

Hot Applied Chip Seal Design and Construction

NWPMA Vancouver, WA 2017

TOPICS

- Street Selection
- Material selection
- Pavement repairs
- Partnering
- Public notification
- Sound construction practices

Street Selection

- Condition
- Traffic
- Climate
- Expectations

Street Selection



- Expectations
- Structurally Sound?
- Traffic volume and what kind of traffic
- System to be used
- Realistic?

Hot Applied Binders

- PG graded asphalt of all varieties modified with polymers and/or rubber.
- No water in the system and applied at elevated temperatures at higher application rates is the major difference between hot applied binders vs emulsion binders.
- Used on a variety of roads from residential, highways, to arterials.
- Can be manufactured on site or in terminal
- Applied with specialized and conventional equipment

Why do we modify asphalt?

- Unmodified asphalt can be sensitive to temperature variations or adverse conditions such as vehicle loading.
- Brittle in the Cold resulting in thermal cracking.
- Soft in the Heat resulting in rutting, flushing, and surface deformation at elevated temperatures.

- Also doesn't hurt that we can use recycled tires to modify asphalt and increase performance! Asphalt Rubber can use 600 recycled tires per lane mile at a 12" width!!

Why Put Rubber or Polymer In Asphalt?

- The purpose is not to get rid of tires but to enhance the performance of the binder and mix.
- Tires have great engineering properties, they don't crack in the cold or melt in the heat. They have a wider range of performance temperatures than asphalt.
- Make asphalt pavements that perform like tires.

Why Put Rubber or Polymer In Asphalt?

Tire rubber is an engineering tool used to:

- Reduce cracking
- Increase asphalt content and asphalt film thickness
- Prevent bleeding, flushing, and drain-down
- An aid to increase performance life
- Save Money in reduced maintenance
- Increase safety and reduce noise

Type II an IV Asphalt Rubber Components & Blending

- 5%-22% Ground Recycled Tires
 - 0%-6% Asphalt Modifier such as Raffex 120
 - 0-3% SBS Polymer
 - 78%-85% PG Graded Asphalt
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- PG Asphalt brought to 375-440 degrees fareinheit prior to incorporation of rubber
 - Asphalt modifier typically added to PG asphalt prior to incorporation of rubber
 - Polymer added to rubber in pellet form if milled and ground form if incorporated without mill *PG should not exceed 400f
 - Finished product requires 45-60 minutes of “reaction time” prior to use.

Field Blend Site



Rubber or Polymer is loaded into Hopper



Rubber/Polymer and Asphalt metered into
“mix drum” and delivered to finish/
reaction vessel



On Site QC through Viscosity Testing





Field Blended Rubber Binders

- Long term performance history
- Maximum Crack Mitigation
- High volume of recycled tire usage
- High application rates resulting in thicker membrane
- Enhanced high temperature and low temperature performance properties

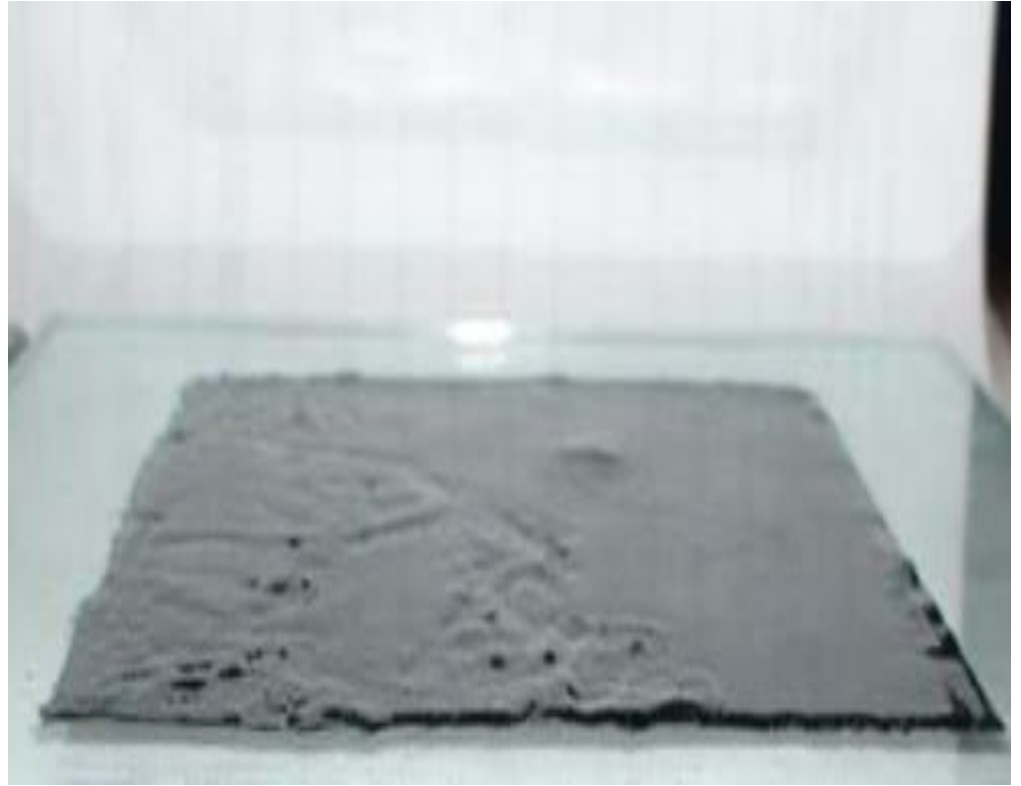
AC 15-5 TR & AC 15-P

- ❖ Terminally manufactured
- ❖ First used in the mid 1980's in Texas.
- ❖ Introduced to the NW in the 2000's
- ❖ heated under a controlled environment in a tank to an elevated temperature fully digesting rubber when tires utilized
- ❖ Polymers utilized in both AC 15P and AC 15-5tr
- ❖ 0-18% rubber content



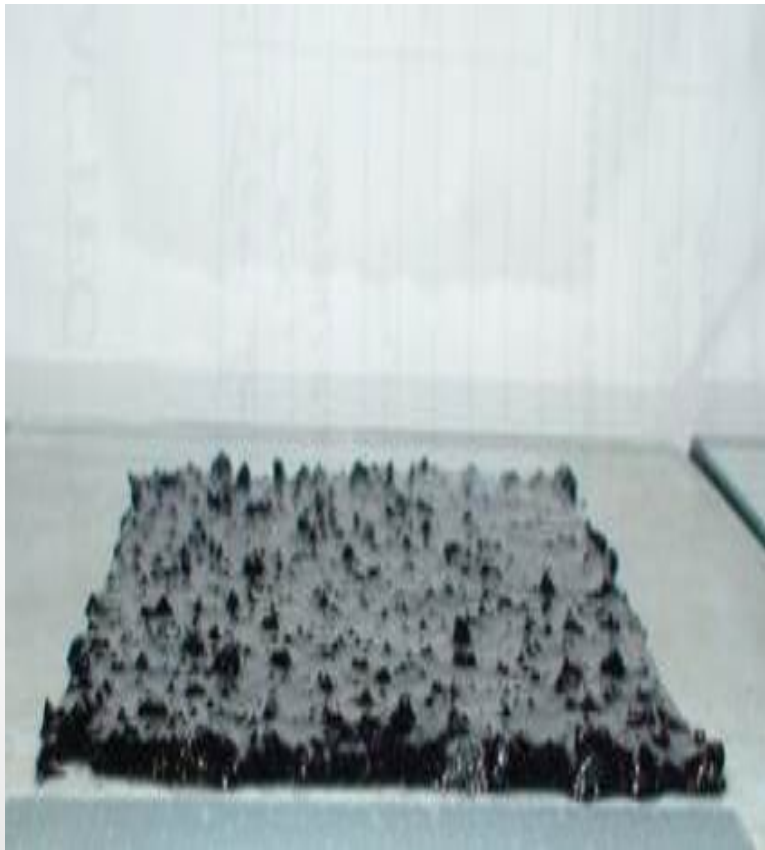
AC-15P or PG-M application

- ❖ .30-.50 gallons per yd²
- ❖ Aggregate Applied at 18-24lbs per yd²
- ❖ Application temperature of 350 to 375 degrees Fahrenheit.
- ❖ Applied with conventional (non agitated) distributors
- ❖ Boot Crew Optional



Visual Comparison

Asphalt Rubber



AC 15-5tr or AC-15P





Modified Binder AC-15P

- Quick Cure
- Applied with conventional equipment
- Improved crack mitigation
- Available Terminally

Time to Chip!



Public Notification

- Communication
- Media Notification?
- Bilingual?
- How Many Days of Work?
- Information on Entire Process
- Transit and Garbage?
- Three Day No-Park
- Advance placement of cms boards



NOTICE

WE WILL BE WORKING ON YOUR STREET

The week of April 2, 2007 International Surfacing Systems will be placing an Asphalt Rubber Chip Seal on your street. Asphalt Rubber Chip Seal is one of the most efficient and economical ways of resurfacing and maintaining your streets.

Asphalt Rubber Chip Seal consists of rubberized liquid asphalt applied to the existing surface, which is then covered with aggregate rock called "chip". The Chip Seal takes about 1 to 2 hours to cure completely. Your street will receive a cury seal approximately 1 week after the chip seal is applied, which will give your street a smooth black finish. You will receive a notice of the proposed work by Valley Slurry Seal, the slurry contractor, prior to the work commencing.

There will be flagmen and other workers directing traffic to ensure the safe passage of all citizens and for the safety of our workers. Expect some delays, and choose alternate routes, if possible. The hours of construction will be from 7:00 AM to 3:30 PM.

Your street will not be closed to traffic during the Chip Seal process, but delays are to be expected. Streets that are to receive treatment will have "No Parking" signs placed along the street at least 48 hours prior to the work being started. These signs will have specific dates and times that all parking on the street will be restricted. **ANY CARS PARKED WITHIN THE POSTED AREA ON THE DAYS OF THE CHIP SEAL PLACEMENT WILL BE TOWED.** In order to sweep excess loose chips after placement, we request that you still park off the street or in some other convenient area for the two days following the placement of the chip seal.

The oil used in the Asphalt Rubber Chip Seal placement can and will stain your carpets, floors, and other related items if traveled through before it is covered with chips or has had time to cure. If you do have oil on something, simple dish soap and water will clean the area if caught before the oil has had time to dry. Otherwise we recommend a citrus solvent type cleaner. If you have any questions, there will be a representative of International Surfacing Systems on the job site. Below is the number and address for our main office.

International Surfacing Systems
P.O. Box 4770
Modesto CA 95352
(209) 523-9065 Office
(209) 236-1864 FAX

Barricade Spacing and timeline





TRAFFIC CONTROL

Traffic Control

- Traffic patterns
- Chip seals allow one way traffic during construction
- Sufficient amount of flaggers with communication needed to guide traffic safely through project
- Loose Gravel signs at all entry points of street or placed periodically through out highway projects
- Reduce Speed on Highways of County Roads

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?

Pavement Conditions

- 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!



Oil Application



Application of Hot Applied Binder

- Type II AR binder applied at .55 to .70 gallons per square yard.
- Application Temperature of 375 to 400 degrees Fahrenheit
- AC 15-P or Type IV AR binder applied at .30-.50
- Application temperature 350 to 400 degrees Fahrenheit

Rates Determined By:

Aggregated Size

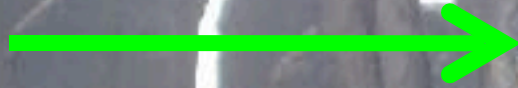
Pavement Condition

Traffic Patterns

Climate

Expectations?

POSITIONING
OF TIPS IS
VITAL



KNIFED TIPS MAKE A DIFFERENCE!!



Handwork is Required



Handwork

- Squeegee Out all Oil Joints on AR
- Paper all Starts



Aggregate Application



AGG Selection and Gradation

3/8 or 1/2

- Residential or Highway
- Binder Selected
- Customized gradation?
- Cape Seal?

Aggregate Source

- Cleanliness
- Coating .5%-1% of any grade PG Asphalt
- Temperature if required
- Hardness
- Salt and Pepper Appearance

Chip Box Calibration

Apply over yd2 canvas mat



Weigh and verify rate



Hot Applied Aggregate Application



- 26 lb yd² - 35 lb yd² Type II AR
- 18-24 for AC 15P and Type IV AR
- Distance Between Spreader and Chip-box is important



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**



AR Candidate after 3 years



Summary

- AR Type II and IV
- Higher Application Rates of aggregate and oil
- Specialized Equipment necessary
- Manufactured utilizing “field blend” portable plant
- AC 15/5tr & AC-P
- Lower application rates of aggregate and oil
- Conventional Equipment
- Manufactured and available at some terminals

Summary

- Both may utilize WMA
- Both hot applied binders have similar construction practices
- Different manufacturing process
- Multiple contractors bidding work and performing work
- Should not be specified as same product
- Both valuable tools in the pavement maintenance tool box

Final Coat if desired

Cape seal

- Consists of application of a slurry seal or micro on top of chip seal
- Typically will require a minimum of five days cure time on chip seal prior to application of slurry
- Streets must be clean of all loose chip prior to application

Flush coat “fog seal”

- Consists of application of css or ss emulsion diluted with 40% to 50% water at an average of .08 to .12 gal per yd² followed by an optional sand blotter at an average of 4lbs per yd²
- Typically occurs immediately following sweeping operation

Cape Seal



Cape Seal Finish



Cape Seal

- Can reduce raveling
 - Aesthetically more pleasing!
 - Extends life of seal
-
- Expect higher application rates of closer to 15lbs per yd
 - May use Micro or Slurry
 - Can be applied over any chip seal



3541 Burson Rd SB
Valley Springs, Calaveras Co.
Before AR Chip Seal
September 2005

No Prep Work Was Done
Prior To Chip Seal



3541 Burson Rd SB
Valley Springs, Calaveras Co.
AR Chip Put Down Sept 2005
Picture Taken July 2008

Field Blended Asphalt Rubber Chip

Tracy: Granada Way in 2007 Before Asphalt Rubber Cape Seal application



**Tracy: Granada Way in 2012
After Asphalt Rubber Cape Seal application
Done in 2007**

11/19/2012

Questions???

