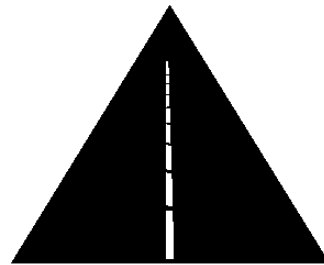


Asphalt Paving Inspection

John Hickey
Asphalt Pavement Association of Oregon
jhickey@apao.org



ASPHALT PAVEMENT
ASSOCIATION OF OREGON

Identify:

- Areas where inspectors can positively influence paving projects
- Problem areas in asphalt pavement inspection

Expectations:

- Willingness to participate
- Agree that we may not agree



Knowledgeable paving inspectors are important because:



Setting Clear Expectations

- **Planning Pre-Project**
- **Communication**
 - **Confirm understanding**
- **Topics for Communication**
 - **Pet peevs**
 - **Roles/authority**
 - **Plans and specifications – order of precedence**
 - **Documentation – what needs to be documented and who is going to do it**
 - _____
 - _____

Roles/Authority

- **Inspectors May**
 - **Inspect**
 - **Reject materials**
 - **Temporarily suspend work**
 - **Act within the PM's grant of authority**
- **Inspectors May Not**
 - **Accept Work**
 - **Change/waive contract requirements**
 - **Give instructions contrary to contract**



Roles/Authority

- **Superintendents Must**
 - **Be present while paving**
 - **Have radio or cell phone**
 - **Have authority to execute orders and control crew**
 - **Coordinate work**
 - **Provide access**
 - **Communicate expectations and schedule**
 - **Be point of contact for subcontractors**



Documentation

- Good Ideas
- Bad Ideas



Job Mix Formula

The _____, the
_____, and the
_____ must have and
cherish the JMF.



OREGON DEPARTMENT OF TRANSPORTATION
MATERIALS LABORATORY
800 AIRPORT ROAD SE
SALEM, OR 97301-4798

503.986.3000
Fax: 503.986.3096

Contract No.: C99989 EA: F.A. No Lab No. 13-MD0147
Project Name: Riverbend S & G (Private Mix Design) Amendment 1 Date:
Highway: County: Amendment 2 Date:
Begin MP: End MP: Amendment 3 Date:
Contractor:
Project Manager: Use: Level 3 1/2" Dense Mix

BITUMINOUS MIX DESIGN REVIEW

Lab Name: APAO Certified Mix Design Technician: Kevin Berklund
Mix Producer: Riverbend S&G Contractor Mix Design No.: KB-2013-01
Asphalt Supplier: McCall Transferred from Lab No.:
Asphalt Grade: PG64-22 Antistrip Information: %
Gb (60%/60° F): 1.030

Dryback Rices are required for production testing.

Stockpile Information							
Stockpile Size	1/2" - #4	#4 - #8	#8 - 0	RAP			
Stockpile Source	27-032-2	27-032-2	27-032-2	Sikpile			
Stockpile Percentage	16.0	25.0	30.0	30.0	0.0	0.0	0.0
Bulk Specific Gravity (Gsb)	2.614	2.556	2.500	2.627	0.100	0.100	0.100

Job Mix Formula		Paving Course	% Asphalt by Wt. of Mixture (Pb)	Maximum Specific Gravity (Gmm):
Sieve	% Pass	Wearing <input checked="" type="checkbox"/>	6.2	2.408
3/4" (19mm)	100	Base <input checked="" type="checkbox"/>		
1/2" (12.5mm)	99	Leveling <input checked="" type="checkbox"/>		
3/8" (9.5mm)	89	Temporary <input checked="" type="checkbox"/>		
1/4" (6.25mm)	71			
No. 4 (4.75mm):	60			
No. 8 (2.36mm):	41	VMA: 15.6	VFA: 74	
No. 16 (1.18mm):	26	Percent A/C in Rap: 5.9	Combined Aggregate Gravity (Gsb): 2.568	
No. 30 (0.60mm):	19	Number of Gyration: 80	Gmb Sample Weight: 4570	
No. 50 (0.30mm):	13	Void Target (Va): 4.0	Mixing Temp Range: 305-315 F	
No. 100 (0.15mm):	9	Tensile Strength Ratio: 86	Placement Temp Range: 285-293 F	
No. 200 (0.075mm):	6.7			

Compliance Statement: Based on the information submitted for review, this mix design does comply with specifications. Total Lab Charges: \$0.00

Reviewed by Signature: _____ Date: _____

C: Files; FHWA, Project Manager; Mike Stennett, Pavements; Bituminous; Region QA Coord;
Larry Ilg, Pavements

Clear Expectations

- **Planning Pre-Project**
- **Communication**
 - Confirm _____
- **Topics for Communication**
 - Pet peevs
 - Roles/authority
 - Plans and specifications – order of precedence
 - Documentation – what needs to be documented and who is going to do it
 - _____
 - _____

Quality in Paving

What is the number 1 indicator of a pavement that will last?

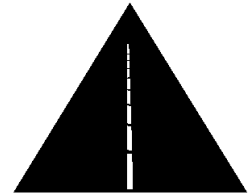
- **Balanced production and laydown operations**
- **Site preparation**
- **Mix type**
- **Truck loading**
- **Hauling practices**
- **Truck to paver exchange method**
- **Mix temperature**
- **Laydown practices**
- **Types of rollers**
- **Weather/temperature**
- **Longitudinal joint construction**
- **Transverse joint construction**
- **Segregation**
- **Smoothness**
- **Compaction**



Quality in Paving

What will give us better quality at lower cost on average?

- **An inspector who demands strict adherence to the specification.**
- **An inspector who understands the fundamental principles of paving and will engage in communication (and confirm understanding) over why the specification may not fit a certain context.**



ASPHALT PAVEMENT
ASSOCIATION OF OREGON

Site Preparation

Site preparation is important because it is how we ensure bonded layers.

- **Clean existing surface**
- **Proper milling**
- **Proper tack coat**



Bonding Demonstration

(courtesy of FHWA/AI Tack Workshop)

**1/2" Deflection,
60lb Load**



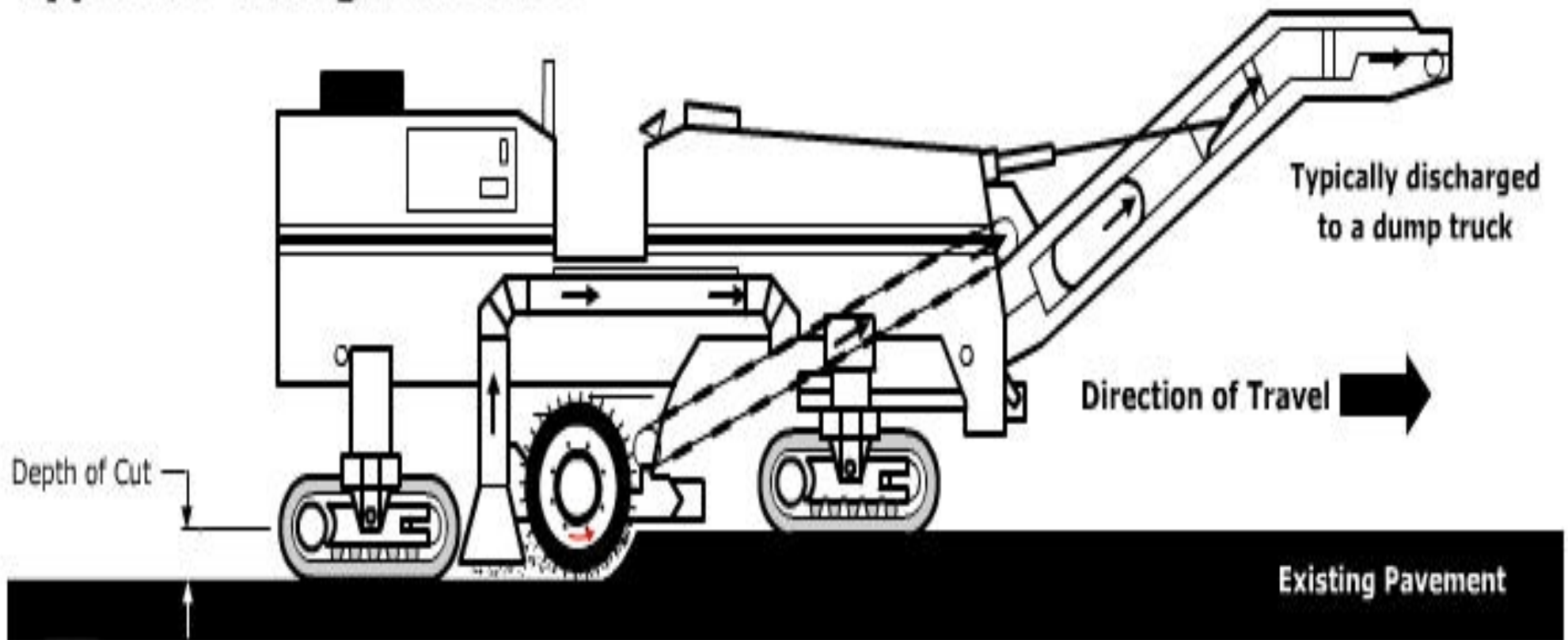
Unbonded

**1/4" Deflection,
160lb Load**



Fully Bonded

Typical Milling Machine



Tracks

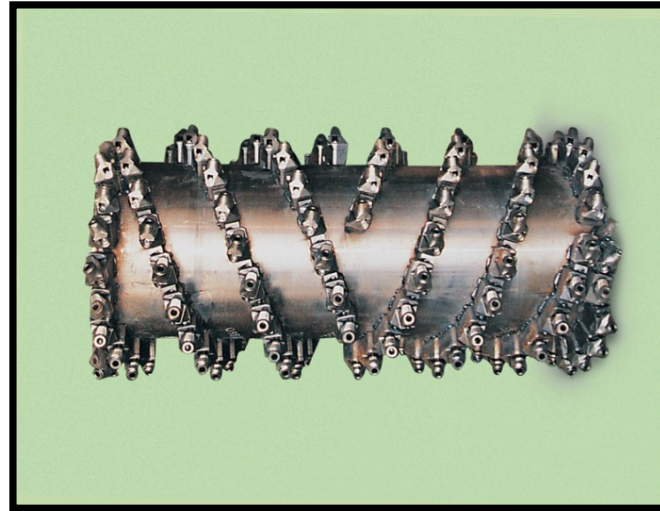
Vacuum

Cutter Drum

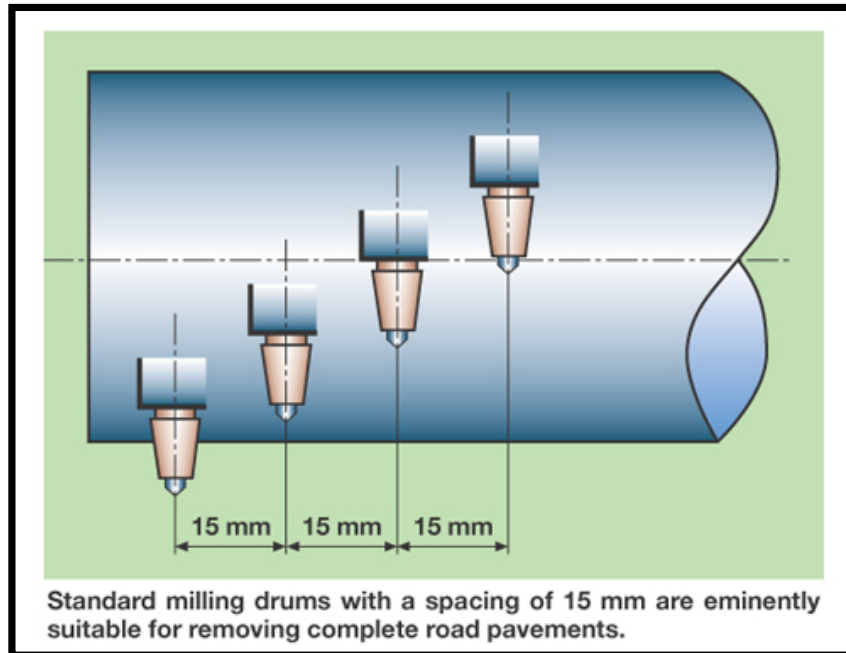
Conveyor Belts



Triple Wrap

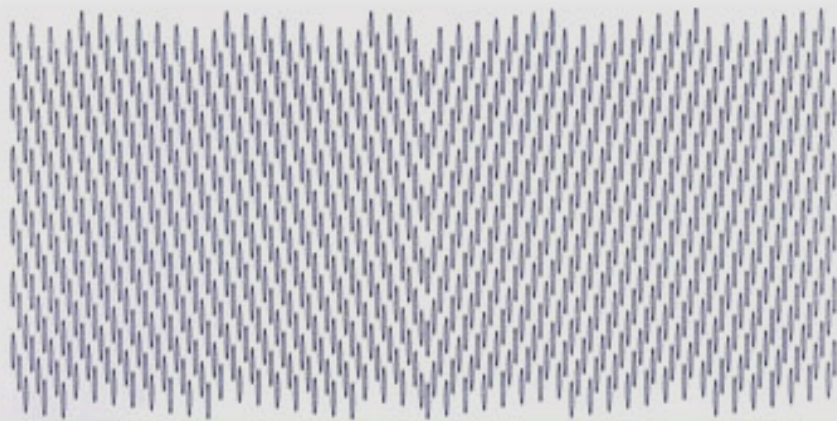
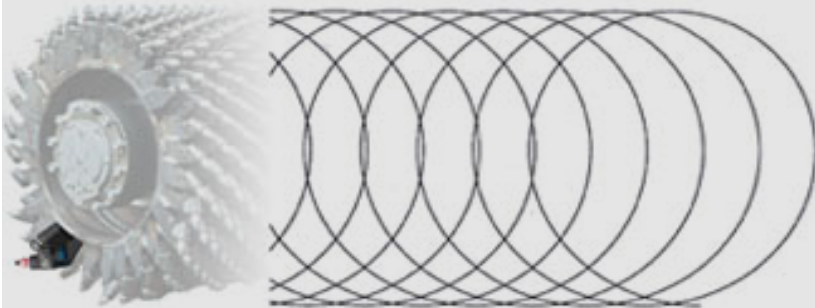


5/8" Spacing



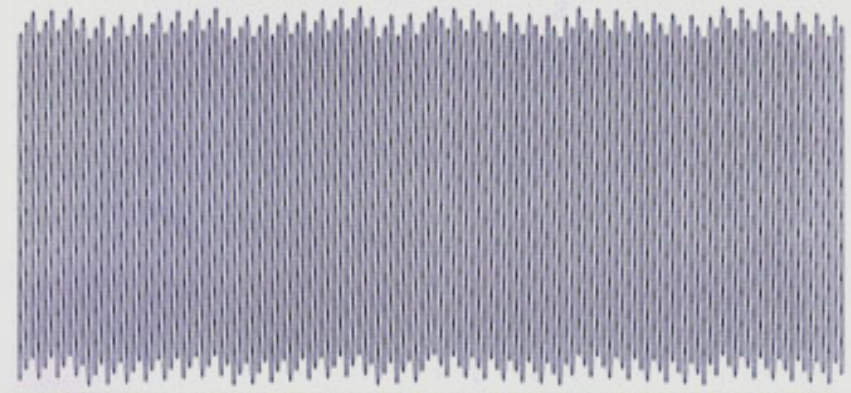
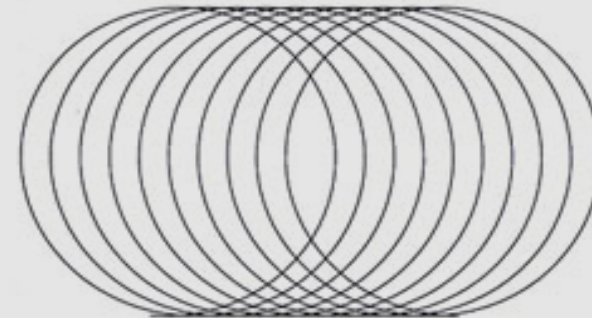
Standard milling drum FB 2000_LA 15

Advance speed: 16 m/min



Standard milling drum FB 2000_LA 15

Advance speed: 8 m/min



MILLING PROBLEMS



BAD TEETH AND
HOLDERS

MILLING PROBLEMS

TOO FAST

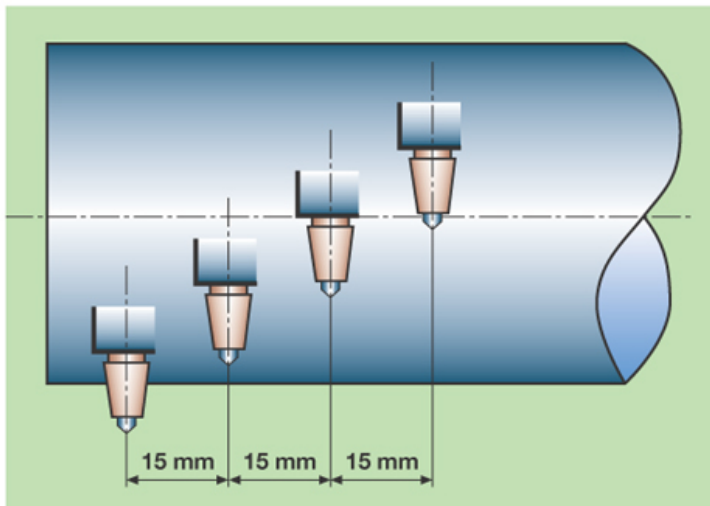
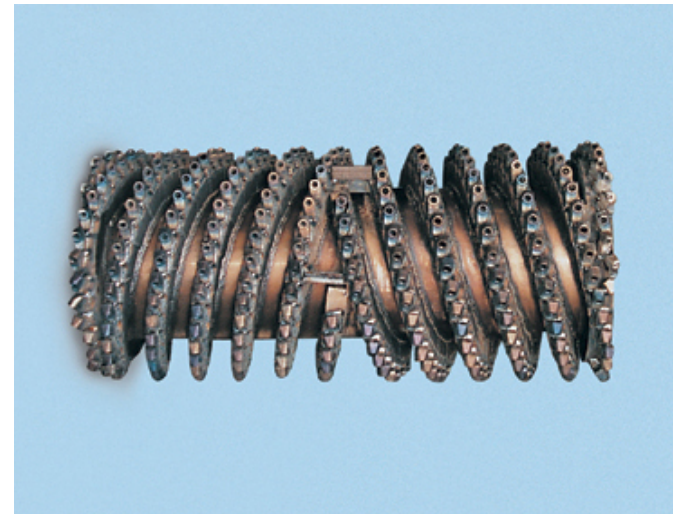
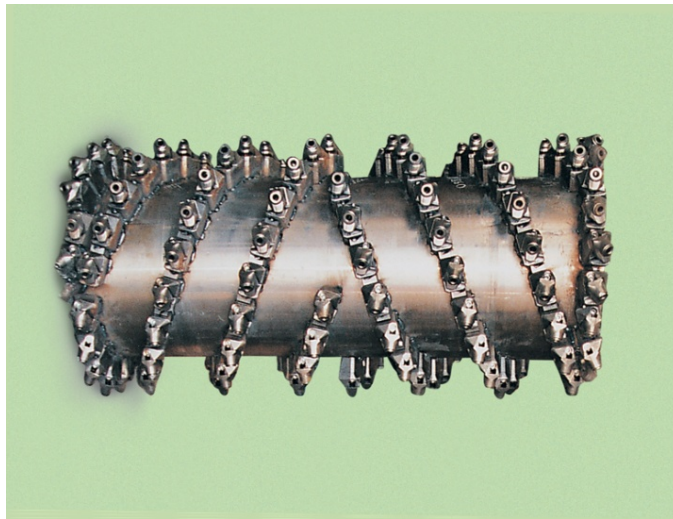


MILLING PROBLEMS

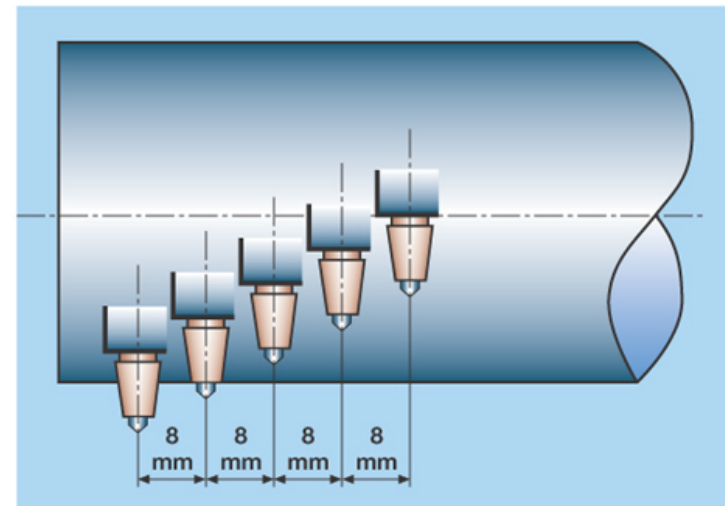
JUST RIGHT



FINE MILLING



Standard milling drums with a spacing of 15 mm are eminently suitable for removing complete road pavements.



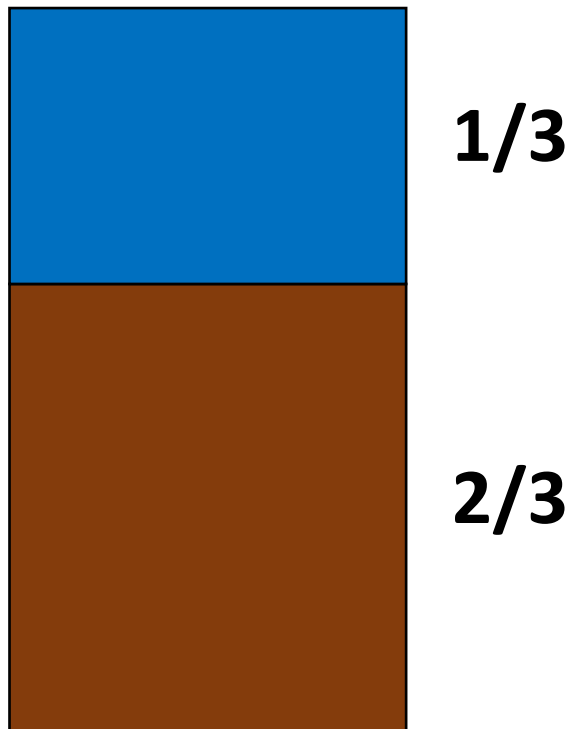
The fine milling drums with a spacing of 8 mm are ideal for treating the surface of pavement courses.

Tack Coat

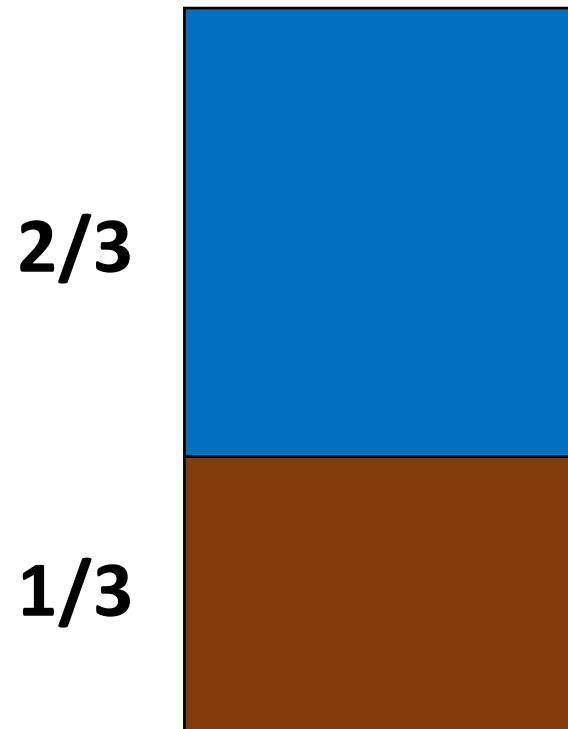
What is it?



Produced



Diluted



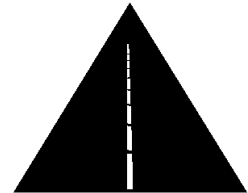
Diluting Tack

Advantages

- More uniform application
- Fewer plugged nozzles

Disadvantages

- Need to accurately calculate application rate
- Longer time to break



ASPHALT PAVEMENT
ASSOCIATION OF OREGON

Tack



Tack



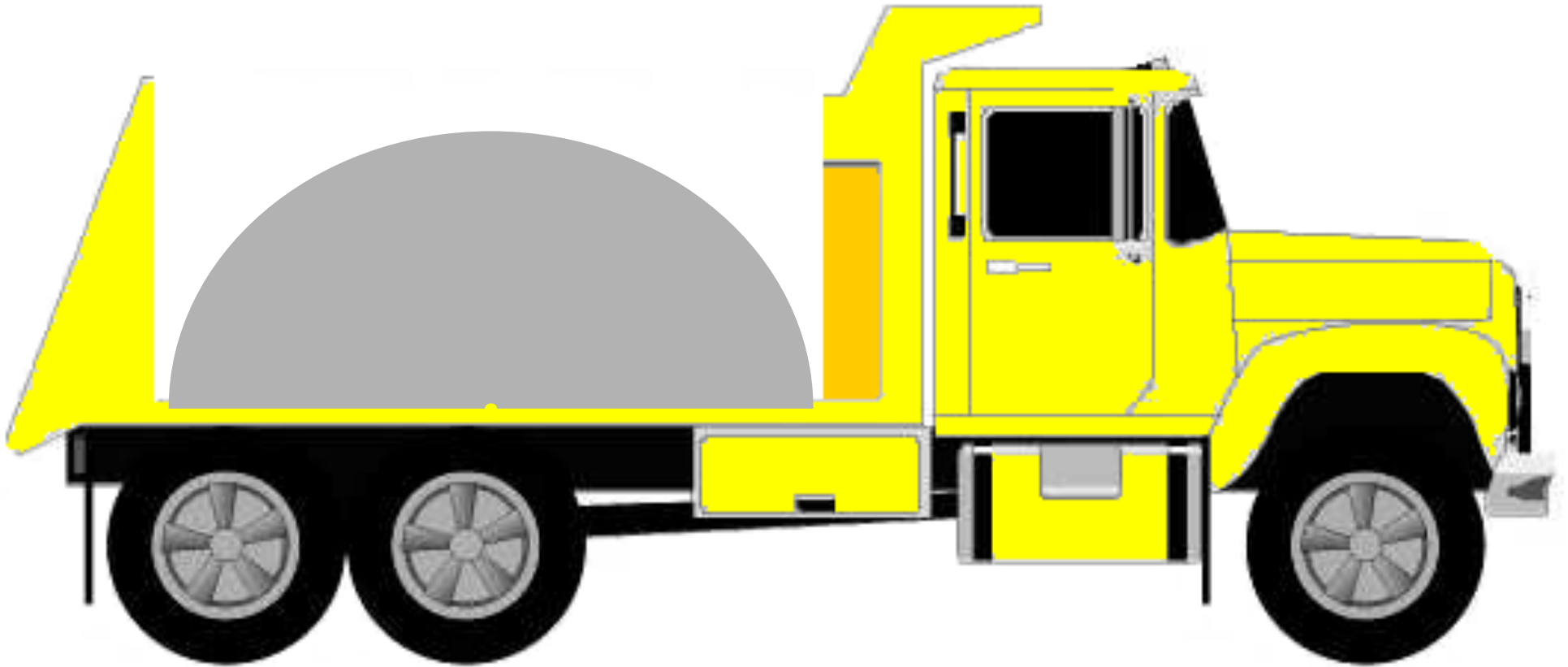
Tack



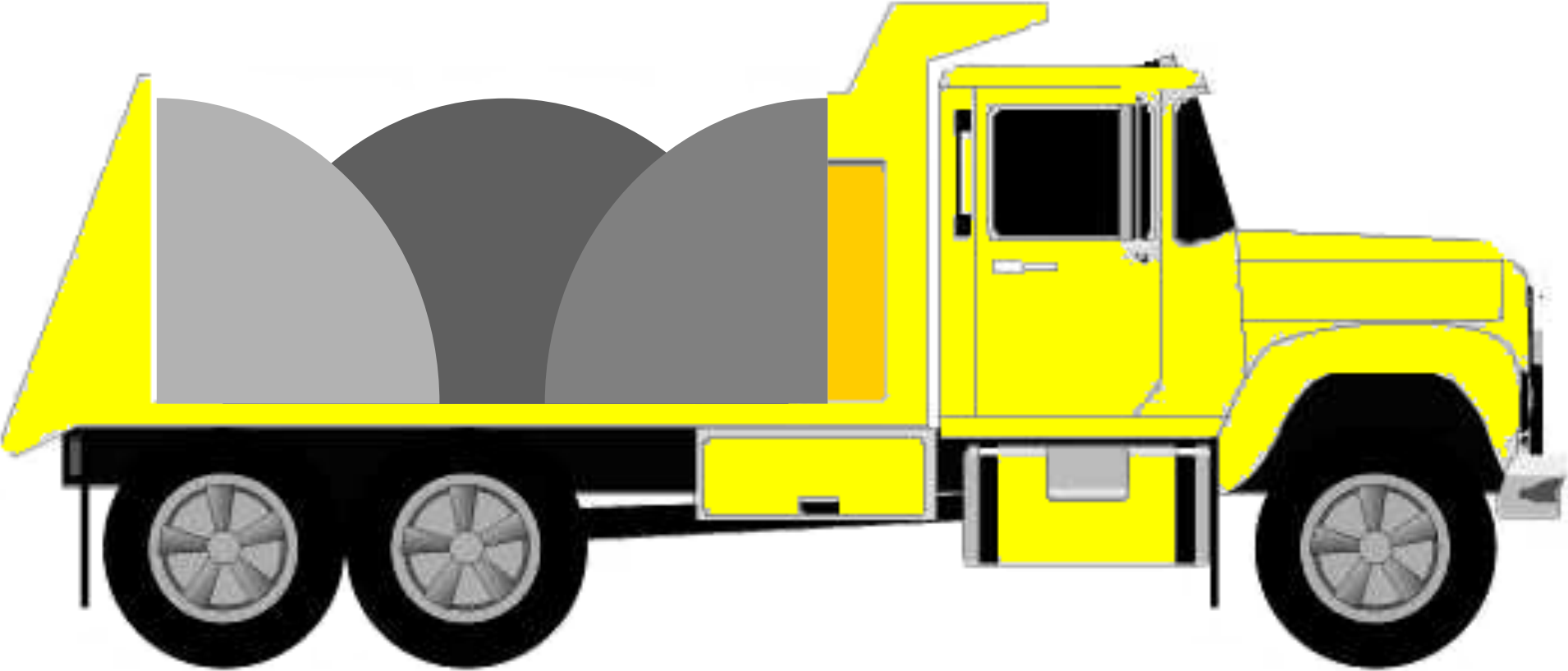
Tack



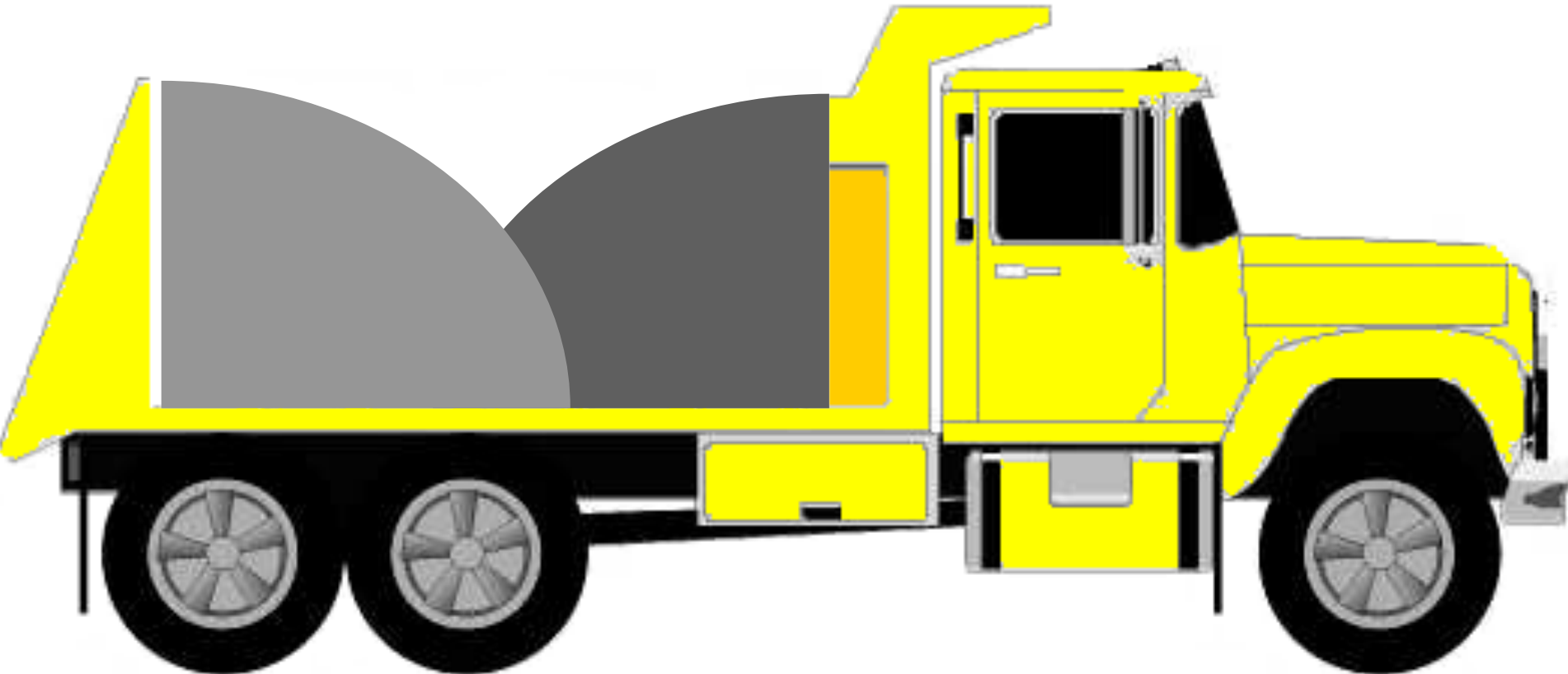
Truck Loading



Truck Loading



Truck Loading



Truck Loading

If an inspector notices a truck loading issue what should the inspector do?



Compaction

Compaction:

- **Bulk Density ÷ Theoretical Max Density**
- **Bulk Density: Nuclear gauge or cores**
- **Theoretical Max Density: Lab results (e.g., MAMD)**

Inspectors should _____ the numbers

Compaction Questions for Inspectors

- Where is the density technician?
- Does density tech have JMF?
- Is density tech communicating?
- Does the density tech know the numbers behind each roller?
- Do the numbers make sense? Consistent?
- Is the gauge measuring below new pavement?
- If numbers are unexpected, can the contractor get a 2nd gauge?

Compaction

What if one test result is below the minimum?

TEST NUMBER		3-2-1	3-2-2	3-2-3	3-2-4	3-2-5
DATE OF TEST		11/9/2011	11/9/2011	11/9/2011	11/9/2011	11/9/2011
TEST LOCATION (STATION)		203+64	205+46	206+81	211+78	215+64
DISTANCE LT. OR RT. OF CENTERLINE FEET		3.4 Lt	1.2 Lt	11.0 Lt	8.8 Lt	6.1 Lt
LIFT	DIST BELOW GRADE	LIFT THICKNESS				
		2/2"/2"	2/2"/2"	2/2"/2"	2/2"/2"	2/2"/2"
DENSITY lb/ft ³	1	143.2	144.7	144.9	144.4	143.7
Max difference 2.5 lb/ft ³	2	142.8	144.1	145.1	144.8	144.1
AVERAGE DENSITY (LINE 1+LINE 2)/2	3	143	144.4	145	144.6	143.9
CORE TO NUCLEAR CORRELATION	LINE 3 *	4	143	144.4	145	144.6
X MAMD	TARGET DENSITY lb/ft ³	5	156.6	156.6	156.6	156.6
% COMPACTION FOR INDIVIDUAL TESTS (LINE 3 OR 4 / LINE 5) X 100	6	91.3%	92.2%	92.6%	92.3%	91.9%
SUBLOT OR SECTION LINE 6 AVERAGE	% REQUIRED	92.0%		92.1%		
REPRESENTS MATERIAL INCORPORATED						
FROM STATION	203+08	TO STATION	217+24			
FROM OFFSET	CL	TO OFFSET	12 ft Lt CL			
REMARKS						

Compaction Variability



- **Sampling method and location**
- **Testing – operator and equipment variation**
- **Material – natural variations in aggregate and binder**
- **Existing Surface – flat and strong or not**
- **Construction – consistency in production and placement procedures**
- **Environmental Conditions – changes**

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means _____

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means _____ E _____

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means O E _____
____ O _____ O ____.

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means O E G
 O O G .

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means S O E G
S O O G.

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means S O E G
S P O O G.

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means S O E G
S P O Y O G.

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means S O E G
S P R O Y R O G.

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means S O E N G
S P R O Y R O N G.

Compaction Variability

- Individual test variability is about 1.5%
- Most tests should be within 1.5% of the average
- What if tests are much closer to average?
- What if tests are much greater?
- Easy compaction means SOMETHING
IS PROBABLY WRONG.

Quality

- **Surface prep**
 - **Cleaned, consistent mill pattern, good tack coverage**
- **Truck loading**
 - **Don't ignore because segregation is bad**
 - **More than 1 dump in each truck**
- **Compaction**
 - **Most important indicator of quality**
 - **Using correct specific gravities is critical**
 - **Variability is a reality and must be understood**