Construction Quality Assurance Program for Pavement Preservation

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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 Surfacings
  ▪ 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
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 ½ to ⅜ 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
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.
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
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.
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 ≥ 50°F and rising.
➢ Do not place if air temperature is over 105°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!