

Customizing Your Preservation Toolbox

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Lets spend the next hour expanding your tools while getting “out of the box!”

- Pavement Challenges
- Residents and the Travelling Public
- Budgets
- What’s in your Box Today?
- What could be in your Box Tomorrow?

Pavement Challenges

- Climate / Geography
- Traffic Loading / Volume
- Road Types
- Pre-existing pavement conditions
- Studded tires
- Rutting

Climate/Geography

- Not all regions are the same therefore changes are necessary. Seasonal Freeze/Thaw and Construction Temperatures
- Heat
- Snow Plows
- Windy roads with grades
- Heavy canopy
- Rain or humidity

Traffic Loading/Volume

- Daily ADT plays a role
- Truck Traffic
- Snow Plows
- Bus Routes
- Garbage Trucks
- Industrial
- Studded Tires/Chains

Road Types

- Collectors
- Arterials
- Highways
- Residential (cul-de-sacs)
- Rural

Residents and the Travelling Public

- Bicycling Community
- Public convenience
- Schools
- Perception
- Rough roads

Pre-existing pavement conditions

Structural

(inability to carry design load)

- Alligator Cracks
- Pumping and Water Bleeding
- Stripping

Functional

(accessibility such as ride quality and safety)

- Bleeding
- Corrugation
- Longitudinal Cracks
- Transverse Cracks
- Polished Aggregate
- Lane Shoulder

Structural/Functional Distresses

- Potholes
- Raveling / Weathering
- Slippage Cracks
- Swell
- Rutting
- Block Cracking

Limited Budgets

- Bidding Efficiency
- Inter-Local Agreements
- Talk to your neighbor
- Life Cycle Costs
- Build smart projects
- Train in-house forces to maximize quality and efficiency
- Renewable Contracts (manage budgets)

What is in your box today?

- That's what we have always done!
- We did a (insert treatment here) 10 years ago and it failed we will never do it again.
- Our crews don't do that work.
- A chip seal
- A slurry seal

Mill and Fill one big project a year.

What could be in your box tomorrow?

- Emulsion Chip Seals
- Hot Applied Binders
- Slurry Seals
- Micro Surfacing
- Bonded Wearing Course
- High Friction Surface Treatment

Chip Seal Emulsions

- PMCRS 2-H(Polymer Modified Cationic Rapid Set/high viscosity-hard asphalt) or CRS2-P (Cationic Rapid Set 2-Polymer), CRS3-P
- PMRE (Polymer Modified Rejuvenating Emulsion)
- HFRS2 (High Float Rapid Set/high viscosity)

PMCRS 2-H/CRS2-P/CRS3-P

- Low traffic volume
- Fair Condition
- Low Cost
- Readily Available
- Compatible with most agg
- Applied with conventional Equipment



PMCRS 2-H/CRS2-P/CRS3-P

- Works in most climates though must be built early in the season to allow cure. Rain cannot be forecast.
- Heavy traffic can do damage
- Windshields
- Mainly used on highways and residential.
- $\frac{1}{4}$ - $\frac{1}{2}$ aggregate



PMCRS 2-H/CRS2-P/CRS3-P

Benefits

- Increase skid resistance
- Seal minor cracks (less than ¼")
- Extends the average service life of the existing pavement for 5 to 10 years
- Correct deficiencies such as:
 - Raveling
 - Flushing
 - Aged or oxidized pavements

High Float Emulsions

- Gel Structure which prevents flow of binder from low spots to high spots.
- Asphalt Continues to rise throughout curing process even through aggregate aiding in embedment
- Can use softer base asphalt making it less brittle in cold temperature
- Can handle dirtier aggregates
- Higher Aggregate Applications recommended based on % of fine material
- .35-.50 Application rates based on aggregate

Polymer Modified Rejuvenating Emulsion (PMRE)

- Scrub broom aids in crack mitigation by filling cracks
- ¼-5/16 chips recommended
- Non-Proprietary and available in OR



PMRE Cont.

- Can use with dirty aggregates
- Helps dried out oxidized pavements
- Works in foggy damp conditions
- Can work in cold weather down to 40 degrees!
- Can fill alligator, blocked, and oxidized cracks due to high polymer content and rejuvenator
- Easier Constructability



Asphalt Rubber (Field Blend)

- Utilized in all climates. Can grade out at PG 88-32
- Custom Binders to meet needs
- Arterials / Collectors / Highways / Residential all road types are a possibility
- Handles high volumes of traffic well
- Maximum crack mitigation, block and alligator
- Heavy canopy ok
- Night work ok
- Quick Cure for Public Convenience
- Course Aggregates Typically Used 3/8-1/2

Modified Binder AC-15P

- Quick Cure / Public Convenience
- Applied with conventional equipment
- Improved crack mitigation
- Available Terminally
- Highways
- Forecasted Rain

Evolution of Chip Seal

- Custom made small batch hot applied binders to meet pavement needs
- Terminally blended binders modified at plant?
- Development of CRS 3 and other emulsions
- Fibers in Chip Seal

Type 4 Binder

89% PG 64-28

10% Crumb Rubber Modifier

2% Polymer

Tests on Original Asphalt-Rubber			45	60	90	120	240	360	1440
Viscosity, 375°F, cP	LP-11	300-1200	600	650	650	650	600	550	550
Penetration, 77°F, 0.10 mm	AASHTO T49	40-80		62			62		62
Ring and Ball Softening Point, °C	AASHTO T53	140 min.		144			144		141
Resilience, 77°F, %	ASTM D5329	Report		28			26		25

Performance Grade	Tex-300 - IV		PG 76-28		
Actual Grade			PG 80-30		

Field Blend Evolution

PG 82-22 TR

WARM MIX AND HOT APPLIED CHIP SEAL

The recycled ground tire rubber shall conform to ASTM D6114 for cleanliness and gradation with 100% passing the Number 8 (2.5mm) sieve. The asphalt rubber shall meet the definition of asphalt-rubber in ASTM D8 except the minimum rubber component will be 1% by weight and will be "reacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles." Once the material is sufficiently reacted it shall conform to the following specifications:

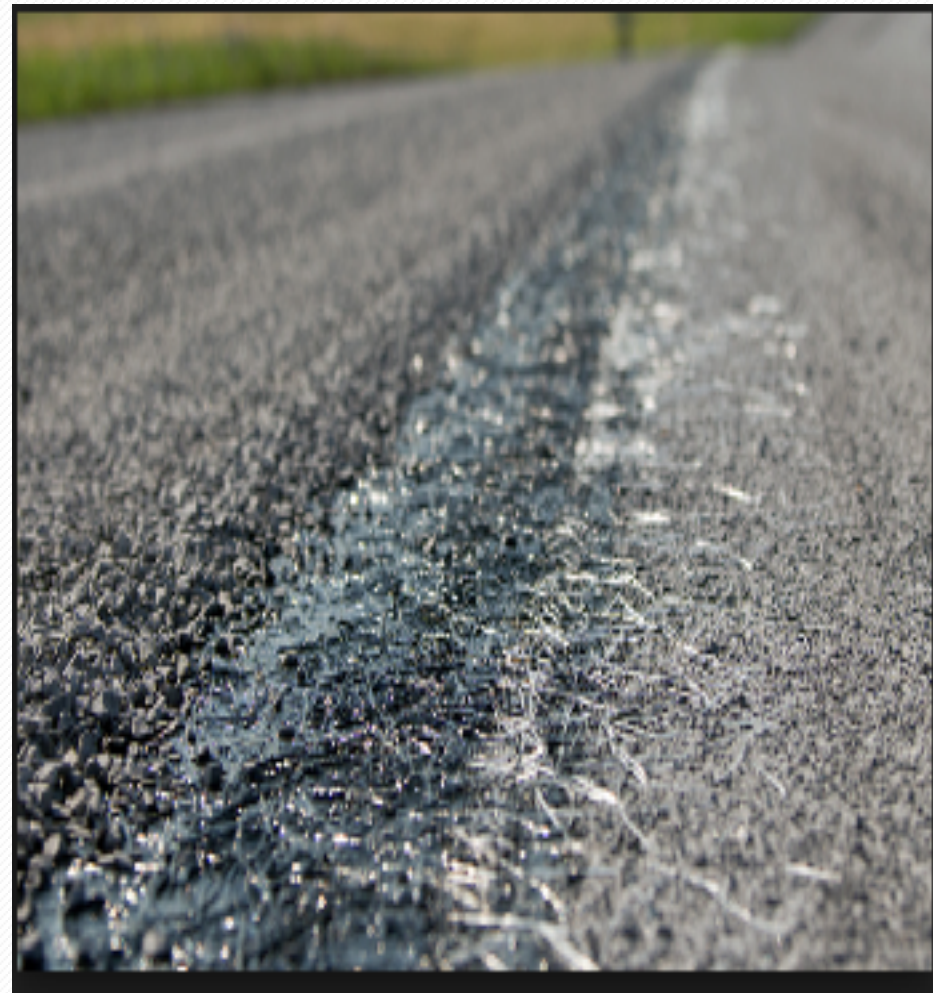
TEST	TEST METHOD	SPECIFICATION	TYPICAL
Original			
Ground Tire Content, %		> 10	10
Flash Point, °F	AAASHOT148	> 400	540
Rotational Viscosity, 150°F (Pa·s)	CA LP-11	200 - 1500	450
Dynamic Shear Rheometer, 82°F, G* (Pa ²)	AAASHOT1315	≥ 1.00	1.05
Softening Point, °F	AAASHOT131	> 130	140
Breideneck, 77°F, % Rebound	ASTM D5129	> 25	30
Vault Chip Retention Test ¹ , % Retention	Caltrans Test Method	> 90	100

PG 88-22 AR HOT APPLIED CHIP SEAL

The recycled ground tire rubber shall conform to ASTM D6114 for cleanliness and gradation with 100% passing the Number 8 (2.5mm) sieve. The asphalt rubber shall meet the definition of asphalt-rubber in ASTM D8 except the minimum rubber component will be 1% by weight and will be "reacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles." Once the material is sufficiently reacted it shall conform to the following specifications:

TEST	TEST METHOD	SPECIFICATION	TYPICAL
Original			
Ground Tire Content, %		> 10	20
Flash Point, °F	AAASHOT148	> 400	530
Rotational Viscosity, 150°F (Pa·s)	CA LP-11	1500-4000	3000
Dynamic Shear Rheometer, 82°F, G* (Pa ²)	AAASHOT1315	≥ 1.00	2.3
Softening Point, °F	AAASHOT131	> 145	162
Breideneck, 77°F, % Rebound	ASTM D5129	> 25	40
Vault Chip Retention Test ¹	Caltrans Test Method	> 90	100

Fibermat



Chip Seal Summary

- The same equipment is typically used to apply the different materials. It is ok to switch materials based on the needs of the roadway.
- Both hot applied and emulsions are valuable tools and using them in the right place can stretch your dollars
- Use associations, engineers, and neighbors to verify performance and discuss expectations.
- Chip Seals have evolved!

Purpose of Micro-Surfacing and Slurry Seals

**To Restore or renew desirable surface
properties such as:**

- **Skid resistance**
- **Crack filling**
- **Weather proofing (sealing)**
- **Surface loss of matrix or raveling**
- **Aesthetics & uniformity of surface**
- **Leveling & or rut filling**

Slurry VS Micro Differences

Slurry Seal

- Type I,II, and III all available
- Can use Polymer in emulsion
- Break dependent upon atmospheric conditions
- Thinner application utilizing conventional box with burlap or other texture drag
- Raveling, sealing, skid resistance, and oxidized pavements benefit

Micro Surfacing

- Type II and III only
- Always Polymer Modified
- Chemical Break independent of weather
- Heavy application and the ability to stack stone, typically applied using auger box
- Can do all that slurry can plus more such as leveling

Micro Surfacing Type II

- Mostly used in residential areas can be used on highways
- Cape Seals
- Workhorse
- Triggers ADA
- Less susceptible to cold weather and can be placed at night
- Public Convenience
- Smoother surface
- Slightly less power steering burns and minor raveling than with Slurry

Truck mount



Micro Surfacing Type III

- Collectors, Arterials, and Highways
- Heavier application rates
- Course aggregates=course surface
- Night Work

Continuous Paver



Slurry Seal I, II, and III

- Parking lots, residential roads, highways all possibilities
- Smoother texture
- Expect some raveling, power steering burns, and slower set
- Does not trigger ADA
- Typically applied with truck mounts

Close up with straight edge looks like Pavement Preservation is paying off

after 6 years
Slurry Seal



Micro-Surfacing



Evolution

- High Polymer Micros and Slurrys
- Modified Slurries with additives such as rubber and fiber

Hi-Polymer Emulsion for Micro-Surfacing and Slurry Seals

- An innovative new product (high polymer content) which is much tougher than its conventional counterparts
 - Higher temperature tolerant to reduce scuffing and tearing
 - More damage resistant to resist snow plow situations



High Polymer Slurry/Micro

Type II Slurry



Type II Hi-Mod Slurry



Victorville, California 08/11/2015 one week after lay down.

Power Steering Burns



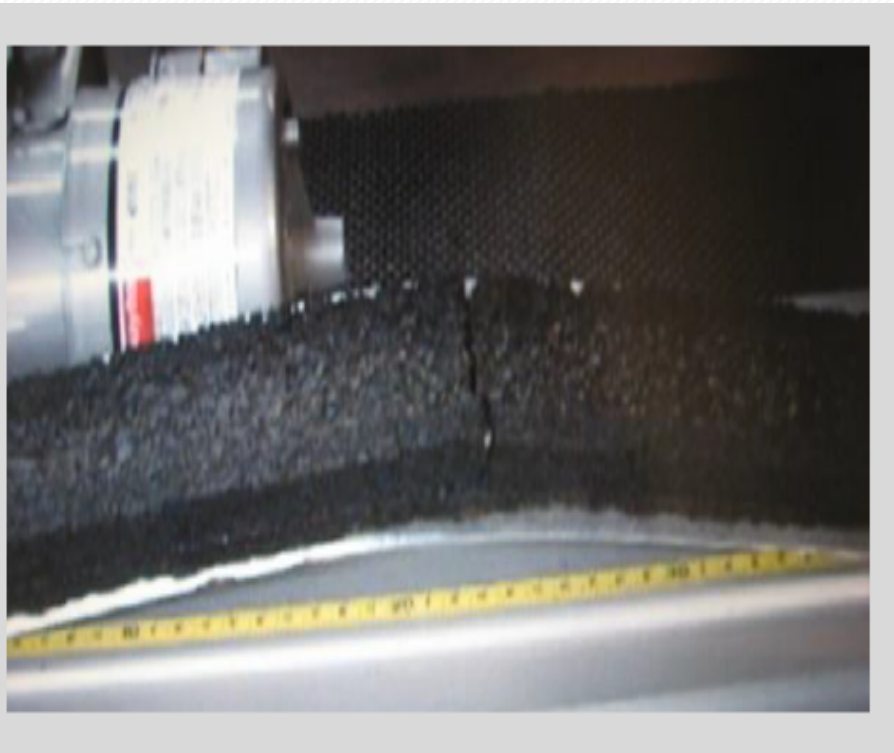


Fiberized Slurry Seals

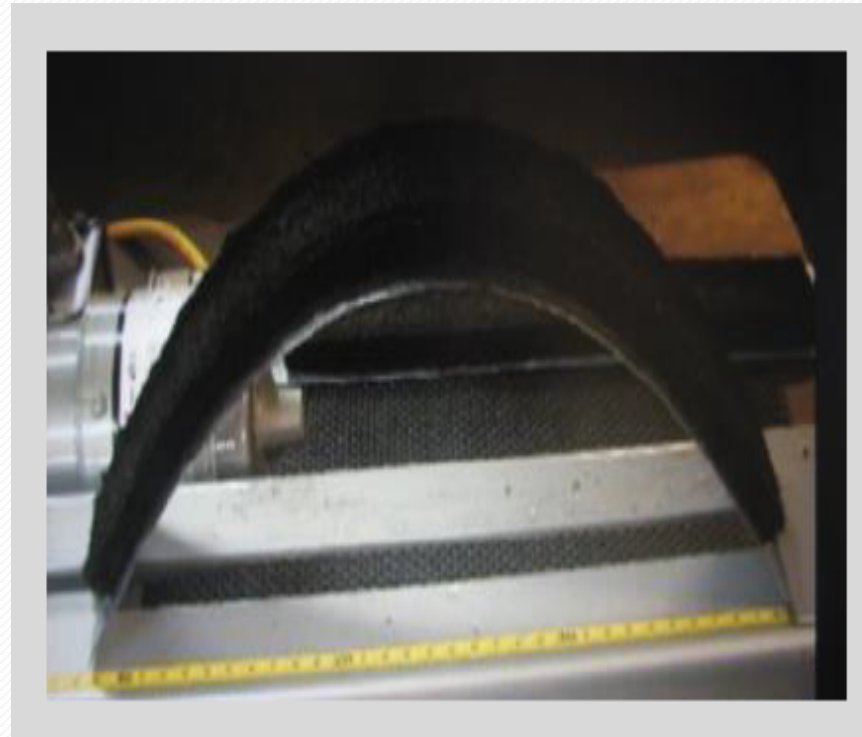
**SLURRY-FIL™ ROVING AND PRE-CHOPPED FIBER
FOR SLURRY SURFACING**



- Slurry without Fiber



- Slurry with Fiber



Ground Tire Rubber in Slurry Seal and Micro-Surfacing Systems

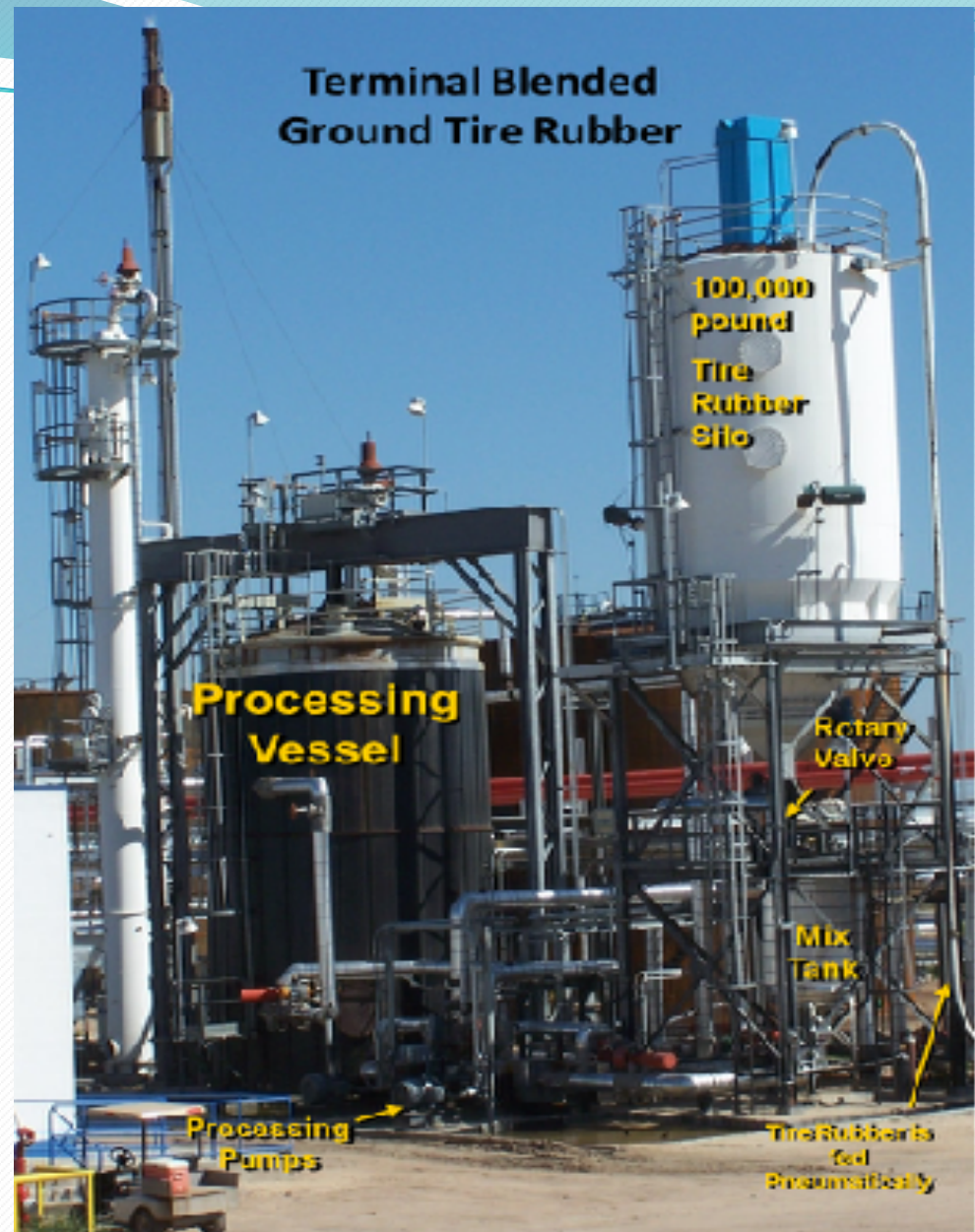
- ❖ 5% by weight of asphalt. The GTR is added at machine through fines feeder; since 1997.
- ❖ 5% GTR Terminal Blended into the asphalt and than emulsified; since 2007.
- ❖ Central Plant Mix 5% Blended into a Blended Mix; since 1997.
- ❖ 5% blended into the aggregate stock pile; “ trial phase”

Truck Added Ground Tire Rubber (GTR)

- The GTR is being added through an extra fines feeder that is mounted on the machine.



The GTR is
Digested into
Asphalt at
Processing Plant
and than emulsified
into a Slurry Seal or
Micro Surfacing
emulsions



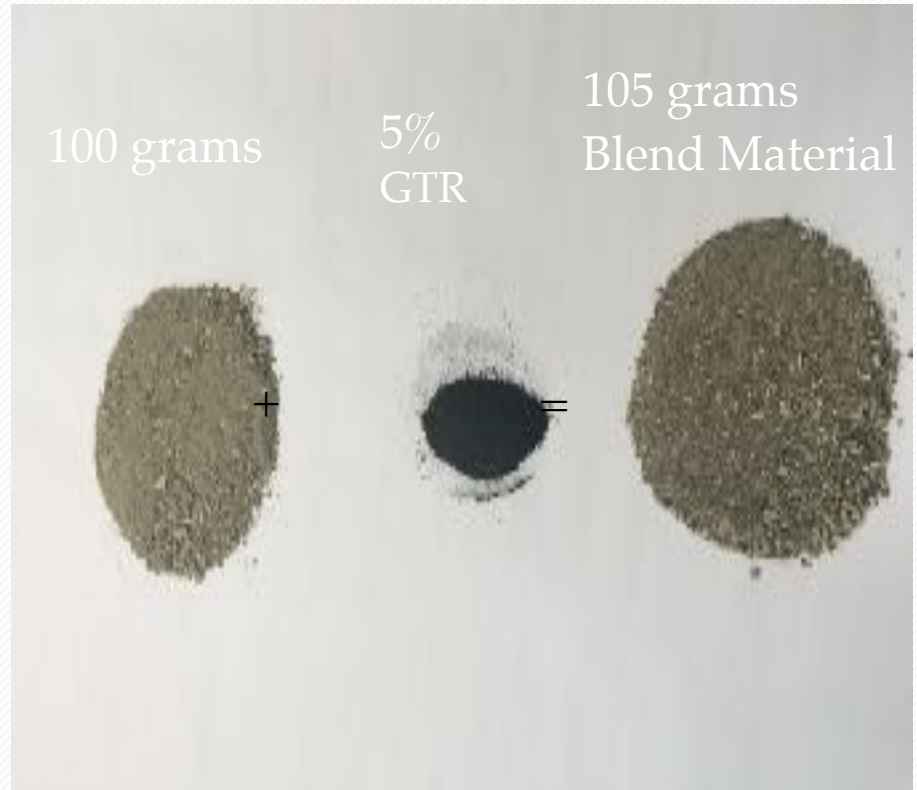


Ground Tire Rubber Blended into Type II Slurry Aggregate

30 mesh ground tire rubber



Blended agg with 5% GTR



Utilizing the Box

- Don't afraid to use multiple products as typically the same equipment is utilized.
- Look at inter-local agreements
- Use tools creativley!

Vancouver Tool Box

SCHEDULE "A" - CITY OF VANCOUVER - SLURRY SEAL, CHIP SEALING, AND MICRO-SURFACING

ITEM NO.	ITEMS WITH UNIT PRICE BID	APPX. QUANTITY	UNIT OF MEASURE
1A	Mobilization	1.00	LS
2A	Project Temporary Traffic Control	1.00	LS
3A	Flaggers	800.00	HOUR
4A	Portable Changeable Message Sign	5.00	EA
5A	Sequential Arrow Sign	120.00	HOUR
6A	1/4-Inch Emulsion Chip Seal	17300.00	SY
7A	Latex Modified Slurry Seal Type 2	103600.00	SY
8A	3/8-Inch Asphalt Rubber Chip Seal	192600.00	SY
9A	Micro-Surfacing Type 2	37700.00	SY
10A	Micro-Surfacing Type 3	175200.00	SY
11A	Asphalt for Fog Seal	160700.00	SY

Pierce County Toolbox

Test Road 2014

3400 ADT

- Tested treatments in 2 x 100' sections
- Micro Surfacing Type 2
- Slurry Seal Type 2
- Cape Seal (AR Chip Type 2 w/Slurry Type 2)
- Cape Seal (AR Chip Type 2 w/ Micro Type 2)
- AR Chip Seal Type 2
- AR Chip Seal Type 4

We also chip sealed the rest of the road using our in house chip seal program (AC15P w/ 3/8" Coated Chips)

AR Three Layer Cape Seal Sacramento



5 9:15AM

Micro Surface Leveling Course



Asphalt Rubber Chip Seal



15 8:58 AM

Type 2 Slurry Finish



?Questions?

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