- Small areas (intersections, gores, transitions) not allowing for consistent joint construction



60

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **One 6-inch core** in each subplot located using PTM 1 and PTM 729 no later than day following placement
- For vertical joints center core over surface joint.
- For notch-wedge joints, center core **6 inches** or one half of joint taper width away from joint line in direction of wedge.



61

PTM (Pennsylvania Test Methods) will be covered later in Module 3.

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive



62

Coring of a vertical joint

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **405.3 (e) Sampling (continued)**
 - Identify by lot & subplot, location, placement date, mixture type, & as acceptance samples (Sample Class AS)
 - Cores tested by LTS
 - If damaged, replacement obtained from within 12 inches of original
 - Hole backfilled with same JMF & sealed within 24 hours



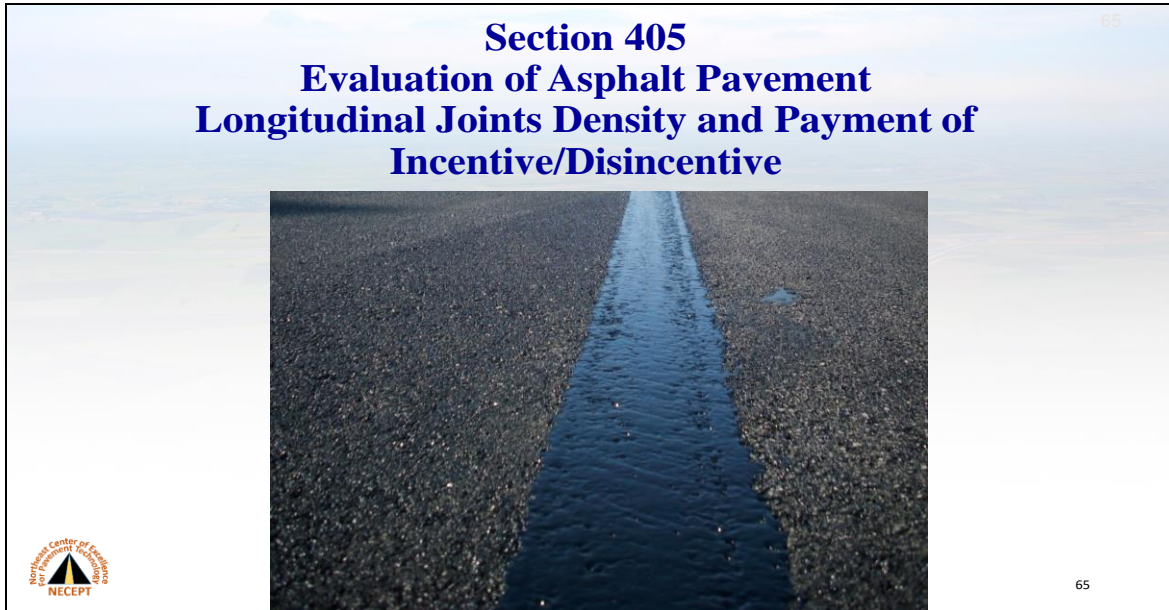
63

Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **405.3 (e) Sampling (Continued)**
 - Provide Theoretical Max Specific Gravity (Gmm) for the mix on each side of the joint.
 - Use average of the two values for density calculations
 - Package and Deliver the samples to the Representative



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Close-up of overband with PG 64S-22

Section 405
Evaluation of Asphalt Pavement
Longitudinal Joints Density and Payment of
Incentive/Disincentive

- 405.3 (e) Sampling (continued)
 - Joint core comprised of portions of two lanes
 - May have two JMFs within each core (one for cold lane and one for hot lane)
 - Report average Gmm for the joint core in eCAMMS or on form [TR-447](#).

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Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- **405.4 Measurement and Payment**
 - Uses the Percent within Tolerance (PWT) from Section 106.03(a)3 in Table A of Section 405.4 for payment by lot.
 - Partial lots with fewer than 3 sublots are combined with the previous lot.
 - Partial lots with three or more sublots will stand as a separate lot.




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Section 405 Evaluation of Asphalt Pavement Longitudinal Joints Density and Payment of Incentive/Disincentive

- Lower density limit for incentive payment is $\geq 90\%$ per lot
- Full incentive for $\geq 92\%$ per lot
- Maximum disincentive \$10,000 per lot
- Lots with density $\geq 89\%$ but $< 90\%$ maximum disincentive of \$1,000 per subplot.



68

Joints constructed when paving in *echelon* are included unless project specifications dictate otherwise.

Are you keeping up with me?



69



**Section 413: Superpave Mixture Design,
Standard & RPS Construction of Plant-
Courses with Percent Within Limits and
LTS Testing (PWL-LTS)**

- **413.1 Description:** [Standard](#) and [RPS](#) construction of plant mixed asphalt on a prepared surface using a volumetric mixture design developed with the Superpave Gyrotory Compactor

70




This Section 413 is for Superpave wearing and binder courses, it is the largest section of 408 specification as related to asphalt construction and is frequently referred to by other asphalt sections for construction requirements.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.2 Materials**
 - Refers to Sections 106 & 700
 - Discusses material sources – Bulletins 14 &15, and aggregate SRL
 - Addresses use of RAP, RAM, and RAS
 - Discusses Job-Mix Formula tolerance requirements for completed mix



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The material section discusses Bulletin 14 (approved aggregate sources) and Bulletin 15 (approved Asphalt binder sources). In addition, tables are provided for the Job-Mix Formula Composition and Tolerance.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.2(i) Mixture Acceptance:**
 - RPS Construction accepted by lots
 - For Standard Construction, use Table C:
- **Table C Mixture Acceptance**

Acceptance Level	Acceptance Method
Certification Acceptance	Producer Certification of Mixture (Section 413.2(i)2)
Lot Acceptance	Mixture Acceptance Sample Testing (Section 413.3(h)2)



Acceptance level MUST be discussed at the pre-placement meeting.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.2(i)2 Certification Acceptance. Appropriate for

- Scratch or Leveling <2", driveway adjustments.
- Mixtures used by Dept. maintenance forces.
- Mixtures used by municipal governments.
- Small quantities <500 tons in a continuous operation.
- Mixtures used for parking lots
- All 4.75 mm NMAS asphalt mixtures
- Other mixtures, conditions, or applications as approved

All others by Lot Acceptance!



73

These are the requirements for Acceptance by Certification under Table “C” of Section 413, Standard Construction.

Loose Box Samples < 500 tons

- No loose box samples for JMF quantity < 500 tons (i.e., less than 500 tons)
- Coring allowed for density acceptance on materials accepted by Certification

Should be discussed at pre-placement meeting



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Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3 Construction

- (a) Paving operation QC Plan:

Contractor must submit a paving operation QC plan for the project (Form CS-413)



75

Form CS-413 was reviewed in Module 1. If work is halted because of weather conditions, the contractor “MAY” be allowed “to place limited quantities of mixture that are en route to the project” as determined by the Department’s representative.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(b) Weather Limitations

- Paving allowed from April 1 to October 15 for the following wearing courses:
 - PG 64E-22 (PG 76-22)
 - >10M ESALs
 - 4.75 mm mix
 - Other mixes compacted less than 1.5 inches.
- Paving allowed from April 1 to October 31 for all other courses:



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Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(b) Weather Limitations

- Do not place asphalt mix when
 - surfaces are wet
 - the temperature of air or surface $\leq 40^{\circ}\text{F}$



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Section 413.3 (a) 2

- Asphalt preplacement meeting scheduled at least 2 weeks before placement of mixture to review
 - Specifications
 - QC plan
 - Paving sequence
 - Mixture & density acceptance
 - Care and custody of asphalt samples




78

This meeting provides the time and place to discuss monolithic placement of mainline and shoulders, non-testable areas, and who makes the call on rain stoppages, as well as any other “lack of communication issues” that you have experienced.

Section 413.2(e), Table A

Temperature of Mixture (F)				
Class of Material	Type of Material	Chemical, Organic, Foaming Additives, Minimum	Mechanical Foaming Equip/Process Minimum*	Maximum*
PG 58S-28	Asphalt Binder	215	230	310
PG 64S-22	Asphalt Binder	220	240	320
PG 64E-22	Asphalt Binder	240	260	330
All other binders	Asphalt Binder	The higher of 215 or the minimum temp. specified in Bulletin 25 minus 45°F	The higher of 230 or the minimum temp. specified in Bulletin 25 minus 30°F	As specified in Bulletin 25

* Outline in the Producer QC Plan and follow more restrictive temperature requirements provided by the WMA technology manufacturer or Technical Representative(s) for production and placement of the mixture. Determine the SGC compaction temperature for the production QC which yields the same target air voids as the designed JMF. Include the SGC compaction temperature in the Producer QC Plan. Compact the completed mixture in the SGC for QC volumetric analysis at the SGC compaction temperature according to the guidelines provided by the Technical Representative.



Extended-Season Paving

- Written request at 14 calendar days prior to extended season paving
 - Paving allowed from April 1 to November 15 for the following wearing courses:
 - PG 64E-22 (PG 76-22)
 - >10M ESALs
 - 4.75 mm mix
 - Other mixes compacted less than 1.5 inches.
 - Paving allowed from March 1 to December 15 for all other courses:
- Must use MTV for lengths > 1,500 ft.



Extended Season Paving

- Project Representative MUST release Material
- Extended season pre-placement meeting at least 5 days prior to review details of Extended Season Paving Plan (CS-413 ES)
- MUST follow Plan or STOP PAVING



Extended Season Paving

- Density acceptance for RPS and standard paving on stable/uniform bases at Table G depths will be by pavement cores.



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Extended Season Paving

- **CS-413ES** to be completed and provided to Dept. within 24 hours of completion of paving.
- Extended Season Fall paving will be subject to Spring Evaluation by May 1 as described in Pub 336.



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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3 Construction**
 - (d) Hauling Equipment
 - Tightly sealed vehicles
 - Provide covers to protect entire load
 - Provide insulation/heated or double-walled truck bodies when air temp is **below 50°F** from October 1 to April 30.



84

Specific details of asphalt delivery, lay down and compaction will be provided in later modules.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- 413.3 Construction
 - (e) 1 Asphalt Pavers
 - Self-contained power-propelled units with automatic screed controls.
 - Hydraulic or other extensions only fed & activated same as main screed
 - (e) 2 Asphalt Wideners
 - Self-contained power-propelled units
 - Strike off assembly capable of producing finished surface of specified evenness and texture.
 - Capable of placing the mix uniformly in front of the strike off assembly



85

Auger extensions are required when screed extensions will not be adjusted in and out throughout the placement. A good rule to follow is that auger extensions should be used in fixed width applications to bring the material as close to the end gate as possible, but a maximum of 18 inches from the end gate. Also, note that a skid steer loader is not listed as paving equipment. Their use should be minimal and only to move material, not to pave.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- 413.3 Construction
 - (f) Rollers
 - Steel-wheel, pneumatic tire, vibratory or oscillating rollers as specified in Section 108.05(c)3 with separate controls for frequency and amplitude.



86

Section 108.05 also addresses many of the specific details.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3 Construction

- (g) Preparation of Existing Surface
 - Clean
 - Correct irregularities in binder course
 - Paint existing vertical surfaces with asphalt Class TACK, NTT/ CNTT in two or more applications or hot asphalt of class & type designated for course.



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All of these topics will be covered in later modules.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3 Construction

- (g) Preparation of Existing Surface
 - Apply a tack coat, Section 460
 - Place scratch and leveling courses as indicated
 - ❖ Paving Notches: Mill existing pavement surface at tie-in with wearing course (use Std Drawing RC -28M & Milling Section 491)



88

All of these topics will be covered in later modules.

Scratch & Leveling courses

- Use **scratch course** to fill wheel ruts & other local small depressions to make even with surrounding pavement.
- Use **leveling course** to provide a relatively uniform working platform for placing binder or wearing courses





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Surface Preparation will be covered in more detail in Module 4.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3 Construction**
 - (h) Spreading and Finishing
 - Deliver and place at laying temperatures specified in Table A (Section 413.2(e)1.d.)

• PG 58S-28	215 °F to 310 °F		Asphalt Temps
• PG 64S-22	220 °F to 320 °F		
• PG 64E-22	240 °F to 330 °F		
 - Courses >6" in compacted depth, place in 2 or more equal layers, none <3" or >6" compacted depth
 - Do not use rakes.



90

Asphalt lutes are to be used for handwork. Garden-type rakes cause segregation of the aggregate in the mix.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3 Construction**
- MTV required for RPS pavement
 - (h)1.d Field Technician
 - Provide Certified Asphalt Field Technician
 - Must be onsite
 - Must carry valid certification card




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The CFT should have control of the quality of the operation, not just the quantity!

92

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3 Construction**
- (h)2 Mixture Lot Acceptance (Standard & RPS Construction)
- (h)2.a Lots and sublots
 - Lots established & specific for each JMF
 - Normal lot size = 2,500 Tons
 - Normal sublot size = 500 Tons (5 per lot)
 - 1 box sample + 1 core sample obtained from each sublot (PTM No. 1)



92

Lot acceptance procedures and practice exercises will be covered in Module 3: PTM's.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(h)2.a Lots and Sublots

- If project size or operational conditions dictate. Lot (*final lot*) will be adjusted as in Table D
- Stoppages of 5 days or more, last lot will be adjusted as in Table D.
- New lot established when work resumes after 5-day stoppage.

Full Size Table D at End of Module 3



413.3(h)2.a Lots and Sublots: Table D

Re-adjustment of Lot Size & Associated Number of Sublots

Remaining Quantity* Following Last Full Lot	Action
Less than 500 tons <u>without</u> a combination of one mixture acceptance sample and one core	Quantity combined with previous lot, (n=5)
Less than 500 tons <u>with</u> a combination of one mixture acceptance sample and one core	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>without</u> a combination of two mixture acceptance samples and two cores	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>with</u> a combination of two mixture acceptance samples and two cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>without</u> a combination of three mixture acceptance samples and three cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>with</u> a combination of three mixture acceptance samples and three cores	New lot defined, (n=3)



Use of Table D is limited to JMF project quantities of 2,500 tons or greater and ONLY after completion of last full lot. Examples at end of PTM module.

413.3(h)2.a: Table D *continued*

Re-adjustment of Lot Size & Associated Number of Sublots

Remaining Quantity* Following Last Full Lot	Action
1500 tons to less than 2000 tons <u>without</u> a combination of four mixture acceptance samples and four cores	New lot defined, (n=3)
1500 tons to less than 2000 tons <u>with</u> a combination of four mixture acceptance samples and four cores	New lot defined, (n=4)
2000 tons to less than 2500 tons <u>without</u> a combination of five mixture acceptance samples and five cores	New lot defined, (n=4)
2000 tons to less than 2500 tons <u>with</u> a combination of five mixture acceptance samples and five cores	New lot defined, (n=5)

- **413.3(h)2.a.1**

- Partially Completed Lot (n=2 or less): When partially completed lot (2 sublots or less) cannot be combined with most recent completed lot, samples will be independently evaluated



Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(h)2.a.2 JMF's less than 2500 tons**

- JMF's > 500 tons and < 2500 tons, tonnage considered a lot and divided into 5 equal sublots
- JMF's ≤ 500 tons, tonnage may be considered a lot and divided into 3 equal sublots, if density acceptance by pavement cores (an option) mixture acceptance is only by certification

****For total JMF less than 2,500 tons, Table D does not apply, do not use!***



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These specs MUST be adhered to when computing sample frequency.

Lot – Sublot Definitions

- *Normal lot* size is 2500 tons with 5 sublots of 500 tons each.
- A *complete lot* will have at least 3, but no more than 7 sublots
- Lots with less than 3 sublots are “incomplete”
- A *complete sublot* **MUST** have a core and a loose (mixture or box) sample



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A complete sublot must have both a box and core when both mixture acceptance is by loose box and density acceptance is by pavement cores.

Section 413.3(h): 2.a Lots and Sublots

- Once the sublot size for JMF has been established, the sublot size will remain unchanged throughout the project.



Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(h)2.b Mixture Acceptance Samples

- Loose samples
 - taken directly behind the [paving equipment](#)
 - identify [ECMS #](#), lot & subplot, location, placement date, mixture type,
 - Identify as acceptance sample (Sample Class AS)
 - For 19 mm and smaller NMAS, Package individual samples in cardboard boxes ~ 3 ¾" x 4 ¾" x 9 ½" (approx.. 8 lbs. of mix)
 - Package all samples for one lot in one container or tie together
 - Utilize LTS testing
- Location of samples determined using PTM 1 & PTM 746



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Procedure for Box Samples: Pub 408/2020 covers box sizes for mixes >25mm and gives further instructions on packaging and identification. PTM 746 from PUB 19 contains additional information and illustrative examples and will be covered in module 3.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(h)3.a Evaluating Pattern Segregation

- Inspector will notify Contractor of observed pattern segregation
- Contractor may continue at own risk
- Project Representative will witness the PTM 751 (pavement surface macrotexture depth test)
- Unacceptable segregation if average texture depth between the non-segregated area and segregated areas exceeds [0.024 inch](#).



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Pattern segregation will be discussed in detail in Module 9.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(h)3.b Test Section**
 - If segregation identified, stop paving!
 - Department will evaluate segregation to determine corrective work
 - Test section then placed, <200 tons
 - Resume normal paving after successful test section



101



These procedures will be covered in module 3.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(h)3.c Defective Pavement**
 - Cores taken – 3 from segregated area & 3 from non-segregated area , tested for density, asphalt content and gradation
 - If tests determine pavement is defective, remove & replace full width of affected lane plus minimum of 5 feet beyond each end of unaccepted area.



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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(h)4. Flushing**
 - Provide a mix that will not flush
 - Flushing is continuous or repeated areas of excessive asphalt on the pavement surface






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Flushing is evaluated by PTM 751 which will be covered in Module #3.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(h)4.a. Evaluating Flushing**
 - When flushing is observed, Project Representative will notify Contractor.
 - Contractor may continue at its own risk while adjusting to eliminate further flushing.
 - Average pavement surface macrotexture depth is determined by PTM 751 in suspected flushing area.
 - Average texture depth ≤ 0.006 inches, pavement considered flushed & defective.



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The procedure for evaluating flushing is similar to the procedure for segregation and again uses PTM 751.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(h)4.b. Test Section

- If flushing identified, stop paving!
- Department will evaluate flushing to determine corrective work
- Remove & replace defective wearing course for full lane width + minimum 5 feet beyond each end of defective area
- After Project Representative allows paving to resume, place test section not to exceed 200 tons.
- Normal paving can be resumed after construction of an entire test section without flushing.



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Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3 Construction

- (i) Compaction
 - Compact to achieve required density & eliminate all roller marks
 - Adjust speed, amplitude, frequency, etc., to eliminate displacement, shoving, cracking, or aggregate breakage.
 - Use pneumatic-tire for compacting scratch courses.
 - For roller inaccessible areas, use mechanical vibrating hand tampers




106

Compaction is the single most important factor that affects the ultimate performance of an asphalt pavement. Compaction will be covered in detail in Module #8.

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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3 Construction**
 - (j) Mat Density Acceptance
 - Standard Construction (non-RPS): Density acceptance according to one of the levels in Table F
 - RPS: Density acceptance by Pavement Cores (lot acceptance)
 - Department determines density-acceptance level (QC Paving Plan)



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QC paving plan should be IN YOUR POSSESSION while paving and must be discussed at the pre-placement meeting!!!!!!

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Section 413: Superpave Mixture Design, Standard & RPS Construction


- **413.3(j) Mat Density Acceptance**
 - Standard Construction (non-RPS)

Table F: Density Acceptance

Density Acceptance Level	Acceptance Criteria
Non-movement	Table H
Optimum Rolling Pattern	Table H
Pavement Cores*	Table I

*Only when mixture is accepted by lots

Cores may be used for density acceptance for quantities < 500 tons.



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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(j) Mat Density Acceptance**
 - 413.3(j)2. Non-Movement (Density accepted when mix does not move under compaction equipment) acceptance for:
 - Scratch or leveling < 1" or ≤ 110 lbs./yd².
 - Area of paving/patching < 4' in width.
 - Following materials if determined non-critical for density:
 - Materials placed in < 500 tons continuous.
 - Mixtures placed on unstable or non-uniform bases.
 - Mixtures used for patching, widening, shoulders*, driveway adjustments, or other miscellaneous applications.

***shoulders considered critical accepted by pavement cores**

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Again, these topics must be discussed at the pre-placement meeting.


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Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(j) Mat Density Acceptance**
 - **413.3(j)3. Optimum Rolling Pattern**
 - Materials placed in small quantities < 500 tons.
 - Mixtures placed on unstable or non-uniform bases.
 - Leveling or other courses $\geq 1"$ or ≥ 110 lbs./yd².
 - Mixtures used for patching, widening, shoulders*, driveway adjustments, or other miscellaneous applications.
 - Mixtures placed at < minimum compacted depths in Table G

***shoulders considered critical accepted by pavement cores**

110



Materials placed in small quantities refers to a continuous placement.

*Shoulders where density is critical (as decided at the pre-placement meeting) will be accepted by pavement cores as specified in section 413.3(j)4.a

An Optimum Rolling Pattern is an accurate measure of the compaction characteristics of the material and capabilities of the equipment under ANY given field condition with reasonably uniform depth.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(j)3. Optimum Rolling Pattern**
 - Density tested by nuclear gauge (PTM 402) or electrical impedance gauge (PTM 403)
 - Inspector & contractor's certified field technician present
 - Nuclear gauge must have licensed operator
 - Use approved gauges or approved equal
 - Use procedure and forms in PTM 402/403



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The approved gauges are listed in the specifications and will be covered in modules 3 and 8.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(j) Mat Density Acceptance**
 - 413.3(j)4. Pavement Cores (Standard or RPS).
 - Material placed at minimum compacted depths according to Table G.
 - Materials placed on stable and uniform bases



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Coring procedures will be covered in Module 3.

**Section 413: Superpave Mixture Design,
Standard & RPS Construction**

- **413.3(j) Mat Density Acceptance**
 - **413.3(j)4. Pavement Cores (Std or RPS)**


Table G: Mixture Minimum Compacted Depths

Mixture	Minimum Depth
9.5 mm Wearing Course	1 ½" (40 mm)
12.5 mm Wearing Course	2" (50 mm)
19 mm Wearing and Binder Courses	2 ½" (60 mm)
25 mm Binder Course	3" (80 mm)



**Section 413: Superpave Mixture Design,
Standard & RPS Construction**

- **413.3(j)4 Pavement Cores (Std or RPS)**
 - 413.3(j)4.c Density Acceptance Samples
 - Locations selected by PTM 1, PTM 729, & PTM 746
 - 6-inch cores no later than day following placement
 - If damaged, replacement obtained from within 12 inches of original
 - Hole backfilled with same JMF & sealed within 24 hours




114

PTMs are from PENNDOT Pub. 19 and are revised periodically. They will be covered later in Module 3.

**Section 413: Superpave Mixture Design,
Standard & RPS Construction**

- **413.3(j)4 Pavement Cores (Std or RPS)**
 - 413.3(j)4.c Density Acceptance Samples
 - Normal lot size = 2,500 Tons
 - Normal subplot size = 500 Tons (5 per lot)
 - 1 core obtained from each subplot
 - Identify by lot & subplot, location, placement date, mixture type, & as acceptance samples (Sample Class AS)
 - Submit samples for one lot in one container.
 - Cores tested by LTS




115

The LTS will test the density acceptance samples to determine the percent of compaction (density), *unless* Local Acceptance is approved for the project.

**Section 413: Superpave Mixture Design, Standard
& RPS Construction**

- **413.3(j)4 Pavement Cores (Std or RPS)**
 - 413.3(j)4.d Acceptance Sample Testing
 - Density cores tested according to PTM 715 & PTM 716
 - Acceptance as specified in Section 413.4(a)4 or 413.4(b)
 - If cores not taken within 1 day after mix placement or if density for 2 consecutive lots or a total of 3 lots does not meet density requirement for 100% payment, stop paving operations.
 - Pavement resumes after evaluation of problem, approved proposed solution, & Department authorization



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CORES ARE TO BE TAKEN WITHIN 1 DAY OF PLACEMENT. This should be discussed at the preplacement meeting.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(k) Joints

- 413.3(k)1. Longitudinal Joints
 - 413.3(k)1.a General
 - Offset joints ~ 6 inches
 - Joint in top layer at centerline of 2-lane roadways & within 12" of lane in multilane roadways
 - Avoid joints directly beneath planned pavement markings
 - Before placing abutting lanes, paint joint face with PG binder in mix or PG 64S-22.
 - All longitudinal joints need to be overbanded with PG 64S-22.
 - Overband must be 4 ± 1 inches.



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Longitudinal and transverse joint construction will be covered in Module 7.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(k)1. Longitudinal Joints

- 413.3(k)1.a General
 - Adhere to the following additional requirements for the construction of longitudinal joints that will NOT be evaluated as specified in Section 405.




118

119

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(k)1. Longitudinal Joints**
 - 413.3(k)1.a General
 - Assure a true line of paving
 - When compacting unsupported edge, make first roller pass with edge of drum overhanging edge by 3 to 6 inches




119

Later modules cover these operations in depth. Do not allow pneumatic-tire rollers to cause lateral movement at any unsupported edge.

120

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(k)1. Longitudinal Joints**
 - 413.3(k)1.a General
 - Placement of mix adjacent to compacted lane, operate paver to overlap previously placed lane by **1 to 1 ½ inches**
 - DO NOT bump back or lute overlapped material
 - Compact joint with first forward pass of roller **6 to 12 inches** from the joint; then overlapping the joint **2 to 6 inches** on the backward and subsequent passes



120

More info in Module 7. Ensure that the joint receives as many roller passes as the rest of the mat.

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(k)1. Longitudinal Joints

• 413.3(k)1.b Vertical Joints

- For base, binder and wearing courses
- Place abutting lane same day, leaving less than 25 lineal feet of exposed edge



121

Section 413: Superpave Mixture Design, Standard & RPS Construction

• 413.3(k)1. Longitudinal Joints

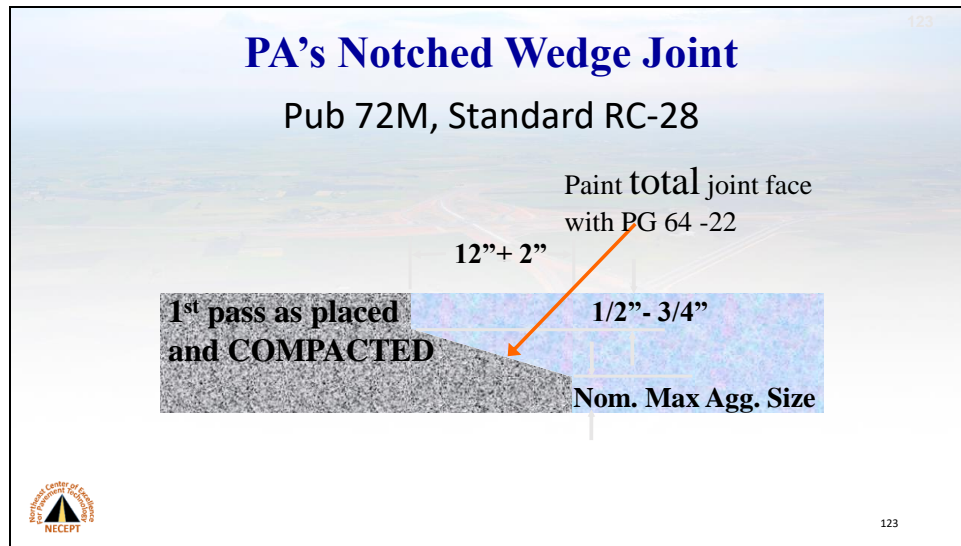
• 413.3(k)1c Notched Wedge Joints

- For wearing & binder course with nominal maximum aggregate size of 19.0mm or smaller
- Use Standard Drawing RC-28
- If joint next to opposing traffic, place abutting lane within 1 day
- If next to traffic in same direction, place abutting lane within 2 days



122

Discussion of “working days” versus “days” at the pre-placement meeting may help to avoid problems.



RC (road construction) Standards contain generic details (drawings AND notes) for reference measurements.

Note: This is the profile of first pass AFTER rolling, not “as laid”.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(k) Joints**
 - 413.3(k)2. Transverse Joints
 - Perpendicular to centerline
 - Use temporary bulkheads or saw joint
 - Paint joint face with PG binder in mix or PG 64S-22.
 - 413.3(k)3. Other Joints
 - Seal joint for new wearing course abutting existing pavement; apply min 6 inches on both sides of joint, using PG binder in mix, PennDOT Material Class Tack or NTT/CNTT.

124

NECEPT

Construction of transvers joints will be covered in module 7.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(l) Surface Tolerance**
 - Test with 12-foot straightedge
 - Defective if irregularities $>3/16''$
- **413.3(m) Tests for Depth**
 - Density acceptance by lots, measure depth of each subplot core (PTM 737)
 - Defective if depth deficiency $>1/4''$ or depth deficiency in 3 or more adjacent cores $>1/8''$



125

The extent of the defective work is the entirety of all sublots represented by the deficient core samples.

Section 413: Superpave Mixture Design, Standard & RPS Construction

- **413.3(n) Protection of courses**
 - No traffic for 24 hours or mat temp is 140°F or less *and adequate stability and adhesion is obtained*
- **413.3(o) Defective work**
 - Remove, replace or repair defective work as directed



126

127

Section 413: Superpave Mixture Design, Standard & RPS Construction

- 413.4 Measurement & Payment
 - 413.4(a)3 Mixture Acceptance by Certification & Density Acceptance by Non-Movement and Optimum Rolling Pattern

TABLE H: Contract unit price adjustments - Mixture Acceptance by Certification

- 413.4(a)4 Mixture Acceptance by Lot and & Density Acceptance by Non-Movement, Optimum Rolling Pattern, or Pavement Cores

TABLE I: Upper & Lower Spec Limits for Calculating Percent Within Tolerance

TABLE J: Dispute Resolution Retest Cost Table



127


RPS--- Restricted Performance Specifications

128

413.4 Measurement and Payment

- **413.4(a)4.**
 - Mixture Acceptance by Lot and
 - Density Acceptance by
 - ✓ Non-Movement
 - ✓ Optimum-Rolling Pattern
 - ✓ Pavement Cores

**Adjust Payment according to PWL.
Use Upper and Lower Spec Limits in Table I.**




128

129

Section 410 Superpave Mixture Design, Standard & RPS Construction of Plant-Mixed Asphalt Fine-Graded Courses

- **410.1 Description.** construction of a plant-mixed asphalt wearing course on a prepared surface using a volumetric mixture design developed with the Superpave Gyratory compactor and modified to be a fine-graded (FG) mixture.



129

This is basically a 9.5-mm mix modified to use as a wearing course which can be laid at a minimum thickness of 1 inch.


130

Section 410 Superpave Mixture Design, Standard & RPS Construction of Plant-Mixed Asphalt Fine-Graded Courses

- **410.2 Materials.** Refers to Section 413.2 using the 9.5 mm mix with modifications
- **410.3 Construction.** Refers to Section 413.3 using a 9.5 mm mix with modifications and a revised Table G.

Mixture Minimum Compacted Depths

Mixture	Minimum Depth
9.5 mm Fine Grade Wearing Crse	1"



130

Section 412, Superpave Mixture Design, Construction of Plant Mixed Asphalt 6.3 mm Thin Overlay Courses

- Used in Thin Lifts (3/4" min to 1 1/4")
- Useful Tool for Pavement Preservation
- An alternative to microsurfacing and seal coats.
- PennDOT sponsored a four-year research project to develop specifications and guidelines for 6.3-mm mixes (2012 to 2016).



131

Recently, Pennsylvania Department of Transportation (PennDOT) has been promoting the use of 6.3 mm Superpave mixes in thin wearing courses as a useful pavement preservation strategy. Several states in the Northeast region including New York, New Jersey, and Virginia have already developed specifications for the use of ultra-fine mixes (i.e., mixes finer than 9.5 mm). Some have special names for such mixes. For example, Ohio has been using 4.75 mm mix under the name of smooth seal.

Section 412 6.3 mm Thin Overlay Courses

Mixture Details

- PG 64E-22 binder required
- Coarse aggregate: Type A
- Sand fine aggregate must be from the same source as coarse aggregate with SRL rating in Bulletin 14
- No RAP or RAS in mix (virgin)




132

133

Section 412 6.3 mm Thin Overlay Courses

Construction details:

- Air and surface temperature must be > 50°F
- MTV required, unless waived by Rep.
- Box samples from roadway, hopper, or screed
- Density acceptance by optimum rolling pattern or non-movement



133


Note that some details of specifications for 6.3 mm courses are different from those of Section 413.

134

Section 412 6.3 mm Thin Overlay Courses

Critical points for success:

- Clean existing surface.
- Proper, uniform tack application
- Selection of compaction rollers
- Begin Rolling immediately.
- Time available for compaction is limited.
- Do not use pneumatic-tire rollers.



134

With a very thin lift and a very stiff binder, the Time Available for Compaction is limited.

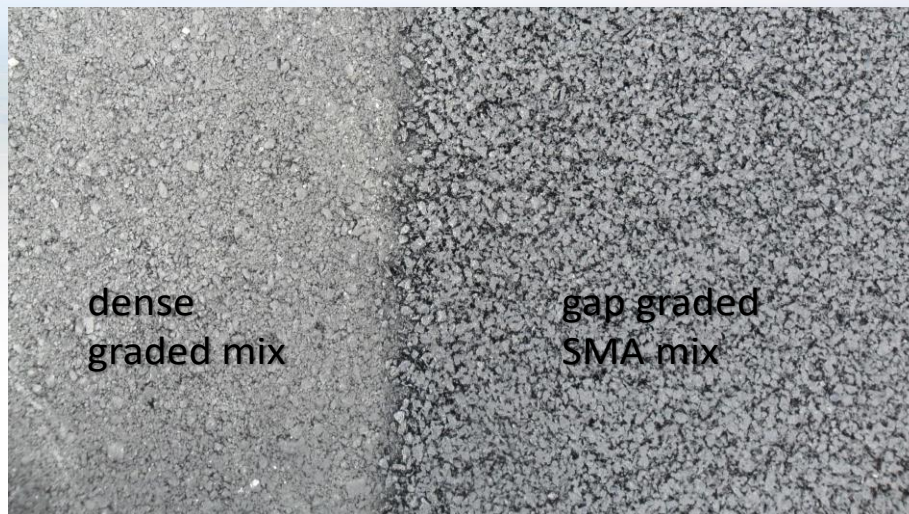
Section 419 Stone Matrix Asphalt Mixture Design, RPS Construction of Plant-Mixed Asphalt Wearing Courses

- **419.1 Description:** This work is the RPS construction of plant-mixed Stone Matrix Asphalt (SMA) on a prepared surface using a volumetric mixture design developed with the Superpave Gyrotory Compactor
- **419.2 Materials:** Refers to Sections 106 & 700; discusses aggregates, SRL, use of stabilizers, Job-Mix Formula and tolerance requirements for completed mix



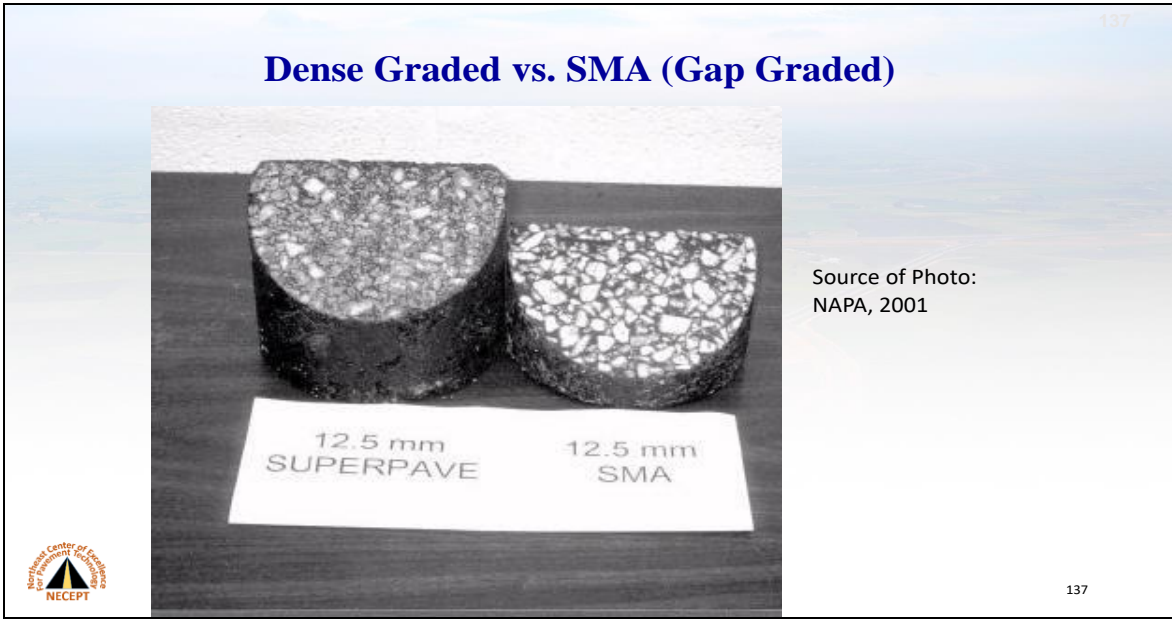
135

Dense Graded vs. SMA (Gap Graded)



136

Dense graded mix on the left, SMA on the right. Just gives a visual of how much more open the surface texture looks on SMA.



Dense graded mix on the left, SMA on the right. Just gives a visual of how much more open the surface texture looks on SMA.



Close up photo of SMA pavement after compaction.

Section 419: Stone Matrix Asphalt, RPS Construction

- **419.2(e) Mixture Composition:**
 - Table D (Section 413.2(e)1.d.6) Temperature of Mixture
PG 64E-22 240°F to 330°F
- **419.2(f) Mixture Acceptance:**
 - By lot acceptance only unless **tonnage < 150**
 - Can use either LTS or HOLA



Section 419: Stone Matrix Asphalt, RPS Construction

- **419.3 Construction**
 - (a) Paving operation QC Plan: Refers to 413.3(a), Contractor must submit a paving operation QC plan for the project (Use PennDOT Form [CS-413](#))
 - (b) Weather Limitations: Paving prohibited when:
 - surfaces are wet
 - the temperature of air or surface is ≤ 50°F



140

Construction: Follow Section 413.3 with noted exceptions.

Section 419: Stone Matrix Asphalt, RPS Construction

- **419.3(b)4 HOLA Lab Testing Facility:**
 - Lab meets requirements of Bulletin 27
 - Lab has gone through AASHTO re:source on-site lab assessment within the last 2 years and has demonstrated proficiency



Section 419: Stone Matrix Asphalt, RPS Construction

- **419.3 Construction**
 - (b) Weather Limitations: Paving prohibited:
 - Oct. 1 to March 31 in Districts 1-0, 2-0 (except Juniata Co & Mifflin Co), 3-0, 4-0, 5-0 (Monroe Co & Carbon Co only), 9-0 (Cambria Co & Somerset Co only) and 10-0
 - Oct 16 to March 31 in Districts 2-0 (Juniata Co & Mifflin Co only), 5-0, (except Monroe and Carbon Co.) 6-0, 8-0, 9-0 (except Cambria and Somerset Co.) , 11-0, 12-0.



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Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

- (d) Hauling Equipment: Refers to 413.3(d)
- (e) Asphalt Pavers: Refers to 413.3(e)
- (f) Rollers
 - Minimum 3 steel-wheeled rollers, each with 10-ton weight
 - Do not operate in vibratory mode unless demonstrated and approved that no breaking of aggregate or flushing of asphalt binder results



143

Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

- (g) Demonstration
 - Before paving, perform trial demonstration outside projects limits by placing minimum of 100 tons.
 - Simulate actual hauling time for project
 - Obtain & test 3 loose mixture samples at plant for asphalt content, gradation, & draindown & 3 cores from demo pavement for density
 - If vibration is to be used, demo vibratory rolling



144

Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

- (h) Preparation of Existing Surface: Refer to Section 413.3(g)
- (i) Spreading & Finishing:
 - 1.a Placing. Use MTV to apply final surface course (MTV to provide additional mixing)
 - 1.b Spreading & Finishing. Refer to Section 413.3(h)1.b, do not allow surface to flush
 - 1.c Field Technician. Refer to Section 413.3(h)1.d, Field Technician required



145

MTV units are described in Section 108.

Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

- (i) Spreading & Finishing:
 - (i)2. Mixture & Density Lot Acceptance
 - Lot acceptance required for RPS construction
 - Lot is 2500 tons with 5 sublots of 500 tons each
 - One core obtained from each subplot for density acceptance
 - Two loose box samples obtained from each subplot: one for mixture acceptance and one for Gmm verification



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Lot/sub-lot computations will be covered in Module 3.

Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

NOTE: A completed subplot will contain one core sample and two loose mixture (box) samples

WHY?

This spec is to address the need for the Gmm verification sample



147

G_{mm} Verification Samples
May be taken from auger tunnel or UNCOMPACTED MAT and may require an additional random sampling procedure.
This must be discussed at the pre-placement meeting and may vary by project and District.



148

Loose Samples are NOT normally taken from the mat on SMA projects.

Section 419: Stone Matrix Asphalt, RPS Construction

- **419. Construction**
 - (i) Spreading & Finishing:
 - (i)2. Mixture & Density Lot Acceptance
 - Project quantities of > 500 to < 2500 tons, the quantity will be divided into 5 equal sublots

 - Project quantities of 500 tons or less the quantity will be divided into 3 equal sublots



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Section 419: Stone Matrix Asphalt, RPS Construction

- **419.3 Construction**
 - A completed LOT must have a minimum of 3 sublots

 - An incomplete (PARTIALLY COMPLETED) lot may have one or two sublots and are tested under different criteria



150

Lot/sub-lot computations will be covered in Module 3.

Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

- (j) Compaction: Follows Section 413 with rollers as specified in Section 419.3(j)
- (k) Mat Density Acceptance
 - 93%-98% for 100% payment (Table F, Section 419.4(a)3)
- (l) Joints: Follows Section 413.3(k) (Vertical or Notched Wedge Joint allowed)



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Section 419: Stone Matrix Asphalt, RPS Construction

• 419.3 Construction

- (m) Surface Tolerance: Section 413.3(l)
- (n) Tests for Depth: Section 413.3(m)
- (o) Protection of Courses: Section 413.3(n)
- (p) Defective Work: Remove & replace as specified for Section 413 (Flushing, surface tolerance, depth, etc.)



152

Computations for application rates to obtain required residue will be covered in module 3.

Section 420 Pervious Asphalt

- Allows infiltration of surface water
- Use 9.5- or 19-mm mixes
- Ambient temperature $\geq 50^{\circ}\text{F}$
- NO tack between layers



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Section 420 Pervious Asphalt

- 4 passes with static steel drum roller
- No pneumatic tire roller allowed
- DO NOT over compact or crush aggregate
- Surface irregularities $> 3/8$ inch are unacceptable
- Do NOT grind or mill
- Cool to 100°F between layers



154

Computations for application rates to obtain required residue will be covered in module 3.

Section 460 Asphalt Tack Coat

- **460.1 Description** –conditioning & treating of an existing surface with an application of bonding material
- **460.2 Material**



155

Section 460 Asphalt Tack Coat

- Ambient Temp. of 40°F, and rising and surface is CLEAN and DRY
- Test section for each course to determine coverage and uniformity
- Tack to be 6 inches wider than paving panel on BOTH sides
- Tack to “break” before being disturbed or start of paving



156

Section 460 – TABLE A Emulsified Asphalt Materials

Class of Material	Type of Material	Application Temperature, °F	
		Minimum	Maximum
TACK	Anionic or Cationic Emulsified Asphalt	90	150
NTT/CNTT	Anionic or Cationic Emulsified Asphalt	140	180



157

Section 460 – TABLE B Uniform Asphalt Residual Rates by Surface Type

Surface Type	Uniform Asphalt Residual Rates (RR) (gallons per square yard)
New Asphalt Paving	0.03 to 0.05
Existing Asphalt Paving	0.04 to 0.07
Milled Surface (Asphalt & Portland Cement Concrete)	0.04 to 0.08
Portland Cement Concrete	0.04 to 0.07



158

Computations for application rates to obtain required residue will be covered in module 3.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

- **483.1 Description:** construction of a polymer modified emulsified asphalt paving system commonly known as micro-surfacing, to fill ruts and/or resurface existing pavements.



159

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)



160

View of the back of the micro surfacing train. Note the brown color of the emulsion coming out behind the equipment. This emulsion will break as the water evaporates and the remaining asphalt material will turn black in appearance.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

- **483.1 Description** (continued) Three mix types of micro-surfacing:
 - Type A. Used to seal cracks, fill voids and shallow ruts (<1/2 inch) & provide a scratch course or surface seal.
 - Type B. Used to fill moderate ruts (1/2 to 1¼ inch) & provide a scratch course, a leveling course, a seal coat, or surface course
 - Type Rut fill (RF). Used to fill deep ruts (up to 2 inch) in a single pass



161

Type A and Type B can use a double application when specified, to meet total design pounds per square yard for surface courses.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

- **483.2 Material**
 - Asphalt material Class CSS-1hPM (E-8CPM)
 - Polymer Modifier, latex based, capable of making mix cure for traffic within 1 hour.
 - Aggregate, filler (cement or hydrated lime), water, other additives as specified.
 - Approved QC Plan & JMF required



162

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (a) Preplacement meeting required
- (b) Weather Limitations
 - Temperature minimum 50°F
 - Do not apply if rain imminent or freezing temps expected within 24 hours
 - Remove & replace rained on mixture before it sets



163

Apply when entire surface is in a condition to allow satisfactory penetration and adhesion and the atmospheric temperature is 50° F minimum during the entire placement. More details of Micro-Surfacing will be covered in Module 4.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (b) Weather Limitations (continued)
 - Do not apply:
 - Sept 16 to April 30 in Districts 1-0, 2-0, 3-0, 4-0, 10-0, & 5-0 (Monroe, Carbon & Schuylkill County's only),
 - Oct 1 to April 30 in Districts 6-0, 8-0, 9-0, 11-0, 12-0 & 5-0 (Berks, Lehigh & Northampton County's only)



164

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (c) Aggregate Delivery Plan
 - Plan required with # of trucks for continuous operation
- All aggregates must be screened directly into truck



165

Close up view of the material as it flows under the mechanical squeegee box. Note the pavement markings have been eradicated. A slight residue of moisture can be seen from dampening the surface ahead of the operations.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (d) Mixing Equipment
 - Self propelled, front feed, continuous loading mixing machine with chain-dragged conveyor belt aggregate delivery system with positive displacement, water-jacketed gear pump to accurately proportion ingredients.
 - Continuous-flow, twin-shafted, multi-bladed pug mill at least 50 inches long
 - Equip machine with water pressure nozzle spray system to provide water spray ahead of spreader box



166

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (e) Spreading Equipment
 - Mechanical type squeegee box attached to mixer & equipped with paddles on adjustable shafts to continually agitate & distribute material throughout box
 - Attach flexible front & rear seals in contact with road to prevent loss of material from box
 - Provide rut filling equipment with moveable steel strike-off bar
 - Operate to achieve uniform consistence without skips, lumps, or tears in finished surface



167

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (f) Conditioning of Existing Surface. Section 413.3(g)1 & as follows:
 - Clean surface immediately before placing material
 - Remove all pavement markings & legends
 - For existing concrete surfaces, Apply tack coat (Section 460). Do not apply tack coat on existing asphalt surfaces
 - Apply water to dampen entire surface immediately before placing mixture



168



Close up view of the material as it flows under the mechanical squeegee box. Note the pavement markings have been eradicated. A slight residue of moisture can be seen from dampening the surface ahead of the operations.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (g) Spreading & Finishing. Section 413.3(h)1 & as follows:
 - Spread to seal cracks, fill voids, leaving uniform surface
 - Avoid excess crowning of rutted areas
 - Lumps, balls or unmixed aggregate in the finished surface is not allowed.
 - Adjustments to additive may be required to slow set time when hand spreading is needed
 - When hand spreading, form small windrow of mix along one edge of surface to be covered & spread uniformly by hand squeegee or lute



171

If mixture has not set within one hour, representative is to notify contractor who may continue to place material and adjust mixture, if material is not set for traffic within 1 hour and 20 minutes, stop placement and remove and replace defective mixture.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (g) Spreading & Finishing (continued)
 - Make a neat seam where two passes join.
 - Immediately remove excess material from ends of each run
 - Ensure mixture sets within 1 hour of placement or make appropriate adjustments
 - If mixture takes longer than 1 hour 20 minutes, stop operations. Remove & replace mixture.



172

If mixture has not set within one hour, representative is to notify contractor who may continue to place material and adjust mixture, if material is not set for traffic within 1 hour and 20 minutes, stop placement and remove and replace defective mixture.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (h) Compaction
 - Compact using pneumatic tire roller (Section 108) having tire pressure of 40 to 60 psi.
 - Roll entire surface area
 - On double application, roll entire surface area of each application.



173

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (l) Defective Work. Satisfactorily correct pavement not meeting following criteria:
 - 1. Application Rate – Calculate yield at end of each day's application
 - 2. Finished surface
 - No areas of excess asphalt (flushing) >5% of finished surface
 - Bleeding at joints not allowed
 - No tear or drag marks >1/2" wide & 4" long per 10 foot of lane



174

Photo on I-80 of truck dumping plant mix into spray paver and laying hot material directly on emulsion.

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

- Finished surface (continued)
 - No clumps &/or foreign objects >1 ½ inch diameter
 - No washboard or ripple patterns exceeding 100 linear feet
 - No longitudinal streaks >1/4" ridge, bump or depression, as measured with 10-foot straightedge



175

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

- **483.3 Construction**
 - (I) Defective Work. Satisfactorily correct pavement not meeting following criteria: (continued)
 - 3. Longitudinal Joints – make a neat seam with no bump, ridge or depression >1/4" measured with 12-foot straightedge. Do not overlap joints more than 4"
 - 4. Longitudinal Edges – Make neat longitudinal edge with no more than ±3" horizontal variance in any 100 feet of roadway



176

Section 483 Polymer-Modified Emulsified Asphalt Paving System (Micro Surfacing)

• 483.3 Construction

- (l) Defective Work. Satisfactorily correct pavement not meeting following criteria: (continued)
 - 5. Transverse Profile – fill ruts with no depressions as measured with 12-foot straightedge
- (m) Opening to Traffic. No traffic allowed until mix has sufficiently set to prevent pick-up & until directed by Representative



177

Section 489 Ultra Thin Bonded Wearing Course (UTWC)

- Plant mixed *UTWC*
- Apply only 4/1 to 11/1 with ambient temperature $\geq 50^{\circ}\text{F}$
- Paver with built in spray bar, *UTWC* material applied within 5 seconds of *UTWC*
- Roll without vibration at 185°F or greater (vibrations may be used on joint)
- May use pneumatic tire roller
- Cracks sealed at least 24 hours prior



178

Section 489 Ultra Thin Bonded Wearing Course



179

Photo on I-80 of truck dumping plant mix into spray paver and laying hot material directly on emulsion.

Section 489 Ultra Thin Bonded Wearing Course



180

Close up shows the emulsion being spray applied directly before the hot UTBWC material is applied.



181

Section 496 Asphalt Concrete Pavement 60-month warranty



181

THIS MATERIAL NOT ON TEST



182

Section 496.3 Construction Depth Checks

- Combination of two or more courses
- One core 4" or larger for each 2,000 linear feet of pavement lane by PTM 1 through all courses.
- Defective work if Depth deficiency
 - > 1/4 inch in. one location or
 - > 1/8 inch in. three consecutive locations
- Limits of defective work to be determined by additional coring.



182

THIS MATERIAL NOT ON TEST

Section 496.3 Information Samples

- *IF* directed and in the presence of the Inspector---
- Random locations using PTM 1
- One core for each 1,000 ton within 24 hours of placement
- Backfilled and sealed within 24 hours
- Delivered to LTS by Department



183

THIS MATERIAL NOT ON TEST

Section 496 Performance Criteria

- Evaluated as per PUB 336 for 5 years
- Remedial action-- Table A of Sec. 496
- 12-foot straight edge to determine rutting
- No routine maintenance by Dept.
- ESAL levels monitored by Dept.
- Repairs to be square or rectangular and if distance between repairs is < 100 feet ; repair is to be continuous.
- Must meet surface tolerance of 413.3



184

THIS MATERIAL NOT ON TEST

Section 422 Asphalt Wearing Course FJ-1 and FJ-1C34

- This material was primarily used during bridge deck waterproofing operations. Now, it is removed from Spec. 408.
- The 4.75-mm asphalt mix, covered in Section 413, is the new material to be used as scratch course for the bridge box culvert and filling in shoulder rumble strips.



185

Safety Edge Requirements From FHWA

- Affects both binder and wearing courses that are thicker than $1 \frac{1}{2}$ inches
- Requires extrusion device at edge of paver (not just a strike-off)
- Incidental to the course being laid
- 26-40 degree increase in angle from adjacent pavement.
- May require additional prework



186

Drawings for this are in handouts. This cannot be laid on organic material and will be used in conjunction with shoulder back-up.

PennDOT Projects with Dense Graded and Gap Graded Mixes Containing Crumb Rubber Modifier (CRM)

This is not a topic we cover in this course. However, it should be noted that several dense graded and gap graded asphalt pavement projects have been placed in PA under PennDOT contracts using CRM.



187

THIS MATERIAL NOT ON TEST

Some of the Gap Graded CRM Projects Placed in PA

District	County	SR	Size	Year Paved
3	Snyder	0015	12.5mm	2013
5	Berks	0078	12.5mm	2012
8	Adams	0015	12.5mm	2014/15
11	Lawrence	0376	12.5mm	2014



188

THIS MATERIAL NOT ON TEST

Questions?



• Was Everything Clear?



PennState

Discussion



pennsylvania
DEPARTMENT OF TRANSPORTATION



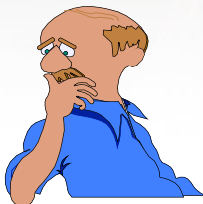
190

Quiz

Module 2

Specifications

?



1. PennDOT Publication 408 contains all of the asphalt specifications.

- a. True
- b. False

Answer:



2. All Superpave Standard mixes have to be delivered and placed at a laying temperature range of 220°F to 320°F.

- a. True
- b. False

Answer:



3. A contractor can receive incentive bonus compensation depending on the smoothness of the new pavement surface.

- a. True
- b. False

Answer:



4. Section 413 is the main specification for SuperPave asphalt mixtures.

- a. True
- b. False

Answer:



5. The normal lot size and number of sublots for Standard and RPS paving is

- a. 1500 tons and 3 sublots
- b. 2000 tons and 4 sublots
- c. 2400 tons and 6 sublots
- d. 2500 tons and 5 sublots

Answer:



6. Section 413 contains which of the following.

- a. Standard specifications**
- b. RPS specifications**
- c. Placement temperatures**
- d. Weather restrictions**
- e. All of the above**

Answer:



7. Existing vertical surfaces may be treated with NTT/CNTT prior to asphalt placement.

- a. True**
- b. False**

Answer:

- a. True, but require two applications**



8. WMA viscosity reducing technologies are divided into three groups.

- a. True**
- b. False**

Answer:



9. The maximum temperature of WMA is always less than HMA using the same PG grade of Asphalt.

- a. True**
- b. False**

Answer:



10. NTT or CNTT application rates will vary according to

- a. Existing surface conditions**
- b. Percentage of Asphalt in the product**
- c. Residual Asphalt requirements**
- d. All of the above**

Answer:





CERTIFICATE OF COMPLIANCE FOR DAILY BITUMINOUS MIXTURES

Plant: _____

Location: _____

Plant Code: _____

Job Mix Formula (Year-Number): _____ Material Class: _____

ESALS: _____ SRL: _____ PG Grade: _____

Publication 408, Section: _____

Consigned to:

PennDOT Maintenance: _____ County: _____ P.O. No. _____

Contractor: _____ S.R.: _____ Section: _____

Group / P.O.C. No.: _____ ECMS No.: _____

Municipality: _____ County: _____

Wearing Course: _____ **Binder Course:** _____ **Base Course:** _____

Tons Shipped: _____ **Daily AASHTO T209 Density:** _____

Test Results	%AC	Pass #8	Pass #200	Air Voids		VMA	
				Specimen #1	Specimen #2	Specimen #1	Specimen #2
Daily No. 1							
Daily No. 2							
Daily No. 3							
Daily Avg.							
Running Avg. of 5							

Please select the Payment Factor percentage below, based on Pub 408 Sec. 409.4(a) Table H:

- 100% Payment Factor:** The material as listed above shipped on this date conforms fully with the specification requirements of the Pennsylvania Department of Transportation. Our records, attesting to this statement, are open for inspection by a Department Representative for not less than **THREE** years from the date of shipment.

- 85% Payment Factor:** The material as listed above shipped on this date does not conform to the certification tolerances for 100% pay as listed in Pub 408 Sec. 409.2(e) Table A. A reduced pay factor has been applied and QC test results are being forwarded to the Inspector-in-Charge. Our records attesting to this statement are open for inspection by a Department Representative for not less than **THREE** years from the date of shipment.

- Defective Pavement:** The material as listed above shipped on this date does not conform to the certification tolerances for 100% pay as listed in Pub 408 Sec. 409.2(e) Table A. QC test results are being forwarded to the Inspector-in-Charge which indicate material must be removed and replaced or accepted at 50% CUP with District Executive approval in writing. Our records attesting to this statement are open for inspection by a Department Representative for not less than **THREE** years from the date of shipment.

Name (print): _____ Title: _____

Signature: _____ Date Shipped: _____

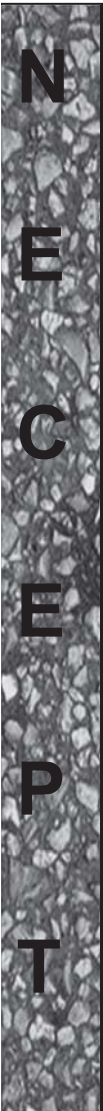
Asphalt Pavement Construction Program

1

Certified Asphalt Field Technician
Course of 2022

Module 3:

Pennsylvania Test Methods (PTMs)



Asphalt Construction Program

Certified Asphalt Field Technician - 2022


Module 3: Pennsylvania Test Methods (PTMs)




1

What you need to know... Which Pennsylvania Test Methods apply to the asphalt field work?

- The P.T.M.'s in the Asphalt paving operations
- The purpose of each of these important test methods



PENNSYLVANIA TEST METHODS (PTMs)			
Table of Contents - July 2016			
TEST TITLE	PTM NO.	REVISION	DATE
Probability Sampling	1		October 2013
Treatment of Extreme Values	4		October 2013
Evaluating Testing Repeatability	5		October 2013
Determination of Percent Within Limits (PWL) for Construction Aggregates	6		October 2013
Automated Density Measurement	10		October 2013
The Modified Asphalt Compaction System (MACS) - Part 1: Test Method	11		October 2013
Sample Preparation of Fill Material for Mechanically Stabilized Earth (MSE) Retention Systems	128		October 2013
Evaluation of Polymer Modified Systems	130		October 2013
Determination of Coefficient of Friction	131		January 2016
Field Sampling of Coated Films for Laboratory Analysis of Toxic Metal Content	200		October 2013
Weight Per Liter of Paint	201		October 2013
Patch Test for Assessing Coating Compatibility	207		October 2013
Sampling and Testing Treated Wood Products	210		October 2013
Cloud Point of Diesel Fuel	211		October 2013
Sponge Equilibrium Low Temperature Brittleness	305		October 2013
Sampling and Reporting Nonpneumatic Bridle Heating Pails	312		October 2013
Sampling Nonpneumatic Sealers	313		October 2013

2

PennDOT Pub 19 Pennsylvania Test Methods contain the full descriptions of all the PTMs and is updated regularly. Be sure that you are using the current version. The Pub 19 website is as follows:
(ftp://ftp.dot.state.pa.us/public/pdf/BOCM_MTD_LAB/PUBLICATIONS/PUB_19/PTM_TOC.pdf)

P.T.M.'s for Field Technicians

- **PTM 1:** Probability Sampling
- **PTM 402:** Determining In-Place Density by Use of Nuclear Gauges
- **PTM 403:** Determining In-Place Density Using Electrical Impedance Measurement Methods
- **PTM 428:** Measuring Pavement Profile Using a Light Weight Profiler
- **PTM 715/716:** Determination of Bulk Specific Gravity of Compacted Asphalt Mixtures
- **AASHTO T209:** Theoretical Maximum Specific Gravity of Asphalt Mixtures (Vacuum Method)



3

The PTMs are included in PennDOT Pub 19 and get updated as needed.

P.T.M.'s for Field Technicians

- **PTM 729:** Sampling Roadway Asphalt Concrete
- **PTM 737:** Measuring Thickness of Asphalt Concrete Courses
- **PTM 746:** Sampling Asphalt Paving Mixtures
- **PTM 747:** Determination of Distributor Application Rate in the Field
- **PTM 751:** Measuring Surface Macrotexture Depth Using a Volumetric Technique & Determining Pattern Segregation



4

PTM's will also be covered in applicable modules.

PTM #1: Probability Sampling

- Selecting samples using probability sampling techniques.
- Selecting all Department samples in an unbiased manner, **based entirely on chance.**
- Production divided into **Lots and Sublots** and random samples taken from Sublots



5

The importance of *random* sampling cannot be over emphasized and PTM 1 is used for *ALL random sampling*.

Lots and Sublots

- **Lot**--a quantity of specified material from a single source or produced by the same process.
- **Sublot**--a portion of a lot; location from which a sample is taken.
- Lot size, sublot size, and number of sublots per lot specified by *PTM* and/or specifications.
- Lot and Sublot sizes are described in Pub 408



6

Lots and sublot size are not always the same size. Relevant section of Pub 408 must be consulted for determination of the lot and sublot size.

Sampling Procedures

- Procedures are based on project quantity (tonnage) of each material produced.
- Sample size increments do NOT change.
(if a subplot size is determined to be 500 tons, it remains 500 tons for all computation purposes throughout the project).
- **3 rules as determined by tonnage:**
 - **500 ton or less,**
 - **> 500 ton to < 2500 ton,**
 - **and 2500 ton or more**



7

Sampling Made Simple

**Acceptance sampling for any RPS or any Standard paving project
Pub 408, Sect. 413.3(h) 2.b**

Rule #1: Assume Project quantity is 2500 ton or greater.

- ❖ Divide quantity by 500 and ROUND UP to establish the number of sublots. All sampling computations will be based on 500-ton increments.
- ❖ Completed Lots MUST have 3 sublots and CANNOT have more than 7 sub-lots.
- ❖ Lots which have only 1 or 2 sublots are incomplete, or partially completed and will be noted as such and tested under different criteria.
- ❖ A subplot does not exist unless it has a combination of one (1) loose box and one (1) core The final subplot could contain as much as 994 tons, mathematically.
- ❖ The final lot could contain as much as 3,994 tons, mathematically.



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Sampling Made Simple

Example:

Production Quantity: 3,750 tons

- ❖ $3,750 \text{ tons} \div 500 \text{ tons} = 7.5$ or 8 sampling locations to be computed for loose box and 8 for core
- ❖ Table D (Section 413) does not alter subplot size for computation... ALL sublots are computed in 500-ton increments
- ❖ Table D applies ONLY to quantities placed AFTER the last complete 2,500-ton lot (before a ≥ 5 -day break or end of project) and regulates both subplot and lot tonnage depending on whether you were or were not able to get both a loose and a core from the quantity of material placed in the final partial subplot (Table D's-- with or without)



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Sampling Made Simple

Rule #2: Assume Project quantity is > 500 to < 2,500 tons

- ❖ Divide entire quantity by 5 and there will be 5 equal sublots
- ❖ **Table D does not apply**

Example:

Production Quantity: 2240 tons

- ❖ $2,240 \div 5 = 448$ tons. So, 5 equal sublots of 448 tons.
- ❖ Use x value of PTM 1 (first column) and multiply by 448 to determine the sampling tonnage.



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Sampling Made Simple

Rule #3: Assume Project quantity is 500 tons or less

- ❖ Divide by 3 to determine 3 equal sub-lots for core locations
- ❖ Material acceptance for Lots of 500 ton or less is by certification. Taking/using cores is included as an option.
- ❖ **Table D does not apply**

Example:

Production Quantity: 475 tons

- ❖ $475 \div 3 = 158.3$ tons. So, 3 equal sublots of 158.3 tons.
- ❖ Use X value from PTM 1 (first column) and multiply by 158.3 to determine the sampling tonnage.



Random Number Table PTM 1

	X		Y
1.	0.29	R	0.66
2.	0.74	R	0.49
3.	0.89	L	0.79
4.	0.60	R	0.39
5.	0.88	R	0.31
	.		.
	.		.

Procedure:

- Determine lot size and number of sublots per lot from the specifications.
- Select a set of consecutive numbers from random number table--one for each subplot.
- For roadway sampling, values in X and Y columns give coordinates of sample
- X is TONS or length, Y is offset in feet from edge of TESTABLE area



Random Number Table

$Y \times W$ (testable width of paving) = $0.79 \times W$

	X		Y
1.	0.29	R	0.66
2.	0.74	R	0.49
3.	0.89	L	0.79
4.	0.60	R	0.39
5.	0.88	R	0.31

*R or L indicates measurement from Right or Left edge of paved lane OR testable width

$X \times L$ (Length of subplot) = $0.89 \times L$

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Example: if you select random number 3: The number in the X column is multiplied by the length of the subplot to give you a distance from the beginning of that subplot to the sample. The number in the Y column is multiplied by the *testable width* of the subplot to give you a distance from the Left edge (L in this case) of the testable width to the sample. The L or R determines whether the distance is measured from the left or right edge.


What would be the tonnage sampled within the third 500-ton subplot?

Refer to previous slide

- **0.89×500 tons = 445 tons**
- **Where would this sample fall within the entire lot?**
- **500 tons + 500 tons + 445 tons = 1445 tons**





Determining Sample Location



Length or "X" value,
May be computed in
tons or lineal feet

Offset or "Y" value



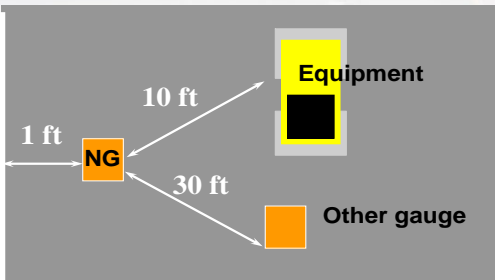


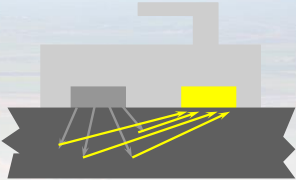
15


Measuring the distances longitudinally along the pavement *in the direction of placement* and transverse from the designated edge determines the exact location for the sample to be taken.


PTM #402: Determine In-Place Density by Use of Nuclear Gauges

- Nuclear Density Gauge
- Standardization
- Location









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PTM 402: The pavement is exposed to a very small amount of gamma radiation. Reflected, or back-scattered radiation is measured by a detector. The density is calculated from the amount of reflected radiation. Gauge must be calibrated to mixture, standardized every day, and operate within manufacturers parameters. Some gauges give counts, which are converted to density, while others are direct readout

Standardization- Gauge must be standardized every day. Follow guidelines as given by manufacturer or Nuclear Operator’s Testing Manual. Warm up the Gauge, set up with proper standard, take standard count and compare to specified limits, then record and report on TR-4276A. Locate gauge away from equipment, other gauges, curbs, and sides of excavations There should be total contact between Gauge and pavement surface.

PTM #402: Determine In-Place Density by use of a Nuclear Gauge

- Test Site Preparation
- Taking Counts



- Operator must be licensed & gauge must be type approved by PennDOT



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Test site Preparation: Surface texture will affect reading. A binder or asphalt base course may need to be prepared by leveling with a small amount of native fines or sand. One-minute counts are more accurate than 15 second counts, rotating the gauge 180°, and taking a second reading may give a different value. Record results on Form TR-4276B.

Although the operator must be licensed, being a CFT is not required. The Gauge must be PennDOT approved type and be calibrated annually. Documentation includes copies of license and annual calibration report. Gauge values may not be the same as lab tested density results

PTM #402: Determine In-Place Density by Use of Nuclear Gauges

- Establishment of Optimum Rolling Pattern



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PTM 402 gives you procedure for establishing an *optimum rolling pattern* by taking nuclear density readings on a control strip. Roller Patterns will be discussed further in module 7.

PTM #403: Determine In-Place Density Using Electrical Impedance Measurement Methods

- Rapid non-destructive technique
- PennDOT approved instrument



- Calibration
- Test Site Preparation



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This is a rapid nondestructive technique for determining density of compacted asphalt mixtures. Density results are relative and require calibration with a known density sample.

An average of five density readings, as described in PTM 403, should be taken to minimize variations in readings.

The instrument shall be PennDOT approved, calibrated and operated according to manufacturer’s recommendations and PTM 403 procedure. Surface conditions will affect readings and values obtained may not be the same as lab tested specimens.

PTM 403 For Electrical Impedance Gauge

Record form:
TR-4276C (3-15)



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Record all data on “Report on Compaction Density By Electrical Impedance Measurement Method” (PTM 403 Appendix B).

Optimum Roller Pattern

- The intent is to achieve the maximum density possible under: existing conditions, material characteristics, ambient temperature and roller capabilities.
- 3 successive passes that do NOT increase density by 3 lbs/cu. ft. indicate further rolling is ineffective at that temperature with that machine



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Optimum Roller Pattern

- Electrical Impedance or Nuclear gauge must be calibrated DAILY
- Readings must be taken from *same location after each pass* of the roller.
- Each roller must make AT LEAST 3 passes, record results of each pass.



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Optimum Roller Pattern

- If the density increase for 3 successive passes is less than 3 lbs./cu. ft., the optimum pass will be the one with the greatest increase of the 3 passes.
- No readings required until after 2nd pass of pneumatic tire roller.
- Record results on proper form, document ten random readings and average density.
- Should be performed DAILY, and may be required more than once per day.



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PTM #428: Measuring Pavement Profile Using A Light Weight Profiler

Terminology

- **International Roughness Index (IRI)**
- Excluded Areas



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PTM 428 Measuring Pavement Profile Using a Light Weight Profiler (LWP). Used to determine the pavement ride quality from the longitudinal profile, as the International Roughness Index (IRI) for acceptance and payment.

International Roughness Index (IRI) – a scale of roughness based on the response of a generic motor vehicle to roughness of the road surface. IRI is determined by obtaining a suitably accurate measurement of the profile of the road, processing it through an algorithm that simulates the way a vehicle would respond.

Excluded Areas – an area that is not included in the measurement used to determine lot payment.

PTM #428: Measuring Pavement Using A Light-Weight Profiler

- **Sampling**
 - Pavement profiles taken in each lane, lot size is 528 feet of single lane
- **Calibration**
 - Operational systems allows distance and profile systems calibration
- **Procedure**
 - Data Collection



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Procedure: Test each wheel path for acceptance only once. Re-run lot for payment after corrections. Measure *Excluded Areas* separately. Produce print out of IRI Data and Settings required for analysis.

PTM #428: Measuring Pavement Using A Light-Weight Profiler

- **Apparatus & Operator**



Light Weight Profiler



Equipment Decal



Certified Operators Card, must be renewed every 3 years



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The Light Weight Profiling System shall be an all-terrain or golf-cart type vehicle equipped with various hardware and software that together allow the measurement and recording of the longitudinal profile of a traveled wheel track. The device and software shall meet the requirements of the “Generic Specifications for Light Weight Profiling System”.

Yearly Verification for LWP Decal Shows: Date of Check; # Of Sensors; Device Make; Software Version

An Operator must be Certified, by PENNDOT, every 3 Years for the LWP Model used and Company.

PTM #428: Measuring Pavement Profile Using A Light-Weight Profiler

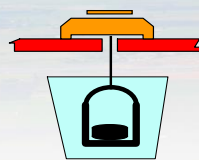
- **Report**
 - **Example Printout**

FILE EASTRTE.P01		RP090L v2.42 - 09 APR 2000		ENGLISH UNITS	
COUNTY york	ROUTE Sro216	DIR East (+)	LANE		
OPERATOR Sue	DRIVER Sue	VEHICLE	EQUIPMENT		
USER_REF_1 eastrte	USER_REF_2 0000	USER_REF_3			
DATE 09/24/2001	TIME 10:22:22	DCF 6629 C			
WAVELENGTH_LONG	100 ft				
WAVELENGTH_SHORT	1 ft				
FEET		ROUGH		IN/MI	
FROM	TO	DIST	IRI 1		
-----	-----	-----	-----		
18803	19331	528	62 (R)		
19331	19859	528	50		
19859	20387	528	56		
20387	20915	528	61		
20915	21188	273	68		
=====	=====	=====	=====		
18803	21262	2385	58		

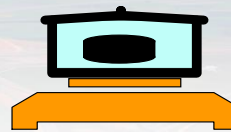


IRI readings are used to determine payment as per table A, schedule A or B.

PTM #715/716: Determination of Bulk Specific Gravity of Compacted Asphalt Mixtures.



Weight in Water



Volumeter

G_{mb} - specific gravity of compacted specimen or pavement core, including air voids.

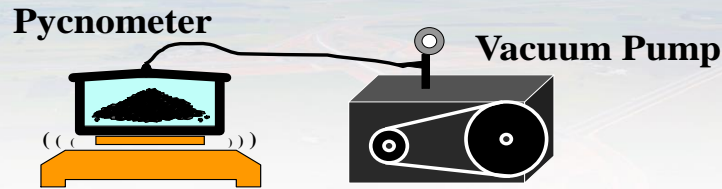
G_{mb} is known as *Bulk Specific Gravity*

These are Laboratory tests



PTM 715 Determination of Bulk Specific Gravity of Compacted Asphalt Mixtures and PTM 716 Determination of Bulk Specific Gravity of Compacted Asphalt Mixtures that Absorb more than 3.0 Percent Water by Volume: Specific gravity of mixture is used to calculate air voids. Dry specimen weighed in air; specimen soaked in water for at least 10 minutes, blotted dry, and weighed again.

AASHTO T209: Determining the Maximum Specific Gravity of Paving Materials (Laboratory Test)



G_{mm} – theoretical maximum specific gravity or “Rice” specific gravity of asphalt-coated aggregated or *specific gravity of mix at zero air voids*.



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AASHTO T 209 Determining Maximum Specific Gravity of Paving Materials: Heat the specimen if necessary, separate into small particles, and cool; place sample into a pycnometer and weigh; cover with water, apply vacuum and agitate for 8 to 12 minutes; fill pycnometer with water and weigh. The maximum specific gravity (100% compaction) is calculated from these weights.

AASHTO T209: Theoretical Maximum Specific Gravity of Paving Materials (Lab Test)

Water Temperature is Important.


- Water batch temperature must be in the range of $77^{\circ}\pm 2^{\circ}\text{F}$.
- If test temperature differs significantly correct for thermal effects.




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Using PTM 715/716 & AASHTO T209 to find Percent Compaction and % Air Voids


$\% \text{ Comp.} = (G_{mb} / G_{mm}) \times 100$
 $P_a = \{1 - (G_{mb} / G_{mm})\} \times 100$ (or $100 - \% \text{ Comp.}$)
 G_{mb} = bulk spec. gr.; G_{mm} = max. spec. gr.; P_a = air void content, percent by volume.




90% compaction
10% air voids



95% compaction
5% air voids



100% compaction
0% air voids



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From these tests, we can determine percent compaction and/or percent of air voids in the mix.

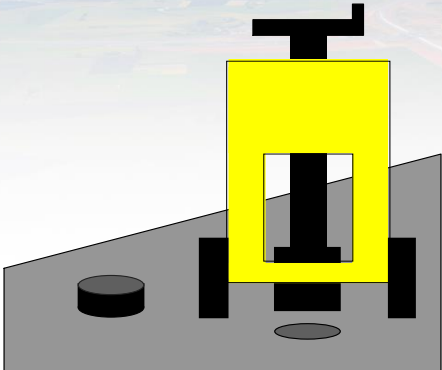
To find the percent compaction (% comp): use % Comp.

= $(G_{mb} / G_{mm}) \times 100$


To find percent air voids (P_a): use $P_a = \{1 - (G_{mb} / G_{mm})\} \times 100$


Where G_{mb} = *bulk specific gravity* and G_{mm} = *Theoretical maximum specific gravity*

PTM #729: Sampling Roadway Asphalt Concrete



Coring





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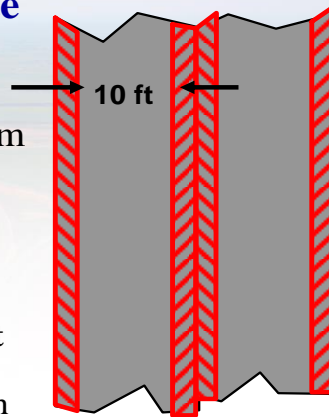
NOTE: Revision includes directions on equipment, procedures, packing and custody!!!!!!!!!!

PTM #729: Sampling Roadway Asphalt Concrete

TESTABLE width will equal the nominal paving width (paving width less one foot from each supported edge and each unsupported edge)

- **Example: 12-foot paving lane:**

12 feet - 1 foot - 1 foot = 10 feet
sampling width to be used with random number table to establish "y" value

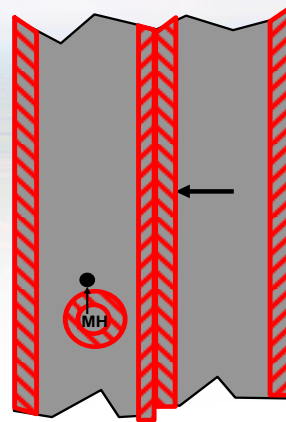


33

PTM 729 provides information for coring sample location procedures. Non-testable areas defined as 1 foot from both supported and unsupported edges. Reference examples in the appendix for examples and full instructions

PTM #729: Sampling Roadway Asphalt Concrete

- Defines non-testable areas as one-foot from the edge of obstructions such as manholes, inlets, and utility valve covers.
- If sample location falls within, adjust location longitudinally in direction of paving to just outside the non-testable area.



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PTM #729: Sampling Roadway Asphalt Concrete

- **Equipment:**

- Core drill, water cooled, equipped to core
- Diamond drill bits
- Extraction tool specifications
- A rigid plate or suitable container to hold sample without distortion after removal (Concrete cylinder molds)
- Masking tape
- Marking pencil
- Incidental materials & equipment



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Concrete cylinder molds have proven to be satisfactory and convenient for shipping cores. Cores placed in molds should be cushioned/separated with crumpled newspaper. If other containers are used, they should not exceed 24" in length and shall not weigh more than 50 lbs.

PTM #729: Sampling Roadway Asphalt Concrete

- Random sampling using **PTM #1** with one sample from each subplot. [See PTM 746 appendix for examples.](#)
- Density samples to be cross referenced to corresponding loose mix acceptance (box) samples on Form [TR-447](#). *BY DATE PLACED in comments.*
- Place increment bar code sticker from Form [TR-447](#) on outside container.
- Secure cored samples with masking tape.
- Store in safe, cool place and transport in a timely manner.



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PTM #729: Sampling Roadway Asphalt Concrete

- **PTM 729 Appendix** provides examples for locating samples
 - Example 1: Location adjustment for edges
 - Example 2: Location adjustment for obstructions



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PTM #729: Sampling Roadway Asphalt Concrete

4. Selection of Longitudinal Joint Incentive/Disincentive Samples (Section 405)

- Samples by random sampling using PTM #1 Random Numbers, X value only
- Lots determined as paving progresses and new joints are formed
- Full lot = 12,500 linear feet
- 5 sublots of 2,500 feet per lot
- One sample from each sublot.



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For projects meeting all the criteria for longitudinal joint density testing and incentive/disincentive payments, the random samples will be located by PTM #1, and extracted as per PTM 729 using the X value only to determine the longitudinal distance from the beginning of the sublot. For longitudinal joint cores, the word “lot” takes on a new definition. A lot is equal to 12,500 linear feet of longitudinal joint with 5 sublots of 2,500 linear feet each. One sample shall be taken from each sublot.

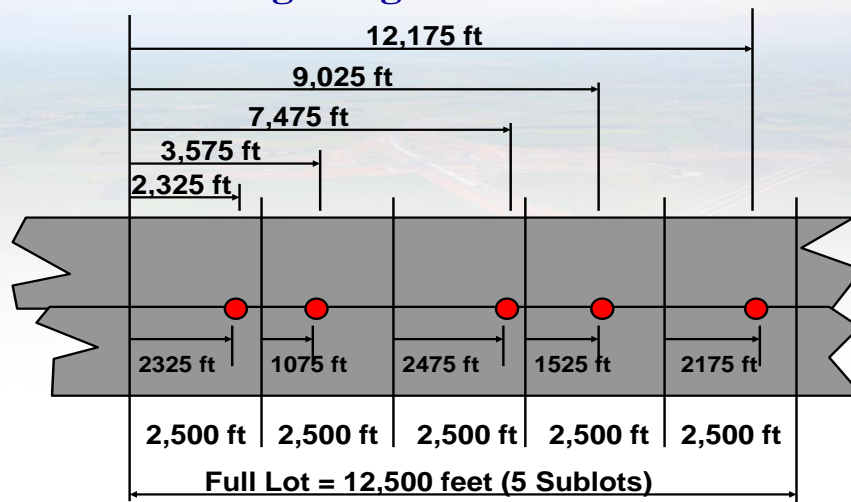
PTM #729 Locating Longitudinal Joint Cores

	X	Y	Linear Feet by Sublot	Total Lot LF
47	0.93	N/A	0.93 x 2,500 ft. = 2,325	2,325
48	0.43	N/A	0.43 x 2,500 ft. = 1,075	3,575
49	0.99	N/A	0.99 x 2,500 ft. = 2,475	7,475
50	0.61	N/A	0.61 x 2,500 ft. = 1,525	9,025
51	0.87	N/A	0.87 x 2,500 ft. = 2,175	12,175




Remember, for longitudinal joint cores, a lot = 12,500 feet with 5 sublots of 2,500 feet each. As a sample location, if you select random number 47, the number in the X column (0.93) is multiplied by the length of the sublot (2,500 ft.) to give you a distance from the beginning of that sublot to the sample (2,375). The next random number 48 gives you an X of 0.43 multiplied by the length of the sublot to give you a distance of 1075 feet from the beginning of that sublot to the sample or, a total distance from the beginning of the full lot of 3,575 feet (2,500 +1,075).

PTM #729 Locating Longitudinal Joint Cores




PTM #729			
Locating Longitudinal Joint Cores			
Example from PTM Appendix – Example No. 3			
Sampling Sequence for LOT (12,500 linear feet)			
Sublot 1	2,325	=	Station 23+25
Sublot 2	2,500 + 1,075	=	Station 35+75
Sublot 3	5,000 + 2,475	=	Station 74+75
Sublot 4	7,500 + 1,525	=	Station 90+25
Sublot 5	10,000 + 2,175	=	Station 121+75


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This is from Example No. 3 of the PTM #729 appendix showing location of longitudinal joint cores by stationing.

PTM #729	
Location of Longitudinal Joint Cores	
<ul style="list-style-type: none"> • Length of final lot is adjusted to ensure final lot has between 3 to 7 sublots (See Example #3 in PTM 729 Appendix) • For final subplot, use a length of 2,500 feet and multiply by the x-value of the random number • If sample falls beyond actual length of joint, subplot not counted and No sample taken. • If sample falls within actual length of joint, sample taken and subplot added to the final lot. 	


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PTM #729
Location of Longitudinal Joint Cores

- **Location of cores on joint**
 - With vertical joints, cores centered on surface joint line
 - Center of core to be within 1 inch of joint line
 - With notch wedge joints, cores centered 6 inches or half the wedge width of the joint taper away from the joint line in direction of wedge
 - If G_{mm} of each lane differs by more than 0.050, ensure half of core is from each lane
 - If not, adjust lateral location for replacement core within 12 inches longitudinally

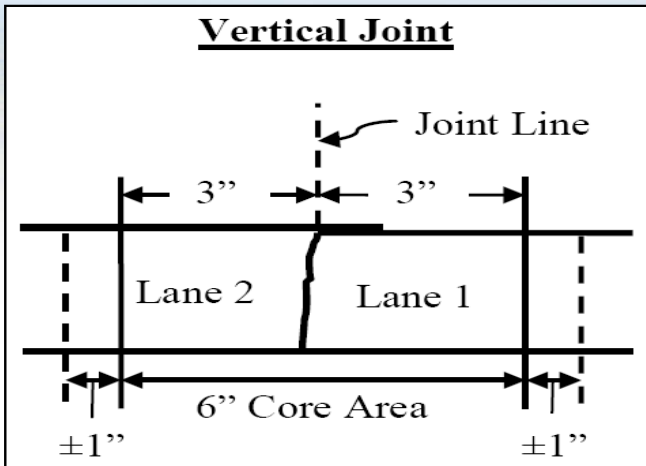


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Vertical joint cores shall be centered on the line where the joint between the two adjacent lifts abut at the surface. The center of all vertical joint cores shall be within ± 25 mm (1 inch) of this joint line. Center notched wedge joint cores 150 mm (6 inches) or one-half the width of the joint taper away from the joint line in the direction of the wedge. When the two lanes forming the joint have G_{mm} values more than 0.050 apart, examine each core to ensure that approximately half of the core is from each lane. If the materials in the core are unbalanced, adjust the location of the core drill relative to the joint line to ensure approximately equal material. Take a replacement sample within 300 mm (12 inches) longitudinally of the original sample location.

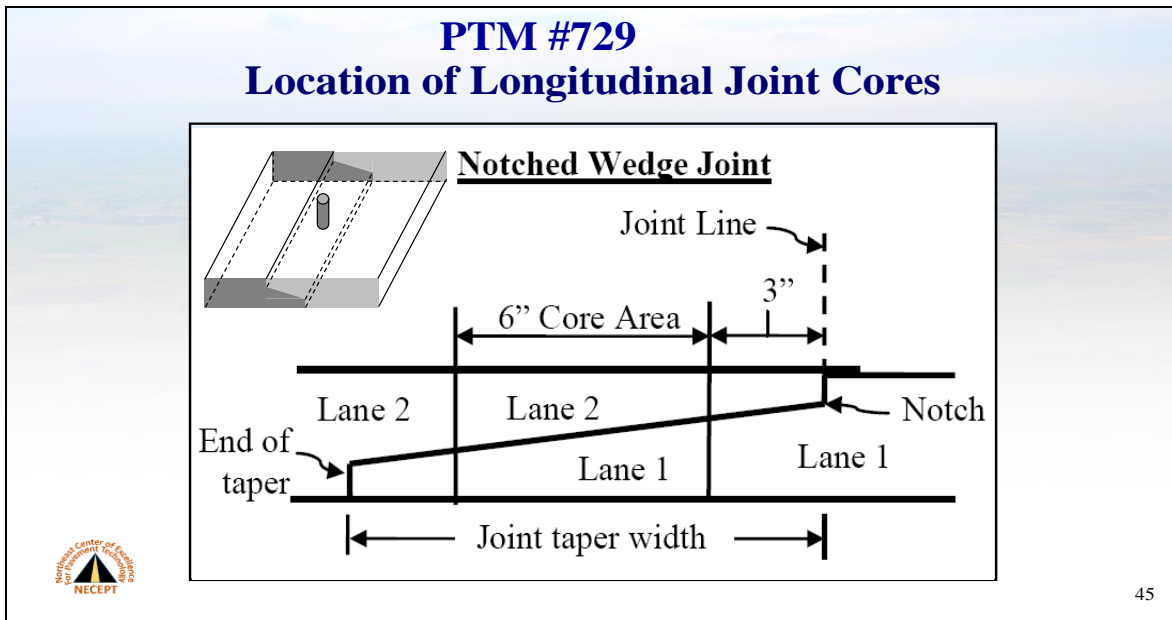
PTM #729
Location of Longitudinal Joint Cores

Vertical Joint



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Vertical Placement of Longitudinal Joint Cores



Joint cores for notch wedge joints should be centered over the wedge of the joint.

**Change 5- TR 447's for
Longitudinal Joint Cores**

- Cores taken from the same lot with the same JMF are packaged and recorded on the same [TR-447](#)
- Cores from Different JMF's on separate [TR-447](#).
- Cores from Paving Break > 5 days placed on Separate [TR-447](#)
- Document the date material was *PLACED*.


NECEPT

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Different JMF's could occur at shoulder/mainline joint.

PTM 729
Longitudinal Joint Cores

- Samples from the same lot with the same JMF will be submitted on the same [TR-447](#) *If* work stoppages do need exceed 5 days.
- Gmm value reported on the [TR-447](#) will be the overall average of each core's average Gmm values.
- Samples from sublots with differing Gmm values will use the average of the two Gmm values comprising the core and be submitted with separate TR447's and will reference the [TR-447](#) containing other lot samples.




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Theoretical maximum density is reported in pounds/cubic foot, found on mix design, Certifications (CS 4171), and some delivery slips.

PTM 729
Longitudinal Joint Cores

- Cores resulting from work stoppages of >5 days will be submitted on a separate Form [TR-447](#) with remarks to indicate a partial lot.
- The lot will continue and be on a second form when work resumes with remarks to indicate completion of lot and reference the initial [TR-447](#) number.
- **See PTM 729 examples 3 and 4 for further info.**



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Stoppages of work more than 5 days will still be contained in the same lot.

PTM #737: Measuring Thickness Of Asphalt Concrete Courses

- **Section 413.3(m)** requires inspector to measure depth of cores. Contractor should be present!
- Average of 4 measurements *minimum @ 90° apart*
- Depth recorded to nearest 1/8 inch

readings to the nearest 1/16 in.

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If bottom of core is uneven, take at least two additional measurements. Thickness shall be recorded on the TR-447 to the nearest 1/8 inch.

PTM #746 Sampling Asphalt Paving Mixture


Location of samples determined as described in PTM 1: Probability Sampling

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PTM #746

Sampling Asphalt Paving Mixture # of Sublots

- **Normal lot defined as 2,500 tons with 5 sublots of 500 tons.**
- **Section 413.3h-2.a.2** covers sampling of projects with less than 2,500 tons total of a JMF per project:
 - If production is >500 tons & <2500tons:
Then, total quantity divided into **5 sublots**
 - If production is <500 tons:
Then, total quantity divided into **3 sublots** if density acceptance is by cores
And mixture acceptance is by certification




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Note the different size of the lots and number of sublots.

PTM #746

Sampling Asphalt Paving Mixture

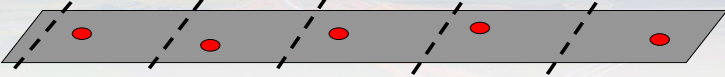
- For large NMA mixes, contractor may obtain larger size samples and then reduce in size; Here is the language in **PTM 746**
- 5.1.1: for 3/4" (19 mm) and larger NMA mixtures, a sample larger than is required in section 4.1 may be obtained and placed on a mixing board, thoroughly mixed, formed into a flat pile and carefully quartered to provide a representative sample of the required size. Scrape the inside of the scoop at each transfer point to incorporate any fines sticking to the inside of the scoop.




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PTM #746
Sampling Asphalt Paving Mixture

Acceptance Sampling on the Roadway




- One sample from each subplot using PTM #1
- Equipment:
 - Flat-bottom, high sided scoop
 - Boxes approx.. 3 ¾” x 4 ¾” x 9 ½” (approx. 8 lbs. of material) (≤ 19 mm)
 - Putty knife for scraping **INSIDE** of scoop
 - Incidental materials & equipment

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PTM #746
Sampling Asphalt Paving Mixture

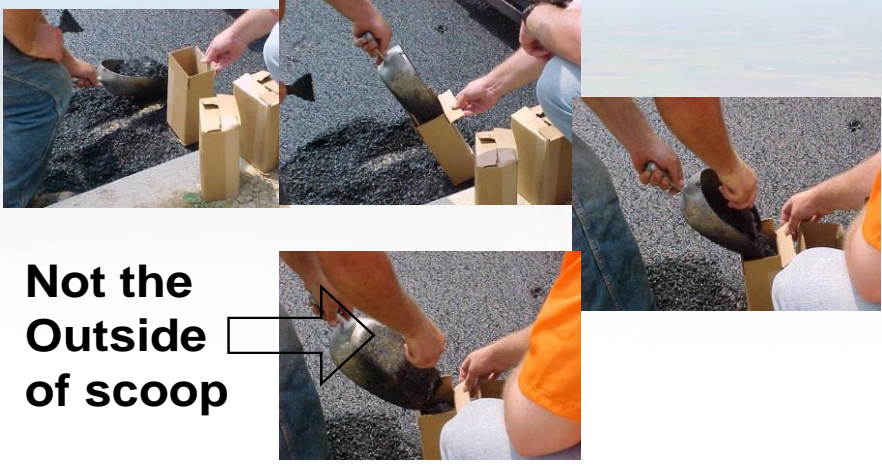
Acceptance Sampling on the Roadway

- Samples taken from uncompacted mix directly behind the paver (**paving equipment**)
- **TR-447** for pavement cores cross referenced to mix acceptance **TR-447**
- Examples of non-testable areas
- **Instructions for sampling, identification, and packaging in appendix of PTM 746**


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Use flat-bottomed scoop, scrape **inside of scoop only**.

PTM #746
Sampling Asphalt Paving Mixture



Not the Outside of scoop



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When removing material from the scoop to the box, be careful NOT to include the material from outside of the scoop.

PTM #746
Sampling Asphalt Paving Mixture

Watch the Video



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PTM #746: Sampling Asphalt Paving Mixtures

Acceptance Sampling on the Roadway

- Sampling scoop should pass completely through entire depth of material lift, transferring material to box, scraping any remaining fines from **INSIDE** scoop.
- PTM Appendix provides examples for locating samples
 - Example 1: Based on tonnage – addresses procedure with MTV
 - Example 2: Based on square yards



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PTM 746 has illustrative examples for using PTM #1 and locating samples on the roadway based on tonnage or on square yards.

PTM #746: Sampling Asphalt Paving Mixtures

PTM also includes:

- Sampling at the production plant under a quality a control program with appropriate illustrative example
- Quality assurance sampling from hauling units with appropriate illustrative example
- Date *PLACED* must be noted on [TR-447](#)



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Note that production sampling does not directly correlate to field lots.

PTM #747: Determination of Distributor Application Rate in the Field

- Calibration of distributor prior to test required
- Equipment
 - 48” Carpenter’s level
 - Dipstick for tank
 - Manufacturer’s certificate of calibration
- Application rate of higher temperature materials determined by correcting temperature using Bulletin 25 conversion chart



PTM #747: Determination of Distributor Application Rate in the Field

- **Procedure**
 - Level tank with level on top of manhole
 - Use dipstick to measure material level in tank, calculate gallons from calibration table
 - Select test strip length according to Table 1

Table 1. Length of Test Strip	
App. Rate, gal/sq.yd.	Length of Test Strip, feet
Less than or = 0.01	1,000
More than 0.01	500



Dipstick should agree with gauge and be marked with serial number of distributor unit. Wheel or infra-red unit on truck should agree with measured distance.

PTM #747: Determination of Distributor Application Rate in the Field

- **Procedure (continued)**

- Apply material to test strip
- Level tank again and measure level of material with dipstick
- Calculate application rate
- Multiply length X width and divide by 9 to calculate square yards.
- Divide gallons placed by square yards covered to determine Application rate.
- Multiply Application rate by % of asphalt in tack to determine yield



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Calculations will be covered again in module 4.

Segregated or Flushed Pavement

- Inspector notifies contractor that segregation or flushing is suspected
- Contractor may elect to proceed at their own risk from that point while trying to rectify the problem
- **PTM 751** will be performed to evaluate the condition.



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PTM #751: Measuring Surface Macrotexture Depth Using A Volumetric Technique & Determining Pattern Segregation

- Also known as **Hockey Puck Test**
- Used to determine degree of segregation or flushing
- Measures voids in pavement surface and indicates segregation or gradation change



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PTM 751 PROCEDURES

- Areas must be clean and dry with no loose debris
- Test will be performed in 3 suspect and three acceptable locations
- A measured quantity of material is applied to mat surface and spread to largest possible diameter circle
- Difference in diameter is used to determine average surface texture depth



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Initial procedure for determining Pattern Segregation: Inspect the pavement surface and select a dry homogeneous area. Thoroughly clean the surface with brush.

PTM 751 PROCEDURES

- Obtain the texture depth from each set of locations from Table 1 on page 7 of **PTM 751**
- If average texture depth difference exceeds 0.024 the area is considered “unacceptable pattern segregation”



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Perform an equal number of tests in an acceptable area. Calculate the average radius for each area and determine the average texture depth.

If Unacceptable Pattern Segregation Is Evident (via PTM 751)

- Stop Paving
- Department will evaluate segregation to determine corrective work
 - DO NOT resume paving until Department reviews corrective actions & authorizes paving to continue
- Test section then placed, <200 tons
- Resume normal paving after successful test section



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Immediately stop all paving. The Department will evaluate the pattern segregation to determine the extent of the corrective work. This work will be in accordance with the Quality Control Plan or as directed by the Engineer. Do Not Restart paving until the corrective action is accepted by the Department. When the Engineer permits work to resume, place a test section limited to 200 tons. If the corrective action corrects the problem, work will be allowed to continue.

Evaluating Segregated Area

- **Evaluating Segregation [PennDOT Specs Section 413.3(h)3.c]:**
 - Take 6” Cores
 - Remove & Replace Segregated Areas if sum of any 2 sieves vary 20% or more from the JMF or core Density is less than 90%
 - Remove full lane width of segregated area plus 5 feet minimum beyond each end



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Evaluate Segregation- Take 6-inch cores from the unacceptable areas. The Inspector will deliver them to the plant and observe the testing for density, extraction and gradation analysis. Remove and replace any area if the summation of absolute deviations from any two sieves is 20% or more from the job mix formula, or the core density indicates less than 90% of Maximum Theoretical Density. Remove not less than full width of the affected lane and 5 feet minimum beyond each end of the affected area. New replacement area should meet surface tolerance requirements. When the test results exceed the above limitations, the pavement is accepted. (This does not mean that surface Segregation does not exist. In fact, in most cases the surface is segregated and during the life of the pavement will ravel.)

Module 3 – Review Objectives

- Which Pennsylvania Test Methods (or AASHTO) tests apply to the asphalt pavement construction (field work)?
- Specifically, we discussed PTMs related to
 - Sampling/Random Numbers
 - Determination of lot and subplot size
 - Density measurement protocols
 - Joint cores
 - Thickness Measurement
 - Pavement profile Measurement
 - Distributor Application Rate
 - Pattern Segregation



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Questions?



Did I go too fast?



PennState

Discussion

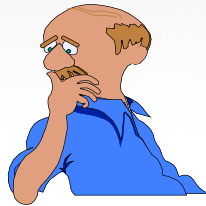


pennsylvania
DEPARTMENT OF TRANSPORTATION

Quiz

Module 3

PTMs



1. PTM 751 can be used to help determine pattern segregation or flushing.

- a. True**
- b. False**

Answer:



2. PTM 746 is used for loose samples only.

- a. True**
- b. False**

Answer:



3. Loose box (mixture acceptance) samples require that all fines be removed from the scoop and replaced in the box.

- a. True**
- b. False**

Answer:



4. Nuclear density testing procedures are outlined in PTM 403.

- a. True**
- b. False**

Answer:



5. Random sampling procedures are covered in PTM #1.

- a. True**
- b. False**

Answer:



6. The operator of a light-weight profiler does not have to have a separate certification.

- a. True**
- b. False**

Answer:



7. Sub-lots for longitudinal joint cores are 12,500 feet in length.

- a. True**
- b. False**

Answer:



8. The “R” in PTM #1 designates that the measurement is from the right edge of the pavement mat.

- a. True**
- b. False**

Answer:



9. Pub. 19 contains all the PTMs for testing of asphalt roadways.

- a. True**
- b. False**

Answer:



10. A project quantity of 1900 ton placed in one day will have how many lots and sublots?

- a. 3 lots and 6 sublots**
- b. 1 lot and 3 sublots**
- c. 1 lot with 5 sublots**
- d. 1 lot with 4 sublots**

Answer



Determining Lots & Sublots, and Sampling Locations

Contents:

Table D (Section 413.3(h)2.a Lots & Sublots)

PTM 1, Table 1, Random Number Table

Problem 1 Parts A, B, C, D

Problem 2 Parts A,B

Problem 3

Problem 4



Three Major Rules

- **1 2500 TON OR MORE OF ANY JMF PER PROJECT: DIVIDE BY 500 TONS AND ROUND UP TO DETERMINE THE NUMBER OF *Possible* SUBLOTS**
- **2 >500 TON BUT < 2500: DIVIDE INTO 5 EQUAL SUBLOTS**
- **3 500 TON OR LESS: DIVIDE INTO 3 EQUAL SUBLOTS**



413.3(h)2.a Lots and Sublots: Table D

Re-adjustment of Lot Size & Associated Number of Sublots

Remaining Quantity* Following Last Full Lot	Action
Less than 500 tons <u>without</u> a combination of one mixture acceptance sample and one core	Quantity combined with previous lot, (n=5)
Less than 500 tons <u>with</u> a combination of one mixture acceptance sample and one core	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>without</u> a combination of two mixture acceptance samples and two cores	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>with</u> a combination of two mixture acceptance samples and two cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>without</u> a combination of three mixture acceptance samples and three cores	Two new sublots defined & quantity combined with previous lot, (n=7)



1000 tons to less than 1500 tons <u>with</u> a combination of three mixture acceptance samples and three cores	New lot defined, (n=3)
1500 tons to less than 2000 tons <u>without</u> a combination of four mixture acceptance samples and four cores	New lot defined, (n=3)
1500 tons to less than 2000 tons <u>with</u> a combination of four mixture acceptance samples and four cores	New lot defined, (n=4)
2000 tons to less than 2500 tons <u>without</u> a combination of five mixture acceptance samples and five cores	New lot defined, (n=4)
2000 tons to less than 2500 tons <u>with</u> a combination of five mixture acceptance samples and five cores	New lot defined, (n=5)



PennDOT
TABLE I
RANDOM POSITIONS IN DECIMAL FRACTIONS (2 PLACES)


	X	Y		X	Y		X	Y
1.	0.29	R 0.66	34.	0.61	L 0.87	67.	0.93	R 0.17
2.	0.74	R 0.49	35.	0.76	R 0.16	68.	0.40	R 0.50
3.	0.89	L 0.79	36.	0.87	L 0.10	69.	0.44	R 0.15
4.	0.60	R 0.39	37.	0.41	L 0.10	70.	0.03	L 0.60
5.	0.88	R 0.31	38.	0.28	R 0.23	71.	0.19	L 0.37
6.	0.72	L 0.54	39.	0.22	L 0.18	72.	0.92	L 0.45
7.	0.12	R 0.08	40.	0.21	L 0.94	73.	0.20	L 0.85
8.	0.09	L 0.94	41.	0.27	L 0.52	74.	0.05	R 0.56
9.	0.62	L 0.11	42.	0.39	R 0.91	75.	0.46	R 0.58
10.	0.71	R 0.59	43.	0.57	L 0.10	76.	0.43	R 0.91
11.	0.36	L 0.38	44.	0.82	L 0.12	77.	0.97	L 0.55
12.	0.57	R 0.49	45.	0.14	L 0.94	78.	0.06	R 0.51
13.	0.35	R 0.90	46.	0.50	R 0.58	79.	0.72	L 0.78
14.	0.69	L 0.63	47.	0.93	L 0.03	80.	0.95	L 0.36
15.	0.59	R 0.68	48.	0.43	L 0.29	81.	0.16	L 0.61
16.	0.06	L 0.03	49.	0.99	L 0.36	82.	0.29	R 0.47
17.	0.08	L 0.70	50.	0.61	R 0.25	83.	0.48	R 0.15



18.	0.67	L 0.68	51.	0.87	L 0.36	84.	0.73	R 0.64
19.	0.83	R 0.97	52.	0.34	L 0.19	85.	0.05	L 0.94
20.	0.54	R 0.58	53.	0.37	R 0.33	86.	0.43	L 0.05
21.	0.82	R 0.50	54.	0.97	L 0.79	87.	0.87	R 0.98
22.	0.66	R 0.73	55.	0.13	R 0.56	88.	0.37	L 0.71
23.	0.06	L 0.27	56.	0.85	R 0.64	89.	0.94	L 0.26
24.	0.03	L 0.13	57.	0.14	L 0.04	90.	0.57	L 0.63
25.	0.55	L 0.29	58.	0.99	R 0.74	91.	0.26	R 0.80
26.	0.64	L 0.77	59.	0.40	L 0.76	92.	0.01	L 0.79
27.	0.30	R 0.57	60.	0.37	L 0.09	93.	0.83	R 0.59
28.	0.51	R 0.67	61.	0.90	R 0.74	94.	0.71	L 0.21
29.	0.29	R 0.09	62.	0.09	L 0.70	95.	0.65	L 0.63
30.	0.63	R 0.82	63.	0.66	L 0.97	96.	0.65	L 0.87
31.	0.53	L 0.86	64.	0.89	L 0.55	97.	0.72	R 0.92
32.	0.99	R 0.22	65.	0.67	L 0.44	98.	0.85	L 0.78
33.	0.02	R 0.89	66.	0.02	R 0.65	99.	0.04	L 0.46
						100.	0.29	L 0.95

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X = Decimal fraction of the total length measured along the road from the starting point.
Y = Decimal fraction measured across the road from either outside edge towards the centerline of the paved lane.
R = Indicates measurement from the right edge of the paved lane.
L = Indicates measurement from the left edge of the paved lane.




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Determining Lots & Sublots and Sampling Locations

Problem 1 :

- Part A:** You are the inspector on a paving project using 1-1/2 inches of 9.5 mm wearing surface. The project calls for placing 3745 tons for a 12-foot lane. You intend to take a combination of mixture acceptance and core samples. How many LOTS and SUBLOTS will be involved?



How Many Sublots ?

- **3745 tons > 2500 So, Rule #1**
- **DIVIDE BY 500 AND ROUND UP**
- **$3745 / 500 = 7.49$ OR 8 *POSSIBLE* sublots to compute for sampling locations**
- **IF no paving delays > 5 days**
- **A subplot exists ONLY if you get both a loose and core sample**



HOW MANY LOTS?

- **We do not yet know how many Lots**
- **LOT sizes are decided by actual paving schedules and Table D**
- ***Completed* lots must have 3 sublots (one loose and one core per subplot) and NEVER have more than 7 sublots**



Problem 1 :
Part A: How many Lots and Sublots
will be involved?



Answer 1:

3745 tons

1st LOT = 2500 TONS = 5 SUBLOTS @ 500 TONS

3745 tons – 2500 tons = 1245 tons

Using Table D, if you got a combination of 3 box samples and 3 core samples:

New lot defined with 3 sublots

2nd LOT = 1245 TONS = 3 SUBLOTS

TOTAL: 2 LOTS and 8 SUBLOTS

Or....

Using Table D, if you did not get a combination of 3 box samples and 3 core samples:

Two new sublots defined & put in previous lot

1st Lot = 5 lots + 2 new defined lots

TOTAL: 1 LOT and 7 SUBLOTS

Problem 1 :
Part A: How many Lots and Sublots
will be involved?



Answer 1:

3745 tons

1st LOT = 2500 TONS = 5 SUBLOTS @ 500 TONS

3745 tons – 2500 tons = 1245 tons

Using Table D, if you got a combination of 3 box samples and 3 core samples:

New lot defined with 3 sublots

2nd LOT = 1245 TONS = 3 SUBLOTS

TOTAL: 2 LOTS and 8 SUBLOTS

Or....

Using Table D, if you did not get a combination of 3 box samples and 3 core samples:

Two new sublots defined & put in previous lot

1st Lot = 5 sublots + 2 new defined sublots

TOTAL: 1 LOT and 7 SUBLOTS

413.3(h)2.a Lots and Sublots: Table D

Re-adjustment of Lot Size & Associated Number of Sublots

Remaining Quantity* Following Last Full Lot	Action
Less than 500 tons <u>without</u> a combination of one mixture acceptance sample and one core	Quantity combined with previous lot, (n=5)
Less than 500 tons <u>with</u> a combination of one mixture acceptance sample and one core	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>without</u> a combination of two mixture acceptance samples and two cores	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>with</u> a combination of two mixture acceptance samples and two cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>without</u> a combination of three mixture acceptance samples and three cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>with</u> a combination of three mixture acceptance samples and three cores	New lot defined, (n=3)



Problem 1 :

- **Part B:** On the same project, the length of the sublots need to be determined. The first subplot contains 500 tons. What distance will the 500 tons of asphalt pave if we are placing a 12-foot wide lane at 1 ½ inches thick? We are assuming a mix density of 110 lbs./sq. yd./inch.



Problem 1 :

Part B: What distance will the 500 tons of asphalt pave?

÷

**Problem 1 :**

Part C: Find the location on the pavement where the first box sample would be taken. The first subplot random number is 25.



Problem 1 :

Part D: Find the location on the pavement where you would take the third core sample. This will represent the third subplot. The first subplot random number is 61.



Problem 2 :

- A Contractor is placing 18000 yd² of Superpave Asphalt Wearing Course with a PG76-22, 3 to <10 million ESALS, 9.5mm mix, 1½” depth, 12-foot lane.
- Assume yield of 115 lbs./yd²/inch of pavement

Part A: Calculate tonnage and total number of lots and sublots.

Part B: What will be the length of each subplot?



Problem 3:

- A Contractor is placing approximately 6500 tons of Superpave asphalt Wearing Course with a PG64-22, 3 to <10 million ESALS, 9.5mm mix, 1 ½" depth, 12-foot lane over 4 days of paving.
- Acceptance by lots required
- The actual daily placement is as follows:
 - 1st Day: 1532.12
 - 2nd Day: 1511.14
 - 3rd Day: 1876.51
 - 4th Day: 1532.25
- Assume yield of 110 lb./inch/yd² of pavement
- Calculate total number of lots and sublots, assuming you obtained the required combination of both box and core samples on the last partial lot.



How many sublots

- $6500 \div 500 = 13$ possible sublots
- How many lots?
- We do not yet know
- Why Not?



413.3(h)2.a Lots and Sublots: Table D

Re-adjustment of Lot Size & Associated Number of Sublots

Remaining Quantity* Following Last Full Lot	Action
Less than 500 tons <u>without</u> a combination of one mixture acceptance sample and one core	Quantity combined with previous lot, (n=5)
Less than 500 tons <u>with</u> a combination of one mixture acceptance sample and one core	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>without</u> a combination of two mixture acceptance samples and two cores	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>with</u> a combination of two mixture acceptance samples and two cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>without</u> a combination of three mixture acceptance samples and three cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>with</u> a combination of three mixture acceptance samples and three cores	New lot defined, (n=3)



Chart to help determine

	Tons	Lot 1	Lot 2	Lot 3
Day 1	1532.12	1532.12		
Day 2	1511.14	967.88	543.26	
Day 3	1876.51		1876.51	
Day 4	1532.25		80.23	1452.02
Total Tons	6452.02	2500	2500	1452.02
Sublots		5	5	3



Chart for determining lots.

Problem 4: Paving Delay

- A Contractor is placing approximately 6500 tons of Superpave asphalt Wearing Course with a PG64-22, 3 to <10 million ESALS, 9.5mm mix, 1 ½" depth, 12 foot lane over 4 days of paving.
- Acceptance by lots required
- The actual daily placement is as follows:
 - 1st Day: 1532.12
 - 2nd Day: 1511.14
 - 3rd Day: 1876.51
 - Delayed 7 days
 - 10th Day: 1532.25
- Assume yield of 110 lb./inch/yd² of pavement



Problem 4: Paving Delay

- Calculate total number of lots and sublots
- Assume a full combination of samples obtained on last lot at end of 3rd day
- Assume NOT a full combination of samples obtained on the last lot of the 10th day.



Table “D” at Change from 1 Lot to 2 Lots

Re-adjustment of Lot Size & Associated Number of Sublots

1000 tons to less than 1500 tons <u>without</u> a combination of three mixture acceptance samples and three cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>with</u> a combination of three mixture acceptance samples and three cores	New lot defined, (n=3)



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Discussion



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Determining Lots & Sublots, and Sampling Locations

Contents:

- **Table D (Section 413.3(h)2.a Lots & Sublots)**
- **PTM 1, Table 1, Random Number Table**
- **Problem 1 Parts A, B, C, D**
- **Problem 2 Parts A, B**
- **Problem 3**
- **Problem 4**

Determining Lots & Sublots, and Sampling Locations

413.3(h)2.a Lots and Sublots: Table D

Re-adjustment of Lot Size & Associated Number of Sublots

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Less than 500 tons <u>with</u> a combination of one mixture acceptance sample and one core	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>without</u> a combination of two mixture acceptance samples and two cores	One new subplot defined & quantity combined with previous lot, (n=6)
500 tons to less than 1000 tons <u>with</u> a combination of two mixture acceptance samples and two cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>without</u> a combination of three mixture acceptance samples and three cores	Two new sublots defined & quantity combined with previous lot, (n=7)
1000 tons to less than 1500 tons <u>with</u> a combination of three mixture acceptance samples and three cores	New lot defined, (n=3)
1500 tons to less than 2000 tons without a combination of four mixture acceptance samples and four cores	New lot defined, (n=3)
1500 tons to less than 2000 tons with a combination of four mixture acceptance samples and four cores	New lot defined, (n=4)
2000 tons to less than 2500 tons without a combination of five mixture acceptance samples and five cores	New lot defined, (n=4)
2000 tons to less than 2500 tons with a combination of five mixture acceptance samples and five cores	New lot defined, (n=5)

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TABLE I
RANDOM POSITIONS IN DECIMAL FRACTIONS (2 PLACES)

	<u>X</u>	<u>Y</u>		<u>X</u>	<u>Y</u>		<u>X</u>	<u>Y</u>
1.	0.29	R 0.66	34.	0.61	L 0.87	67.	0.93	R 0.17
2.	0.74	R 0.49	35.	0.76	R 0.16	68.	0.40	R 0.50
3.	0.89	L 0.79	36.	0.87	L 0.10	69.	0.44	R 0.15
4.	0.60	R 0.39	37.	0.41	L 0.10	70.	0.03	L 0.60
5.	0.88	R 0.31	38.	0.28	R 0.23	71.	0.19	L 0.37
6.	0.72	L 0.54	39.	0.22	L 0.18	72.	0.92	L 0.45
7.	0.12	R 0.08	40.	0.21	L 0.94	73.	0.20	L 0.85
8.	0.09	L 0.94	41.	0.27	L 0.52	74.	0.05	R 0.56
9.	0.62	L 0.11	42.	0.39	R 0.91	75.	0.46	R 0.58
10.	0.71	R 0.59	43.	0.57	L 0.10	76.	0.43	R 0.91
11.	0.36	L 0.38	44.	0.82	L 0.12	77.	0.97	L 0.55
12.	0.57	R 0.49	45.	0.14	L 0.94	78.	0.06	R 0.51
13.	0.35	R 0.90	46.	0.50	R 0.58	79.	0.72	L 0.78
14.	0.69	L 0.63	47.	0.93	L 0.03	80.	0.95	L 0.36
15.	0.59	R 0.68	48.	0.43	L 0.29	81.	0.16	L 0.61
16.	0.06	L 0.03	49.	0.99	L 0.36	82.	0.29	R 0.47
17.	0.08	L 0.70	50.	0.61	R 0.25	83.	0.48	R 0.15
18.	0.67	L 0.68	51.	0.87	L 0.36	84.	0.73	R 0.64
19.	0.83	R 0.97	52.	0.34	L 0.19	85.	0.05	L 0.94
20.	0.54	R 0.58	53.	0.37	R 0.33	86.	0.43	L 0.05
21.	0.82	R 0.50	54.	0.97	L 0.79	87.	0.87	R 0.98
22.	0.66	R 0.73	55.	0.13	R 0.56	88.	0.37	L 0.71
23.	0.06	L 0.27	56.	0.85	R 0.64	89.	0.94	L 0.26
24.	0.03	L 0.13	57.	0.14	L 0.04	90.	0.57	L 0.63
25.	0.55	L 0.29	58.	0.99	R 0.74	91.	0.26	R 0.80
26.	0.64	L 0.77	59.	0.40	L 0.76	92.	0.01	L 0.79
27.	0.30	R 0.57	60.	0.37	L 0.09	93.	0.83	R 0.59
28.	0.51	R 0.67	61.	0.90	R 0.74	94.	0.71	L 0.21
29.	0.29	R 0.09	62.	0.09	L 0.70	95.	0.65	L 0.63
30.	0.63	R 0.82	63.	0.66	L 0.97	96.	0.65	L 0.87
31.	0.53	L 0.86	64.	0.89	L 0.55	97.	0.72	R 0.92
32.	0.99	R 0.22	65.	0.67	L 0.44	98.	0.85	L 0.78
33.	0.02	R 0.89	66.	0.02	R 0.65	99.	0.04	L 0.46
						100.	0.29	L 0.95

X = Decimal fraction of the total length measured along the road from the starting point.

Y = Decimal fraction measured across the road from either outside edge towards the centerline of the paved lane.

R = Indicates measurement from the right edge of the paved lane.

L = Indicates measurement from the left edge of the paved lane.

Determining Lots & Sublots, and Sampling Locations

Problem 1:

Part A: You are the inspector on a paving project using 1-½ inches of 9.5 mm wearing surface. The project calls for placing 3745 tons. You intend to take a combination of mixture acceptance and core samples. How many LOTS and SUBLOTS will be involved?

Part B: On the same project the length of the sublots need to be determined. The first subplot contains 500 tons. What distance will the 500 tons of HMA pave if we are placing a 12-foot wide lane at 1 ½ inches thick? We are assuming a mix yield of 110 lbs./ sq.yd./ inch

Part C: Find the location on the pavement where the first box sample would be taken. The first subplot random number is 0.25.

Part D: Find the location on the pavement where you would take the third core sample. This will represent the third subplot. The first subplot random number is 0.61.

Determining Lots & Sublots, and Sampling Locations

Problem 2:

A Contractor is placing 18000 yd² of Superpave Asphalt Wearing Course with a PG76-22, 3 to <10 million ESALS, 9.5mm mix, 1 ½" depth, 12-foot lane. Assume yield of 115 lbs./ sq.yd./inch of pavement.

Part A: Calculate tonnage and total number of lots and sublots.

Part B: What will be the length of each subplot?

Determining Lots & Sublots, and Sampling Locations

Problem 3:

A Contractor is placing approximately 6,500 tons of Superpave asphalt Wearing Course with a PG64-22, 3 to <10 million ESALS, 9.5mm mix, 1 ½" depth, 12-foot lane over 4 days of paving. Certification by lots required.

The actual daily placement is as follows:

- 1st Day: 1532.12 tons
- 2nd Day: 1511.14 tons
- 3rd Day: 1876.51 tons
- 4th Day: 1532.25 tons
-

Assume yield of 110 lbs./sq. yd/inch of pavement

Calculate total number of lots and sublots, assuming you obtained the required combination of both box and core samples on the last partial lot.

Determining Lots & Sublots, and Sampling Locations

Problem 4: Paving Delay

A Contractor is placing approximately 6500 tons of Superpave HMA Wearing Course with a PG 64-22, 3 to <10 million ESALS, 9.5 mm mix, 1 ½” depth, 12-foot lane over 4 days of paving. Certification by lots required.

The actual daily placement is as follows:

- **1st Day: 1532.12 tons**
- **2nd Day: 1511.14 tons**
- **3rd Day: 1876.51 tons**
- **Delayed 7 days**
- **10th Day: 1532.25 tons**
-

Assume yield of 110 lbs./sq. yd./inch of pavement

Calculate total number of lots and sublots.

- **Assume a full combination of samples obtained on last lot at end of 3rd day.**
- **Assume not a full combination of samples obtained on the last lot of the 10th day.**

SAMPLING MADE SIMPLE

Pub 408, Sect. 413.3(h) Covers Acceptance Sampling for any RPS or any **Standard** paving project. Follow the three rules discussed below.

RULE #1

IF project quantity of ANY JMF is 2500 ton or greater:

Then divide by 500 and ROUND UP to establish the number of sub-lots. All sampling computations will be based on 500-ton increments

Completed Lots **MUST** have 3 sub-lots and **CANNOT** have more than 7 sub-lots.

Lots which have only 1 or 2 sublots are **incomplete, or partially completed** and will be noted as such and tested under different criteria.

A subplot **does not exist unless** it has a **combination** of 1 loose box and 1 core.

The final *sub-lot* could contain as much as 994 tons, mathematically.

The final **lot** could contain as much as 3,994 tons, mathematically.

Example: $3750 \text{ tons} \div 500 \text{ tons} = 7.5$. Round up to **8 sampling locations to be computed for loose box and 8 for cores.**

Table D does not alter sub-lot size for computation. **ALL** sublots are computed in 500- ton increments.

Table D applies **ONLY** to quantities placed **AFTER** the last complete 2500-ton lot (*before a ≥ 5 day break or end of project*) and regulates both subplot and lot tonnage depending on whether you **were** or **were not** able to get both a loose and a core from the quantity of material placed in the final partial subplot (Table D's-- with or without)

RULE #2

IF project quantity of ANY JMF is greater than 500 tons (> 500 tons) and less than 2,500 tons (< 2,500 tons)

Then divide the entire quantity by 5 and there will be 5 equal sublots.

Table D does not apply.

Example: $2240 \div 5 = 448$ tons. That means **5 equal sublots of 448 tons.**

X value from PTM 1 is multiplied by **448 to find the sampling tonnage.**

RULE #3

IF project quantity of ANY JMF is 500 tons or less (≤ 500)

Then divide by 3 to determine 3 equal sub-lots for core locations only.

Material acceptance for Lots of 500 ton or less is by certification. Cores are an option.

Table D does not apply.

Example: $475 \div 3 = 158.3$. That means **3 equal sublots of 158.3 tons.**

X value of PTM 1 is multiplied by **158.3 to find the sampling tonnage.**