



# Construction Quality Assurance Program for Pavement Preservation

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**Public Works Officers Institute**

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# Purpose of Presentation

- Provide information on Quality Control and Agency Acceptance for preservation treatments
- This has been done as a part of a SB-1 project for Mineta Transportation Institute
- Treatments completed to date include
  - Pavement Repair and Surface Preparation
  - Chip Seals
  - Slurry Surfacing
  - Cape Seals
  - Thin Asphalt Overlay

- Manuals can be found on the MTI website at <https://transweb.sjsu.edu/csutc/research/publications>
- Will use a Cape Seal as an example

# Overview

## What are Cape Seals?

- Project selection
- Specifications
- Test methods
- Mix design
- Construction
- Quality Assurance



## What Are Cape Seals?

- Developed originally in Cape town and they consist of two layers
- The first layer consists of an emulsion chip seal or a hot applied chip seal
- The emulsion binders can be conventional, or polymer modified while the hot binders are generally asphalt rubber.
- The chips are generally  $\frac{1}{2}$  to  $\frac{3}{8}$  inch rock, of uniform size and good quality

## What Are Cape Seals?

- The second layer is a slurry surfacing, mixture of graded aggregate and asphalt emulsion binder with fillers and additives to make a cold emulsion mixture which cures quickly to a hard-wearing surface.
- It can be either a microsurfacing or slurry seal.
- Microsurfacing is preferred for cooler weather or night work.

# Project Selection

## ➤ Why use them?

- **A thin, cost-effective preventative maintenance treatment.**
- **Extends the life of the pavement**

## ➤ Where to use them?

- **Normally on asphalt pavement, but have been used on concrete pavements showing some distresses.**
- **They trigger ADA work**

# Project Selection

## When to use them?

### ➤ **Correct/improve**

- Raveling and weathering
- Skid resistance
- Small cracks and voids
- Aesthetics

### ➤ **Prevent/reduce**

- Oxidation of asphalt concrete
- Surface water infiltration
- Pavement degradation due to the elements

# Project Selection

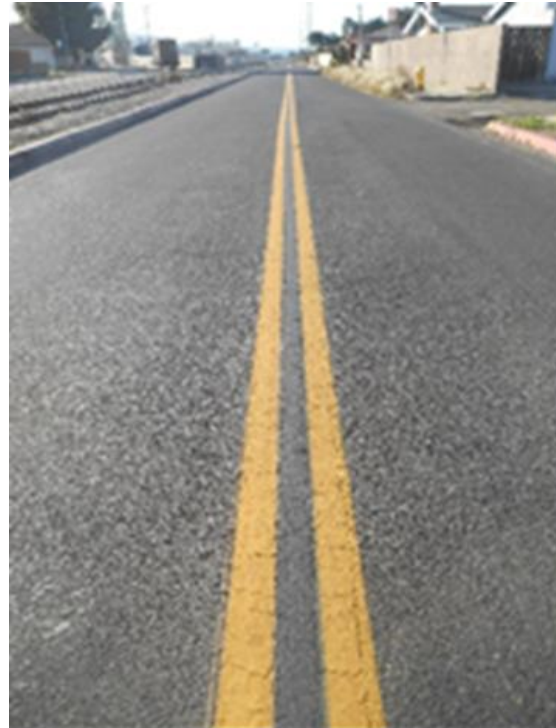
- **Don't use on severely distressed pavement**
  - **Potholes**
  - **Severe alligator problems**
  - **Structurally deficient pavements**
  - **Severe rutting**
  - **Significant profile or cross-slope corrections**
- **These problems require repair work prior to Cape seal surfacing or rehabilitation.**



# Project Selection

## ➤ What kind of distresses can Cape seals fix?

- A Cape seal can handle more severe distresses than a single chip seal or a single slurry surfacing.



**After 8-years  
this Cape seal  
is still  
performing.**

**This is a  
multi-layer  
Cape seal at  
the City of  
Lompoc, CA**

# Cape Seal Surfacing Materials

## First Lift

### ➤ Chip Seal Layer

- Emulsion with damp aggregate

or

- Hot applied rubber binder (AR) and hot pre-coated aggregate

## Second Lift

### ➤ Slurry Surfacing Layer

- Slurry Seal (Top Layer)
  - Emulsion
  - Aggregate
  - Additives

or

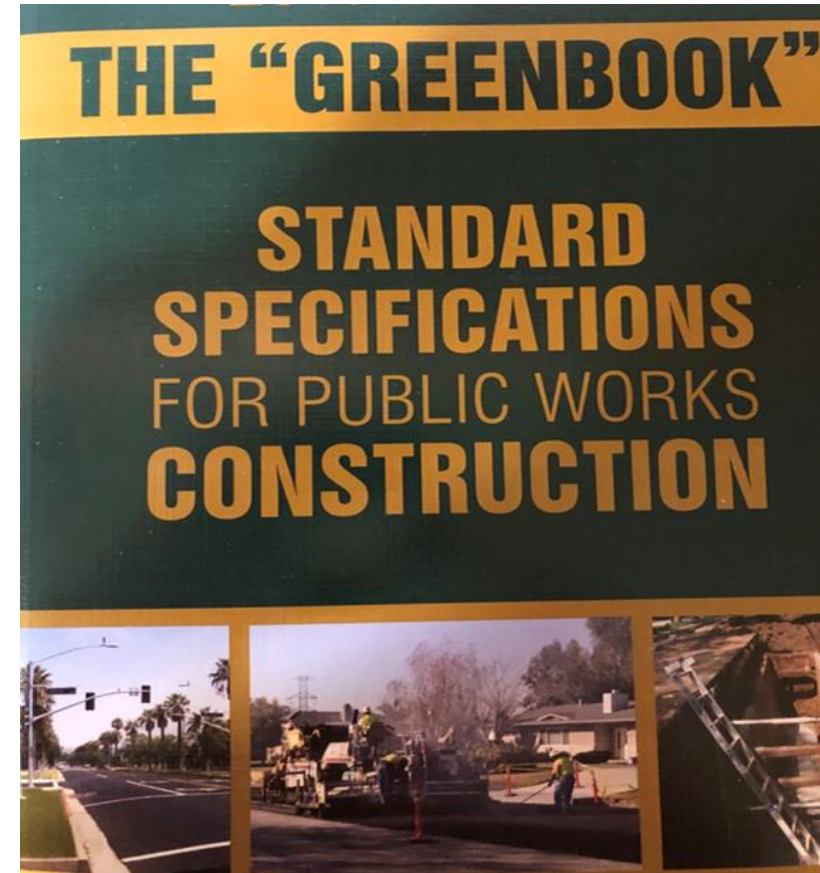
- Microsurfacing
  - Emulsion with additives for faster cure
  - Higher quality aggregate

# Preventing Poor Pavement Performance

- **Proper project selection**
- **Trained personnel with experience (both agency and contractor)**
- **Equipment**
  - **Good condition**
  - **Calibrated**
- **Materials and mix design**
  - **Meets specifications**
  - **Testing with accredited laboratory and certified testers**
- **Good workmanship**

# Design-Specifications

- **Caltrans, Greenbook, used by local agencies**
  - **Differences in materials specifications**
  - **Greenbook speaks of warranties**
- **If the Agency is short on inspectors, a warranty may be a good item to consider in the specifications.**



# Construction Topics to Cover Pre-Construction Meeting

- **Contractor's QC plan and process**
- **Project mix designs and materials control**
- **Equipment calibration procedure**
- **Test strip for each product and location**
- **Quality control data**
- **Inspection and testing by the agency**
- **Documentation by both sides**
- **Protection of existing facilities**
- **Traffic control plan**

# Quality Control Plan (QCP)

- **Contractor is responsible for quality control (QC) sampling, testing, and documentation and needs to submit a QCP.**
- **QCP shall include sampling, testing, inspection, monitoring, documentation and submittals, and corrective action procedures during transport, stockpiling, placement, and sweeping/cleanup operations.**
- **QCP shall detail the Contractor's QC program that meets the requirements of the specifications.**

# Equipment Calibration

## ➤ Chip seal

### ■ General

- Contractor to provide proof of calibration of the distributor truck and the aggregate spreader.
- Calibration to be repeated once per week or after five full days of chip seal operations have been completed. (This may vary per agency)

### ■ Distributor truck

- Application rates-transverse and longitudinal
- Overlap- triple
- Edge nozzle-at right angle

### • Aggregate spreader

- Application rates-transverse and longitudinal

# Equipment Calibration

## ➤ Slurry surfacings

- Perform calibration and submit data for all slurry seal trucks in accordance with Caltrans Section 37-3.01C(3)(f)
- Calibrate the mix paver to be used for the placement of slurry seal in the presence of the Engineer
- Ensures compliance with the approved mix design/job mix formula
- Each unit shall be calibrated prior to the beginning of the project for each aggregate or mixture type



# Quality Control-Contractor

## Per approved sampling and testing plan

- **Sampling and testing of the emulsion**
- **Sampling and testing of the residual binder content**
- **Sampling and testing of the aggregate**
- **Determination of the daily application rates for the mix and the quantities of emulsion, aggregate, mineral filler, water and additives**
- **Daily inspection reports**

# Agency Construction Inspection

## Things to do:

- **Verify application rates**
- **Take field samples from the spreader unit for water content, residual asphalt and wet track abrasion test (WTAT)**
- **Note the following**
  - **Start & stop times of operations**
  - **Traffic control & trucking operations**
  - **Curing, rolling and sweeping**
- **Prepare daily reports**

# Agency - Construction Inspection

## ➤ Workmanship Issues

- Spread materials uniformly
- Longitudinal joints – ensure no material buildup
- Transverse joints – ensure clean joints, start and stop on roofing felt
- Mixture shall be uniform in color and homogenous after spreading

## ➤ Sweeping to ensure removal of loose aggregate (after emulsion is cured)

- Chip seals
- Slurry surfacing

# Construction- Weather Restrictions for Emulsion Chip Seals and Slurry Surfacing

- Place when both pavement and air temperatures  $\geq 50^{\circ}\text{F}$  and rising.
- Do not place if air temperature is over  $105^{\circ}\text{F}$
- No placement if rain is imminent



# Construction–Applying Microsurfacing

- **Allow microsurfacing to cure. Minimum of 1 hr.**
- **Sweep the microsurfacing**
- **Open to traffic after initial sweeping**
- **Sweep for 4 days after opening**
- **Sweep again after 2 weeks**
- **Quantify the sweepings after each day**

# Agency Inspection and Field Testing

- **Essential items for inspector to document and detail**
  - **Workmanship**
  - **Protection of existing facilities**
  - **Weather—temperatures, wind conditions**
  - **Any problems**
  - **Sampling per required frequencies for each material**
  - **Issues to watch for with each material**
  - **Spread rates and temperatures of materials**

# Post Application Inspection

- **Minimum aggregate loss**
- **Correct any workmanship issues**
- **Cleanup**
- **Striping**
- **Opening to traffic**



# Did Everything Work?

- **What do you do if the job does not meet expectations?**
  - **Warranty is a good item to include in the contract specifications.**
    - You can have the Contractor come back and repair it
    - Usual period is for one year, can be longer
    - Greenbook, Section 3-13.3
  - **Specification**
- **Some agencies hold a bond for the warranty period.**
  - **Percentage of \$ amount of contract.**



# What Do We Want to Avoid?

- **Surface de-bonding**
- **Workmanship issues**
  - Excessive drag marks
  - Poor longitudinal or transverse joints
- **Tire marks from early traffic**
- **Excessive shedding**
- **Unacceptable hand work**



# What Do We Want?

- **By following the mix designs and specifications**
  - **Little to no rock loss or raveling after initial period**
  - **Good workmanship**
  - **Project looks like new road**
- **Project should last its expected life**



# The End

Questions?

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**So, when is your  
next  
preservation  
project?**



**Thank you!**