



Pavement Preservation Theory and Strategies

NWPMA 2015 Conference

Presented by:

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Providing Reliable Roadway Technologies Since 1958

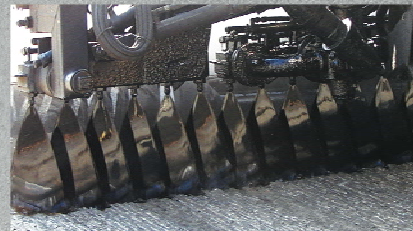
Pavement Preservation

- PMRE – Polymer Modified Rejuvenating Emulsion
- BWC – Bonded Wearing Course
- Chip and Scrub Seal Emulsions (LMCRS, PMRE)
- Slurry and Microsurfacing Emulsions (LMCQS, MSE)
- Fog Seal Emulsions (CQS 50/50, CSS Blends)
- Tack Coats



Rehabilitation & Reconstruction

- Paving Fabrics
- Paving Mat with Fiberglass
- Paving Grids – Including Composites
- Evotherm™ Warm Mix Asphalt Additive



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Pavement Preservation– What it is NOT



Pavement Preservation - What it IS



Chip Seal

Fog Seal



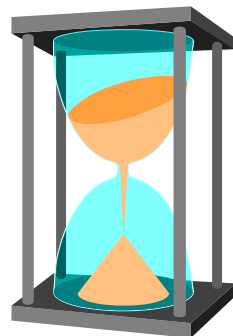
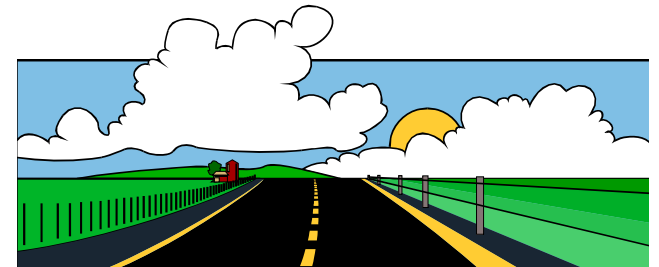
Keep the good roads good.

PAVEMENT PRESERVATION Philosophy



Right Treatment

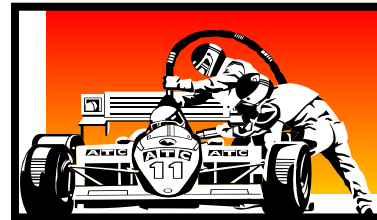
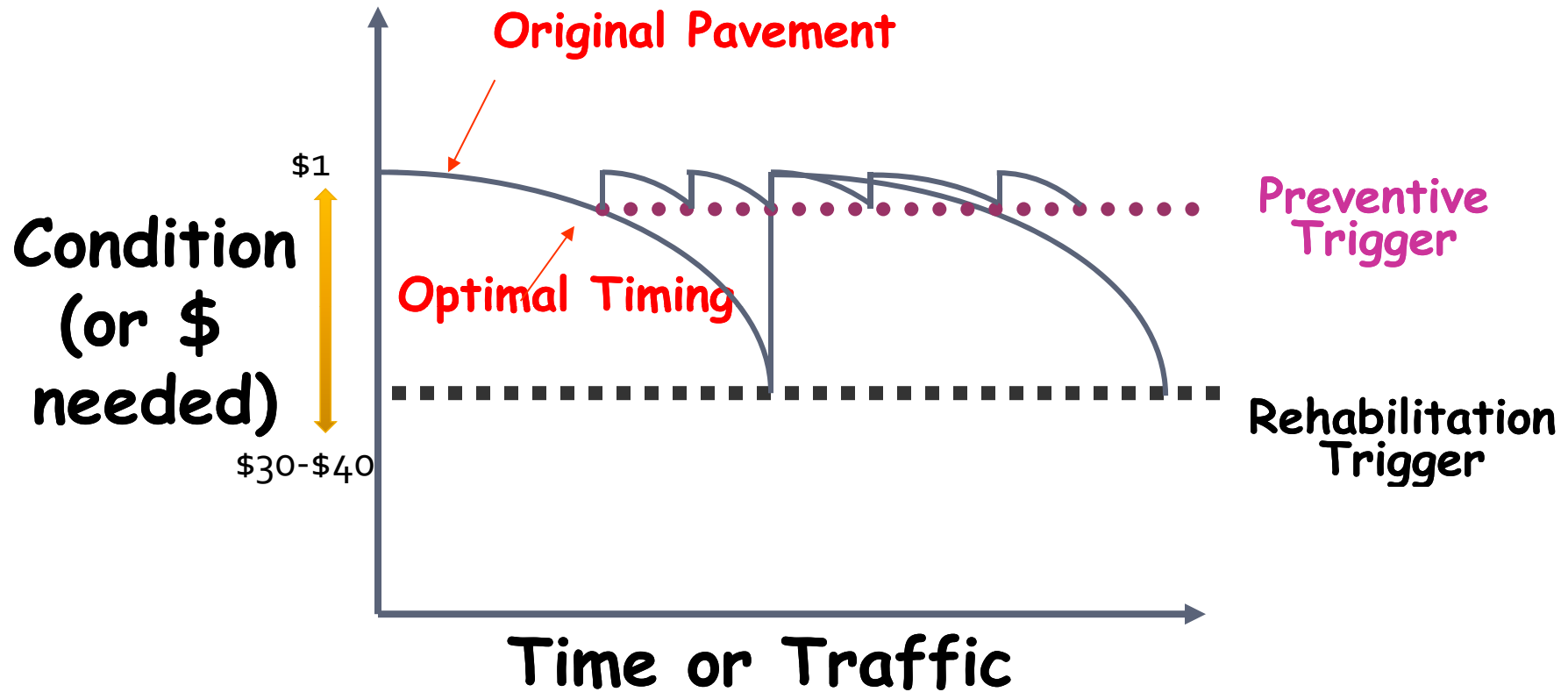
Right Pavement



Right Time

“

Pavement Preservation - Concept



If that doesn't convince you, this should...

ASSUMPTION:

- You own 300 lane miles of road &
- Have a budget of \$1.5M for:
 - pavement reconstruction
 - rehab
 - maintenance
- Typical Breakdown
 - \$1M for reconstruction and rehab = “worst first” scenario &
 - \$500K for maintenance

What You Get for \$1.5M

- Reconstruction ~ \$25.00 per yd²
 - (6" mill and fill with HMA @ \$75/ton)
 - $\$1\text{M} \div \$25/\text{yd}^2 = 40\text{K yd}^2$ or 5.7 LM
- Cost of maintenance ~ \$4 per yd²
 - $\$500\text{K} \div \$4/\text{yd}^2 = 125\text{K yd}^2$ or 17.8 LN

Total LN Mi repaired is 23.5

For 300 lane miles, road cycle will be ~13 years

What If You Flop the Budget Around: \$1M for Maintenance and \$500K for Reconstruct and Rehab

- Costs of reconstruction ~ \$25.00 per yd²
 - $\$500\text{K} \div \$25/\text{yd}^2 = 20\text{K yd}^2 = 2.8 \text{ LN Mi}$
- Cost of maintenance ~ \$4.00 per yd²
 - $\$1\text{M} \div \$4/\text{yd}^2 = 250\text{K yd}^2 = 35.5 \text{ LN Mi}$
- Total LN Mi repaired ~ 38
- For 300 lane miles, road cycle will be ~ 8 years

Keys to Success

- Management Support
- Public understanding and acceptance
- Dedicated & Continuous Funding
- Good products and workmanship
- Contractor relationship
- In house training

And if you do all this... see below

Pavement Condition Index (PCI) for Bay Area Jurisdictions, 2006–2010 (continued)

Metropolitan Transportation Commission (MTC)			3-Year Moving Average			
Jurisdiction	County	Total Lane Miles	2006	2007	2009 ¹	2010 ²
San Rafael	Marin	331	63	66	70	75
Santa Clara County	Santa Clara	1485	75	77	75	74
San Ramon	Contra Costa	398	74	73	74	74
American Canyon	Napa	102	76	76	75	74
Hercules	Contra Costa	128	75	74	73	73
Windsor	Sonoma	168	74	75	74	73
Novato	Marin	318	35	37	71	73*
Portola Valley	San Mateo	71	64	63	67	73
San Mateo	San Mateo	409	61	67	70	73*
Palo Alto	Santa Clara	470	N/A	N/A	72	73
Danville	Contra Costa	301	74	73	72	73
Walnut Creek	Contra Costa	436	72	74	73	73*
South San Francisco	San Mateo	296	67	71	72	73*
Fairfield	Solano	709	77	75	73	73
Alameda County	Alameda	997	69	71	72	72
Lafayette	Contra Costa	202	64	70	71	72
Corte Madera	Marin	64	73	73	73	72*
Cloverdale	Sonoma	64	69	71	72	71*
Saratoga	Santa Clara	281	70	71	72	71**
Hillsborough	San Mateo	164	64	66	69	71
Piedmont	Alameda	78	67	67	69	70
Cupertino	Santa Clara	303	69	70	70	70



Pavement Preservation Treatments

Typical Treatments

- Fog & Rejuvenating Seals
- Chip Seals
 - Cold Applied-
 - PMCRS-2h
 - PMRE
 - Hot Applied –
 - Asphalt Rubber
 - Terminal Blends
- Slurry Seals
- Micro-Surfacing
- Bonded Wearing Course



Fog and Rejuvenating seals

Fog Seals

Benefits:

- Renews aged asphalt pavements
- Seal small voids and surface cracks
- Improve lane delineation and pavement marking
- Prevent raveling of loose aggregate with chip seals
- Prevents water penetration

Materials:

- CSS-1h
- CQS-1h
- PMRE

Materials need to be diluted

Fog Seals and Rejuvenators





Slurry and Microsurfacing

Slurry Sealing

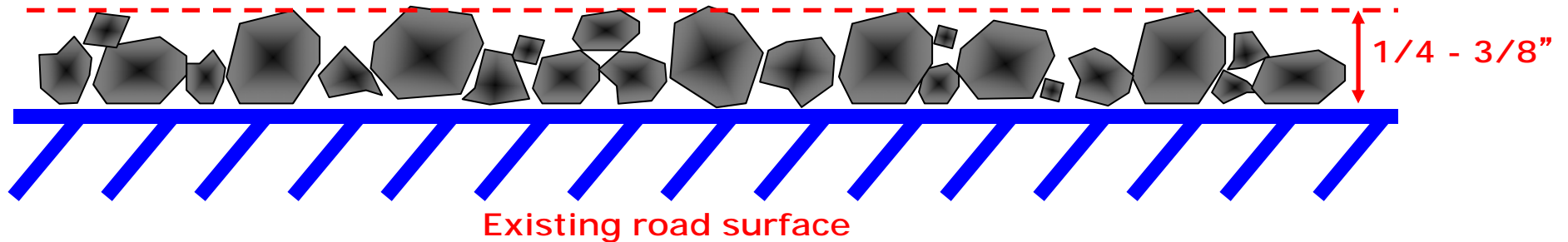
Benefits:

- Improved surface friction course (skid resistance)
- Seals small voids and surface cracks
- Improves lane delineation and pavement marking
- Prevents water penetration
- Can be part of a “cape seal”
(slurry seal over a chip seal)



Slurry application

- Laid at one-stone thickness
- Largest stone bears traffic load



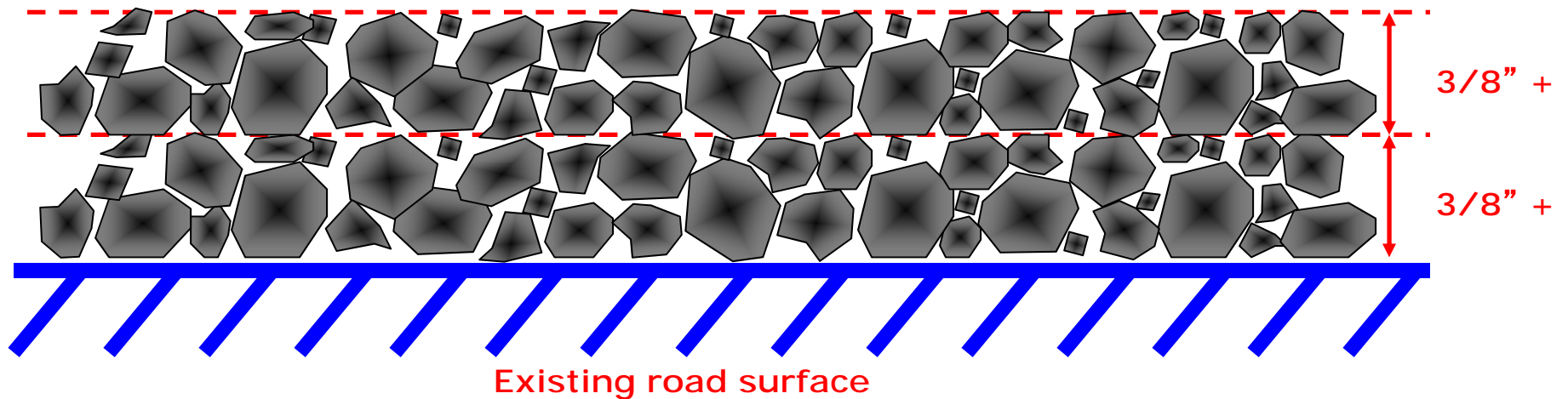
Micro-Surfacing

Benefits:

- Chemically driven emulsion which can reduce traffic delays to less than 1 hour
- Improved surface friction course (skid resistance)
- Seals small voids and surface cracks
- Improves lane delineation and pavement marking
- Day or night construction
- Rutfilling and reprofiling
- Prevents water penetration

Microsurfacing application

- Applied in multi-stone thickness
- Stone interlock and modified binder bears traffic load
- May be applied in multiple layers







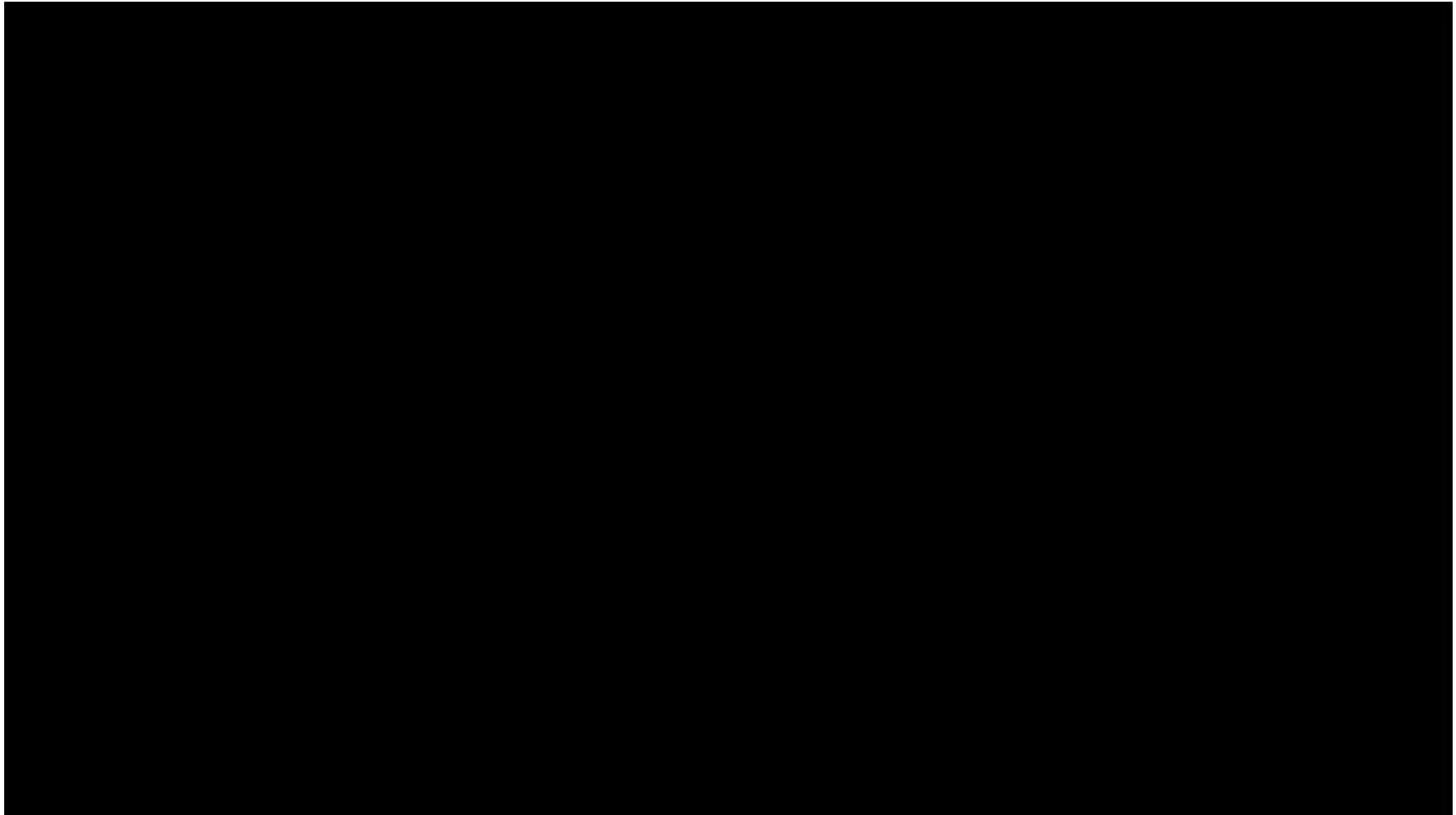
Oregon City/City of Hillsboro - MSE



City of San Francisco



City and County of San Francisco





Chip seals

Chip Seals

Chip seals consist of asphalt emulsions, asphalt rubber binder or terminal blend binder followed by a single layer of aggregate.

Chip seals can consist of multiple layers (single and double chip seals), and are typically followed with a fog seal. Chip seals can also be covered with a slurry or microsurfacing thereby creating a “cape seal”.



Chip Seals

Benefits:

- Renews aged asphalt pavements
- Improves surface friction course (skid resistance)
- Seals small voids and surface cracks
- Improves lane delineation and pavement marking
- Prevents raveling of loose aggregate with chip seals
- Prevents water penetration



Chip Seals Types

Polymer Modified Emulsion Chip Seal

- PMCRS-2h
- Scrub Seals (Rejuvenating Chip Seals)
- Usually .25-.40 gal/sy binder

Hot Applied Chip Seal

- Asphalt Rubber Chip Seal
- Terminal Blend (Modified Binder Chip Seal)
- Usually .35-.6 gal/sy binder

Chip over Paving Fabric

- .25-.35 gal/sy binder plus chip seal over top

BROOM AND SAND SEALS

Scrub Seals using sand or aggregate:

- PMRE asphalt emulsion
- Sand or aggregate
- Broom is dragged behind the distributor truck to embed the emulsion into the cracks
- On sand seals, pneumatic tired rollers embed the sand into the emulsion

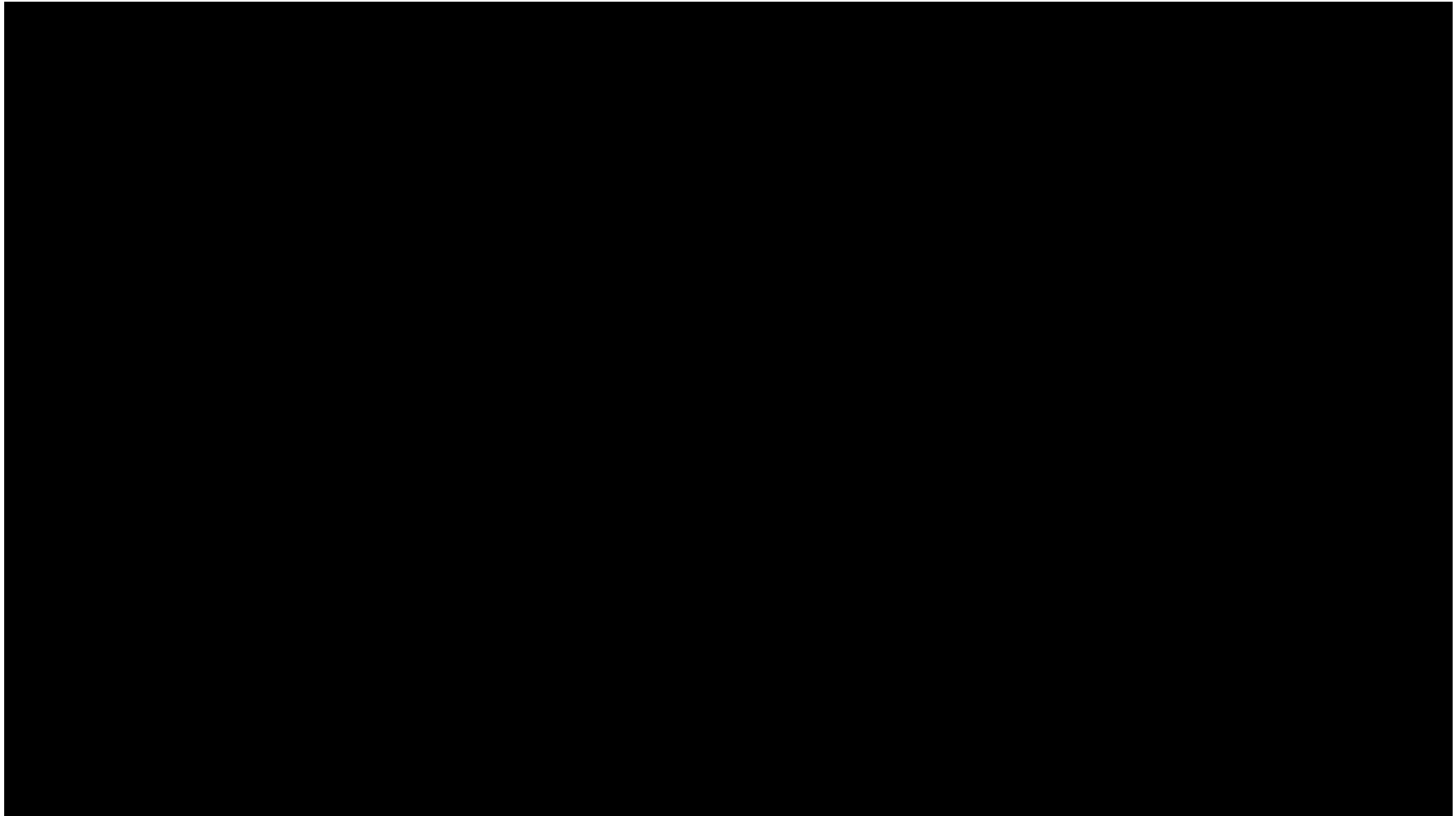


BROOM AND SAND SEALS





City of Santa Cruz



Hot Applied Chip Seal

Asphalt Rubber

Terminal Blends X



Examples of chip seals...



Fabric ready for chip



Terminal Blend Chip Seal



Cape Seal

Nothing done

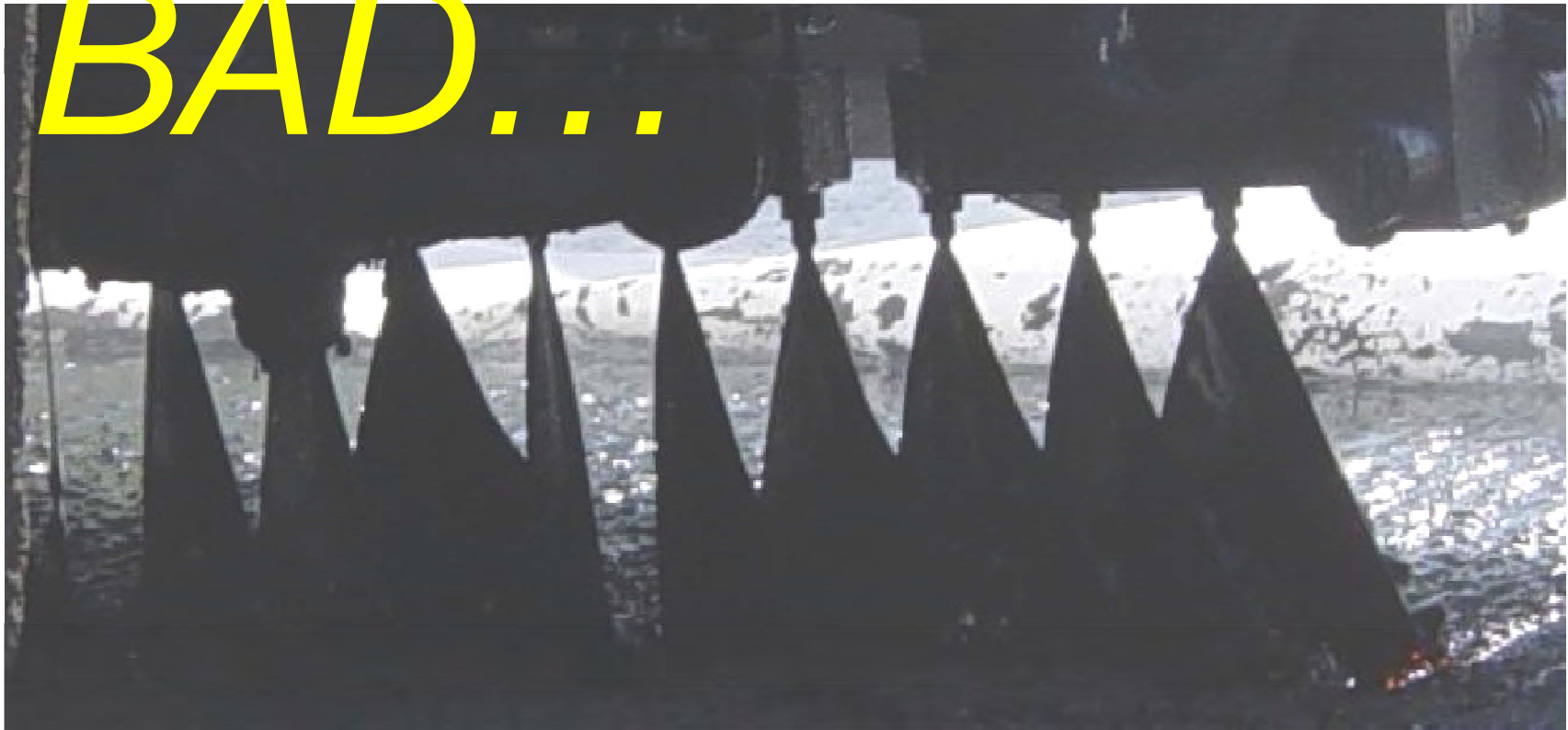
Equipment Inspection



**Triple
Overlap**

Equipment Inspection

BAD....





Bonded Wearing Course

A roadway maintenance system that combines the emulsion technology of a sealcoat in conjunction with a thin HMA gap-graded overlay. The process is applied to either asphalt or concrete roadways by use of a spray paver. The HMA is then rolled to complete the process.



Maintenance Technique that combines the best of two technologies

- Part Chip Seal
 - Application of .14-.25 gal/SY of a polymer modified emulsion for adhesion
- Part HMA Overlay
 - Use of gap or open graded, polymer or rubberized HMA to finish the process

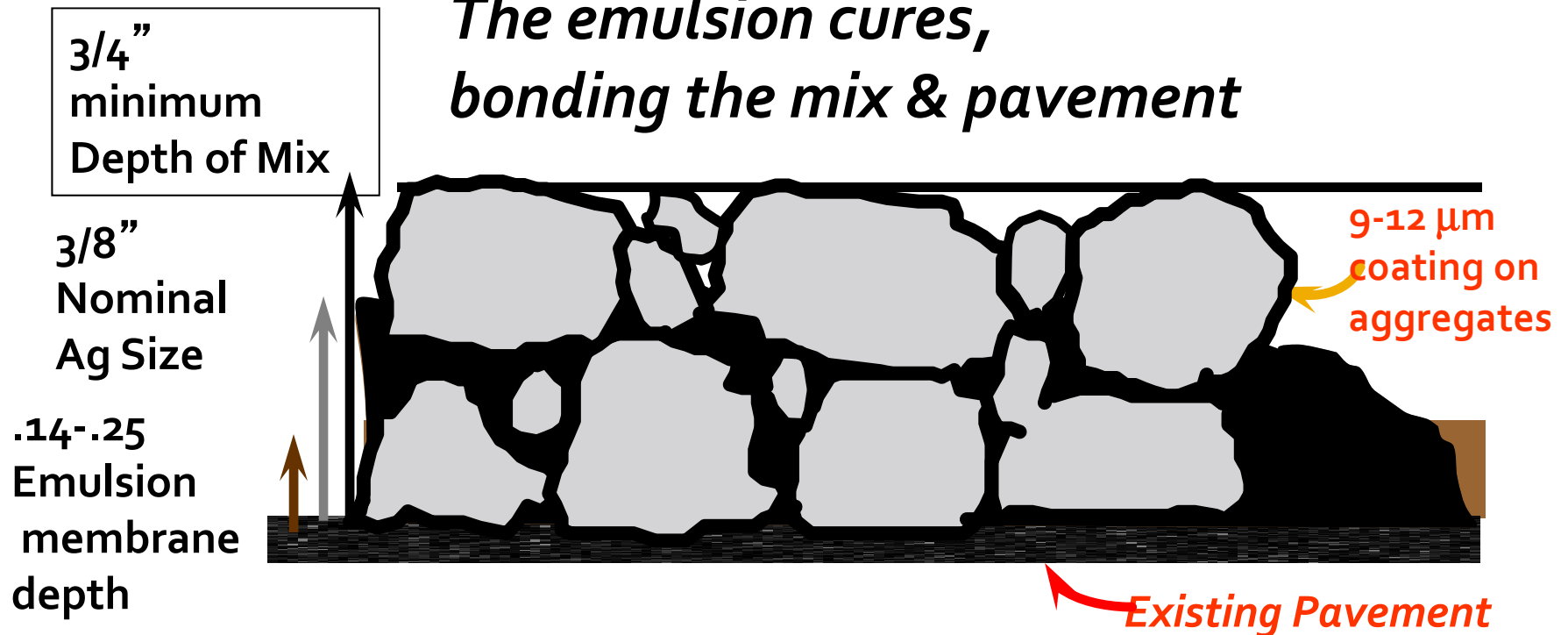
- From the chip seal
 - Spray application that seals the existing roadway
 - Bonding of the new surface to the old surface
 - Quick process – up to 50,000 SY per day

- From the HMA overlay
 - Improved ride quality
 - Quick return to traffic
 - No sweeping or fog seal needed

The Process

The emulsion membrane “wicks up” around the HMA aggregates

The emulsion cures, bonding the mix & pavement

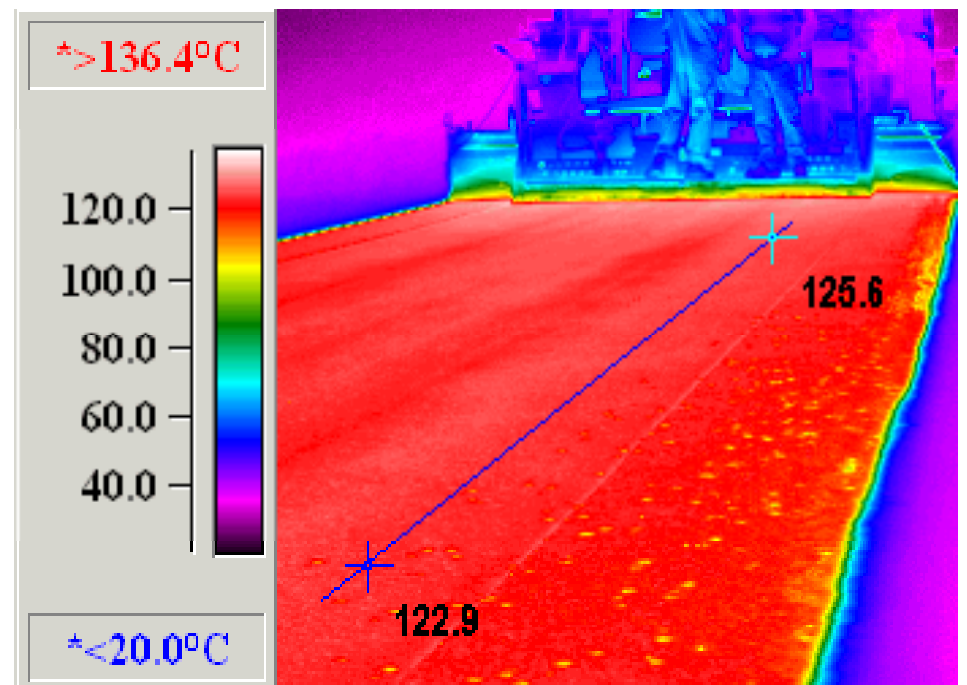
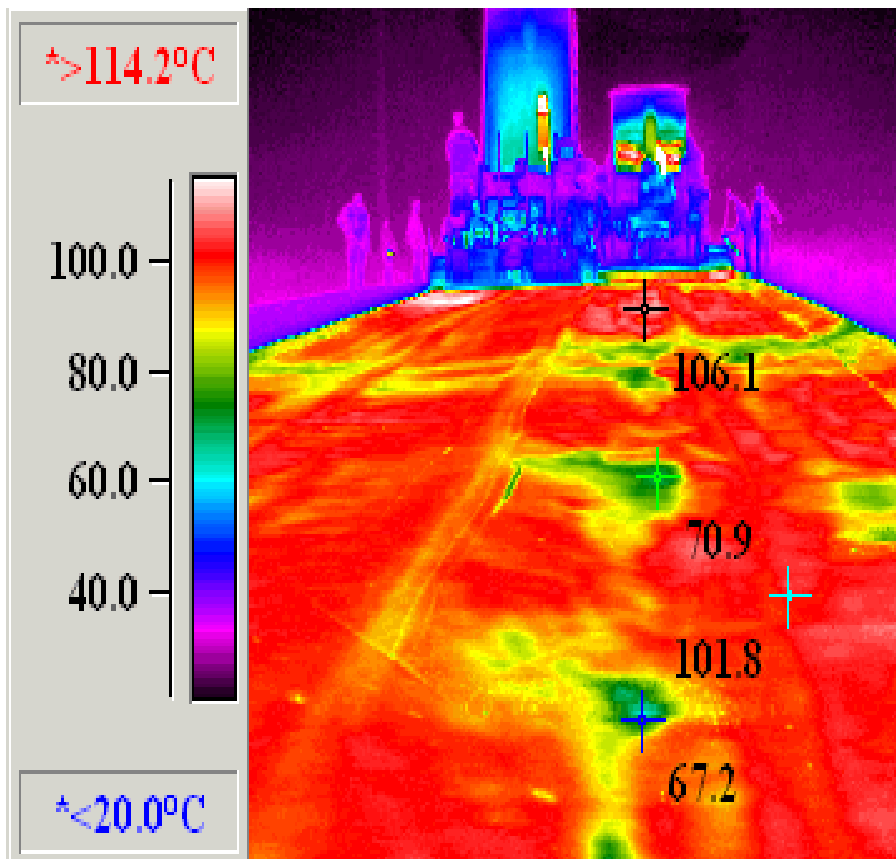


BWC – in place



MTV – Shuttle Buggy





Machine is designed to reduce thermal and mechanical segregation

BWC ride quality improvement





15 10:45 AM



15 10:52 AM

**Construction
Speed and Quick
Return to Traffic**



15 10:47 AM



15 11:00 AM



15 11:02 AM

Does it work?



10 Years as of May, after picture taken last week

CALTRANS District 4 – HWY 37



Highway 37
Caltrans District 4
Bonded Wearing Course

Highway 37



City of Hillsboro - 2015



City of Hillsboro - 2015



Bonded Wearing Course - BWC



Questions?



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