



Asphalt Rubber Chip Seal Inspection

NWPMA 2016
Portland OR
Jason Lampley

Topics

- » Materials
- » Manufacture
- » Placement
- » Expectations

AR Binder Materials

- » Rubber 8%-20%
- » PG Asphalt 75%-90%
- » Modifiers 0%-5%
- » Polymers 0%-3%
- » Testing

Rubber

- » Recycled Tires Pulled from landfills
- » Processed in plants to remove steel belting and fabric
- » Graded to specification
- » Shipped in 2000lb super sacks

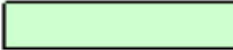
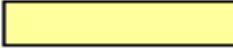



4.0 Crumb Rubber Modifier Gradation, Percent Passing (ASTM C136)

Scrap Tire (ST)	Scrap Tire Spec (% Pass)	Sieve Size	High Natural Spec (% Pass)	High Natural (HN)
100.0	100	2.36 mm/No. 8		100.0
99.7	95-100	2.00 mm/No. 10	100	100.0
55.3	45-75	1.18 mm/No. 16	95-100	100.0
18.6	2-20	600 μ m/No. 30	35-85	62.4
3.5	0-6	300 μ m/No. 50	10-30	18.1
0.0	0-2	150 μ m/No. 100	0-4	0.6
0.0	0	75 μ m/No. 200	0-1	0.0

PG Asphalt

		High Temperature, °C				
		52	58	64	70	76
Low Temperature, °C	-16	52-16	58-16	64-16	70-16	76-16
	-22	52-22	58-22	64-22	70-22	76-22
	-28	52-28	58-28	64-28	70-28	76-28
	-34	52-34	58-34	64-34	70-34	76-34
	-40	52-40	58-40	64-40	70-40	76-40

 = Crude Oil
 = High Quality Crude Oil
 = Modifier Required

Type 2 Binder Design

**20.0% Scrap Tire and High Natural CRM (Crumb Rubber Manufactures)
 Consisting of 75.0% Scrap Tire CRM and 25.0% High Natural CRM
 80.0% Asphalt Cement with 2.5% Extender Oil
 (Targa Sound Terminal PG 64-22/Tricor Raffex 120 ACB)**

1.0 Materials

Material	Source/Supplier	Source Location
PG 64-22 Asphalt Cement	Targa Sound Terminal	Tacoma, Washington
Raffex 120 ACB Extender Oil	Tricor Refining	Bakersfield, California
Scrap Tire Crumb Rubber Modifier	Crumb Rubber Manufactures	Rancho Dominguez, California
High Natural Crumb Rubber Modifier	Crumb Rubber Manufactures	Rancho Dominguez, California

2.0 Asphalt Cement Grade Confirmation

Test	Result	Specified Limits
Dynamic Shear Rheometer, 64°C, G*/sinδ (T315)	1.22	1.00 minimum

3.0 Crumb Rubber Modifier for Asphalt Rubber, Physical Analysis (LP-10)

Test	ST	HN	Specified Limits
Wire in CRM, %	0.0	0.0	0.01 Maximum
Fabric in CRM, %	0.0	0.0	0.05 Maximum

Test Performed	Minutes of Reaction							Specified Limits
	45	60	90	120	240	360	1440	
Viscosity, at 375°F, Pa·s, (10 ⁻³), or cP (D2669)	2100	2300	2400	2400	2500	2500	2400	1500-3500
Resilience at 77°F, % Rebound (D5329)		39			45		41	35 min.
Ring & Ball Softening Point, °F (D36)		147			153		151	140 min.
Cone Penetration at 77°F, 0.10mm (D217)		34			35		36	20-70

Viscosity Testing



Resilience Testing ASTM D 5329

Unrendered

Softening Point ASTM D 36

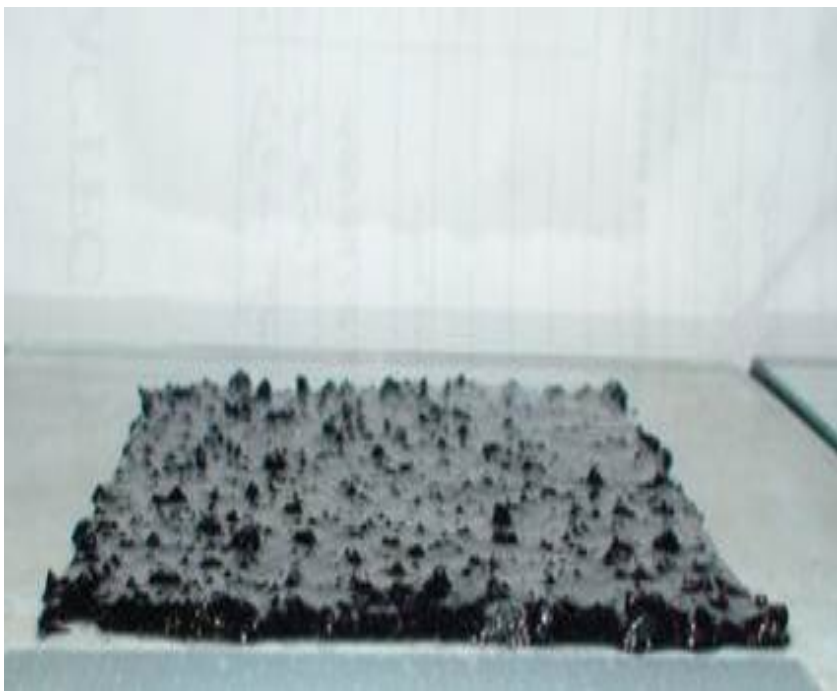


Cone Penetration ASTM D 217

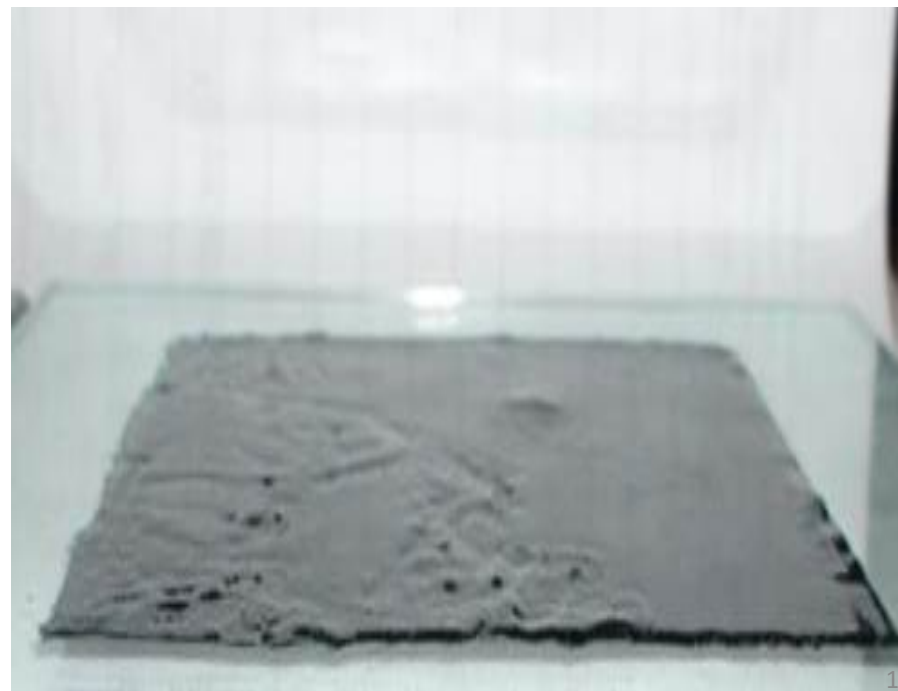


Visual Comparison

Asphalt Rubber



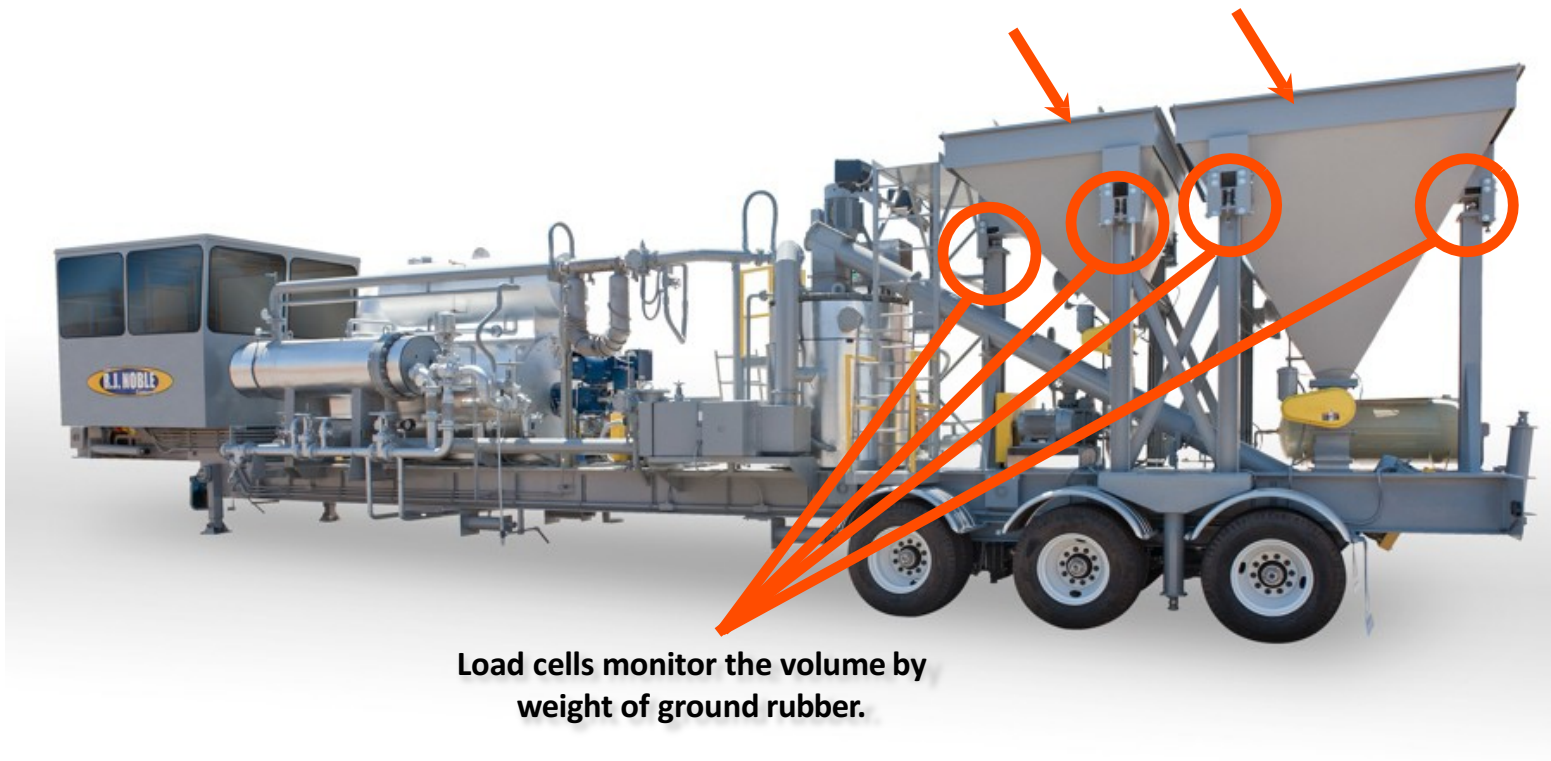
PG Asphalt



Portable Plant

- » Plant is mobile and can produce custom binders for chip seal or hot mix
- » Air Permits May be Required
- » All components metered
- » Paperwork in order
- » Samples must be retained in metal cans

Rubber Hopper



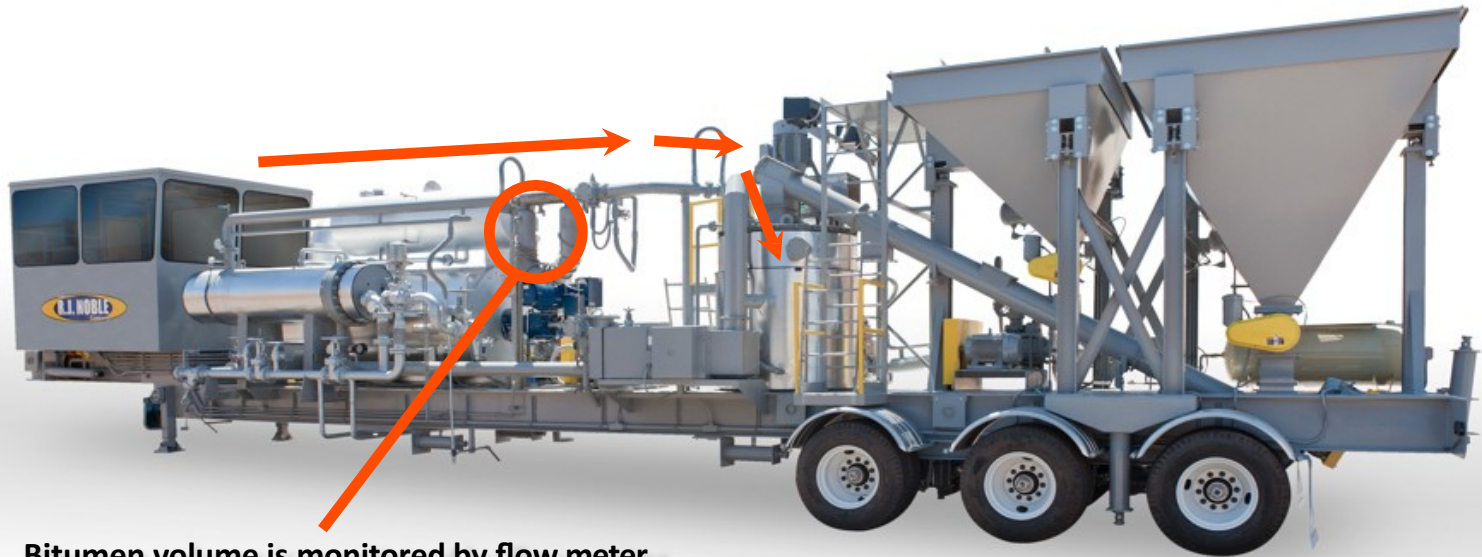
Load cells monitor the volume by weight of ground rubber.

The ground rubber is carried to the mixing container.



PG Asphalt Temperature is elevated in the heat exchanger

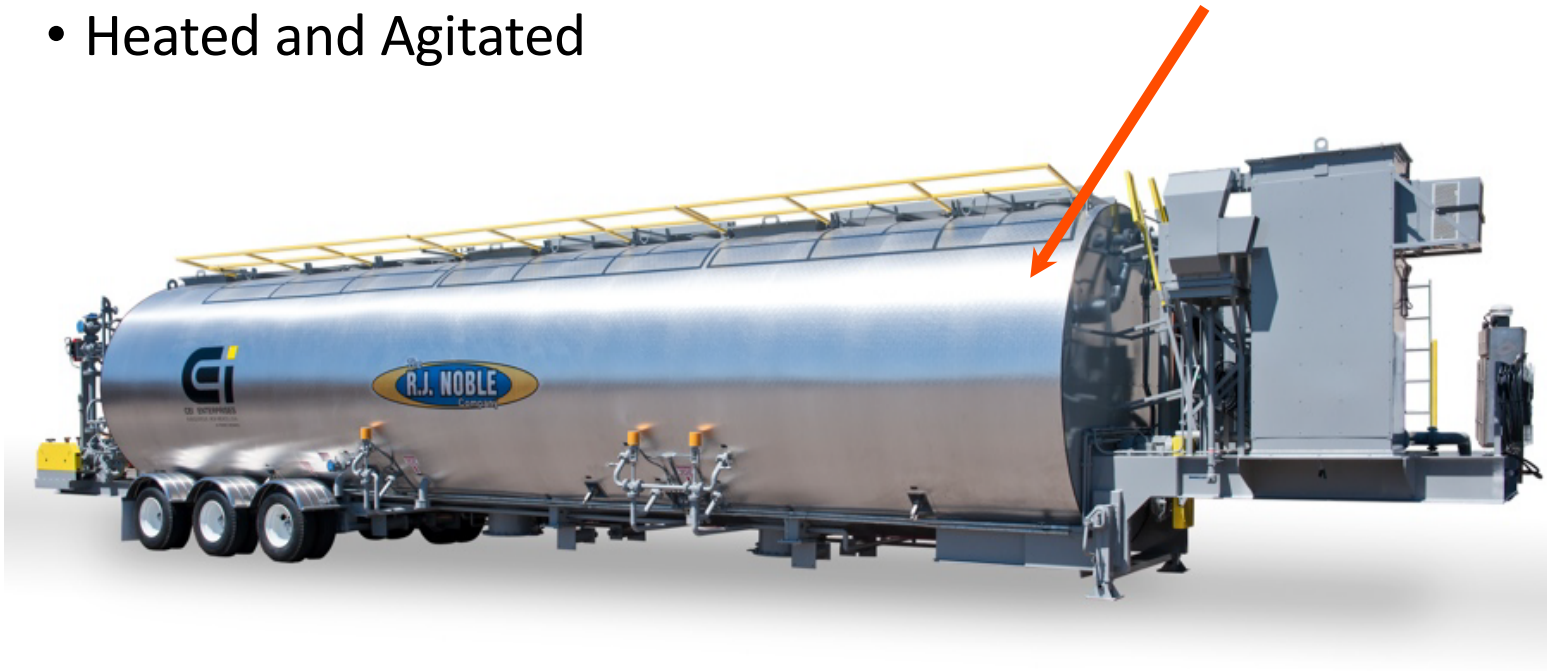




Bitumen volume is monitored by flow meter.

Reaction Vessel

- Heated and Agitated





RUBBER ASPHALT PLANT

AR RUBBER BINDERS PRODUCTS

10500 S. HARLAN ROAD FRENCH CAMP, CA .95231

Email: Miguel.Ramirez@gcinc.com

JOB # 618337

DATE: 7/18/2016

Tire Rubber Supplier: Crumb Rubber Modifier

Type: Scrap tire/ HiNatural

% Rubber: 20%

Asphalt Supplier: McCall Oil and Chemical

Type: PG 64-22

% Oil: 77.50%

Extender oil Supplier: San Joaquin Refining

Type: Raffex 120

% Extender Oil: 2.50%

Asphalt Rubber- Lab Data

NOTES	Blend #	Blend Time	OIL Temp	2.5% Extender Oil	5.00% HN	15.00% CRM	77.5% Asphalt	Tons Blended	Test Time	Viscosity	Test Temp
	8	4:00 PM	365 °	0.1250	0.2500	0.7500	3.8750	5.0000	5:00 AM	2100	368 °
	9	4:40 PM	365 °	0.1250	0.2500	0.7500	3.8750	5.0000	5:00 AM	2100	368 °
	10	5:10 PM	365 °	0.1250	0.2500	0.7500	3.8750	5.0000	5:00 AM	2100	368 °
	11	5:25 PM	375 °	0.2500	0.5000	1.5000	7.7500	10.0000	5:00 AM	2100	368 °
	12	6:30 PM	375 °	0.3500	0.7000	2.1000	10.8500	14.0000	8:00 AM	2000	375 °
	13	7:10 PM	375 °	0.3750	0.7500	2.2500	11.6250	15.0000	8:00 AM	2000	375 °
	14	8:25 PM	377 °	0.3750	0.7500	2.2500	11.6250	15.0000	8:00 AM	2000	375 °
				1.7250	3.4500	10.3500	53.4750	69.0000			

Construction

- » Candidates
- » Preparation
- » Oil Application
- » Aggregate Application
- » Sweeping
- » Final Coat?



Street Preparation

- Weed Removal complete?
- Thermo striping 8" or larger removed?
- Street clear of parked cars , green waste, dumpsters, and trash bins?
- Pre Sweep complete?
- Utilities Protected?
- Temporary Markings in Place?

Suitable pavement conditions

Check that surface temperature is at the minimum requirement and rising

Asphalt Rubber 55 degrees and rising

Can place Asphalt Rubber if rain is in forecast

Sprinklers off, pavement clean!



Application of Asphalt Rubber Binder

- Applied at .55 to .70 gallons per square yard.
- Application Temperature of 375 to 400 degrees farenheit

Rates Determined By
Pavement Condition
Traffic Patterns
Climate
Binder Profile

Expectations?



POSITIONING
OF TIPS IS
VITAL

KNIFED TIPS MAKE A DIFFERENCE!!



Handwork is Required



Handwork

- Squeegee Out all Oil Joints
- Paper all Starts



Aggregate Application





Aggregate Source

- Gradation
- Cleanliness
- Coating .5%-1% of any grade PG Asphalt
- Temperature if required
- Hardness

Chip Box Calibration

Apply over yd2 canvas mat



Weigh and verify rate



Hot Applied Aggregate Application

- 24 lb yd² - 35 lb yd²
- Distance Between Spreader and Chip-box





DIRTY AGGREGATE

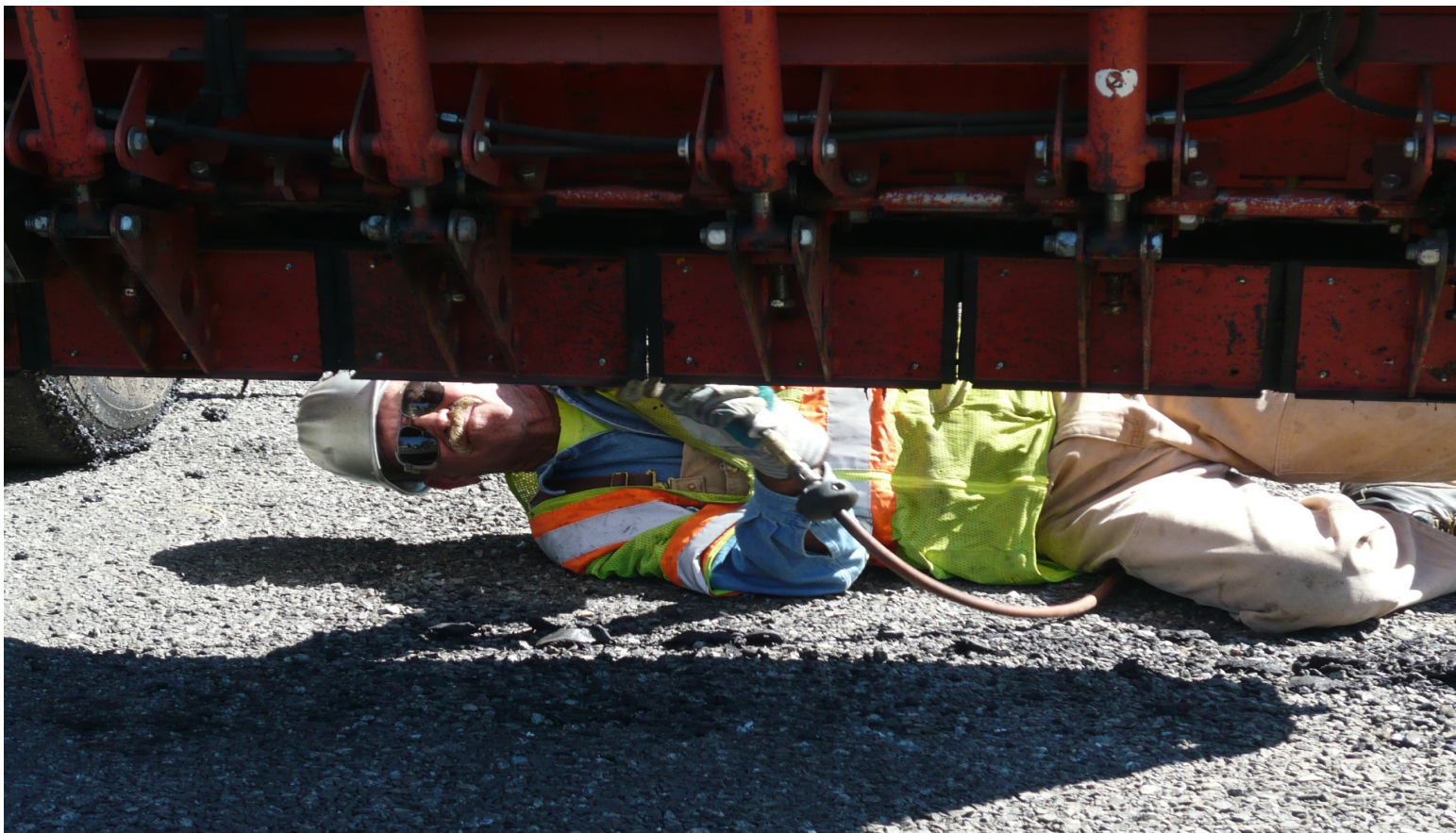
DO NOT ALLOW THE BAGHOUSE FINES TO BE INTRODUCED INTO THE LOADS . BAGHOUSE FINES MUST BE REJECTED

Transfers

- One in, One Chasing
- Stagger Wheel Path



CLEAN GATES DAILY!



SAFETY SLIDE!! Blind Spots



Hot Applied Longitudinal Joint

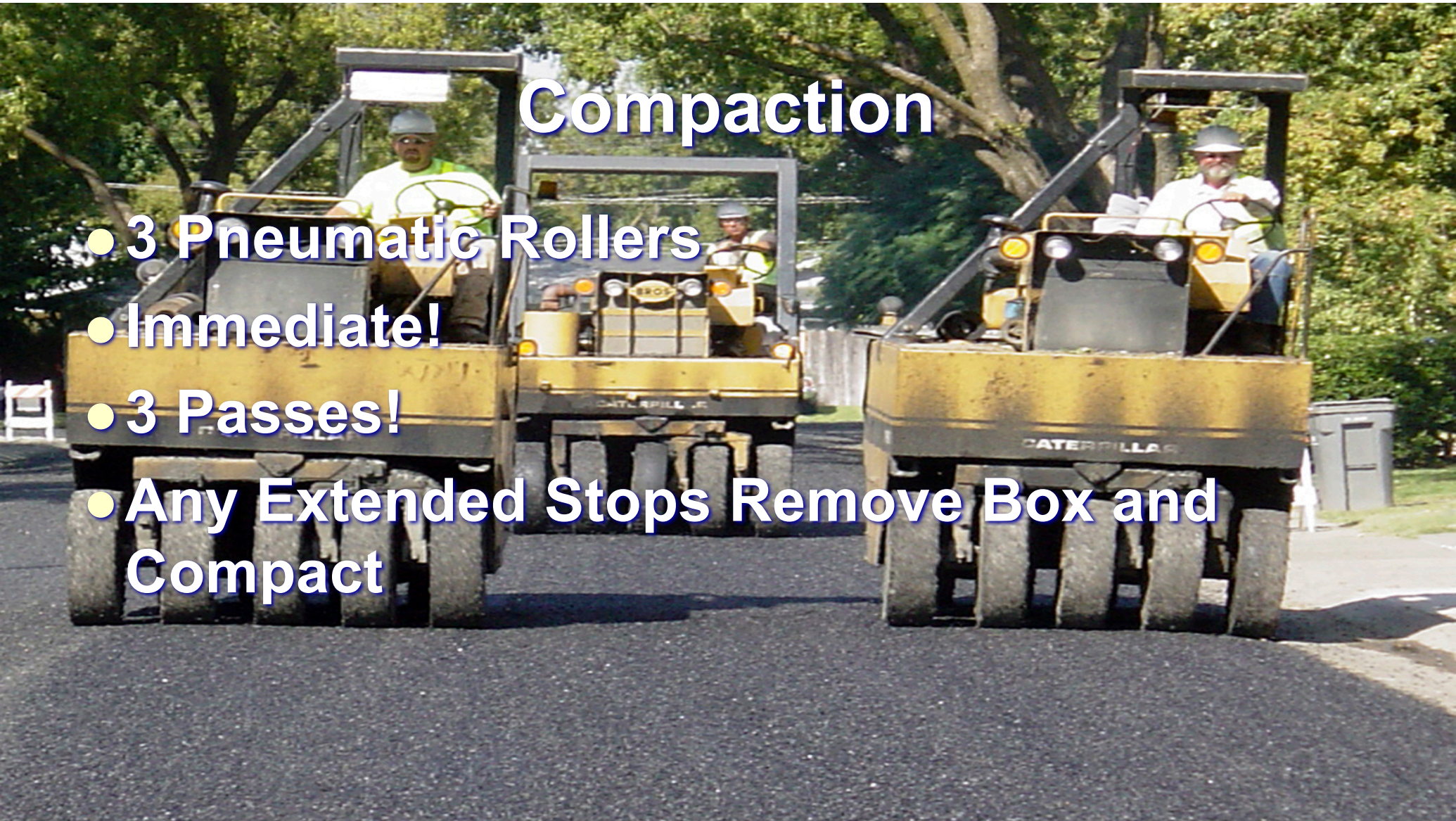
- “Meet Line”

- 12” Min



Compaction

- 3 Pneumatic Rollers
- Immediate!
- 3 Passes!
- Any Extended Stops Remove Box and Compact



SAFETY SLIDE!!!!



**10 FEET FROM FRONT OF
ROLLER**

Compaction

- Optional
- Steel Drum



Hot Applied Sweeping

15 Minutes

- **Additional Sweeping may be required up to Two Days after Application**



Cape Seal



Cape Seal Finish



AR after 4 years Gresham



Pierce County 3 years performance



Vancouver Cape Placed in 2012



Asphalt Rubber Chip in NW

- » Clark County
- » Kitsap County
- » Pierce County
- » Chelan County

Cont

- » City of Olympia
- » City of Vancouver
- » City of La Center
- » City of Gresham
- » City of West Richland
- » City of Richland



Cont

» WSDOT

» Western Federal Lands

Questions ???

