

# *Quality Assurance / Quality Control*

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# *Quality Assurance / Quality Control*

## Presentation Overview

- I. **Defining QA / QC for Chip Seals Applications**
- II. **Assurance of Quality for Chip Seals**
- III. **Elements of a Quality Control Plan for Chip Seals**

# Quality Assurance / Quality Control

## Defining QA / QC

### What is QA / QC?

- ❑ Ensuring the Quality of Work

Making a conscious effort to incorporate and document the “Best Management Practices”

This will guarantee the lowest life cycle cost is achieved.

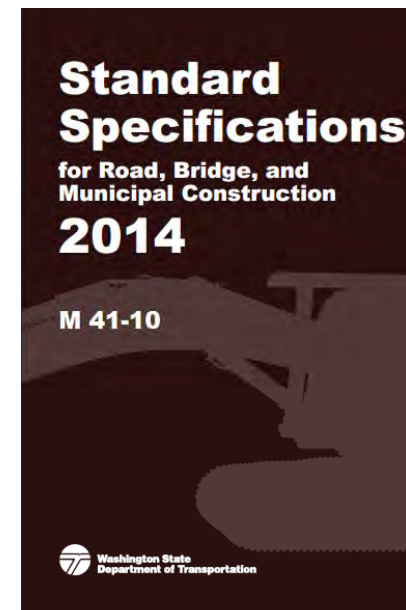


# Quality Assurance / Quality Control

## Defining QA / QC

### What is Quality Assurance

Quality Assurance is a systematic approach taken by an agency or entity to ensure the final product meets expectations of the customer.



***Quality Assurance is the Agency's responsibility!***

# Quality Assurance / Quality Control

## Defining QA / QC

### What is Quality Control

Quality Control is a plan which is drafted and initiated to ensure the work performed meets the requirements defined by the contract.



***Quality Control is the Contractor's responsibility!***

# Quality Assurance / Quality Control

## Defining QA / QC

### Why QA / QC?

- ❑ Art and Science of Chip Sealing

Public tolerance of Chip Seals are directly related to the.....

*Quality of Work*



# Quality Assurance / Quality Control

## Defining QA / QC

### Workmanship

Taking short cuts in a process will reflect in sub-standard work.

Best practices must be established for each step.

***Training on “Best Practices” must occur for all involved.***



# Quality Assurance / Quality Control

## Defining QA / QC

### Success is a Team Effort

A skilled labor force with a clear understanding of goals and expectations are required.....

***Quality is everyone's responsibility!***





# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Contract Plans and Specifications

- Avoid late season contracts
- Mitigate bird, fish and wildlife restrictions
- Complete any corrective actions the prior year



*Quality Assurance depends on timing of the work.....*

# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

Mitigation for roadway distress

- Crack Seal
- Double Seal
- Cape Seal
- HMA Overlay



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Crack Seal



Pavement cracks larger than ¼” should be addressed by filling with a material appropriate to the size of the crack.

- Sand Slurry
- Rubberized
- Commercial Mastic

# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

### Measurement and Payment

- Binder by the ton
- Aggregate by the square yard

*Why does it make a difference?*



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Correct System Selection

- Forecast Pavement Condition
- Weather Constraints
- Land Use Zoning
- Traffic Levels



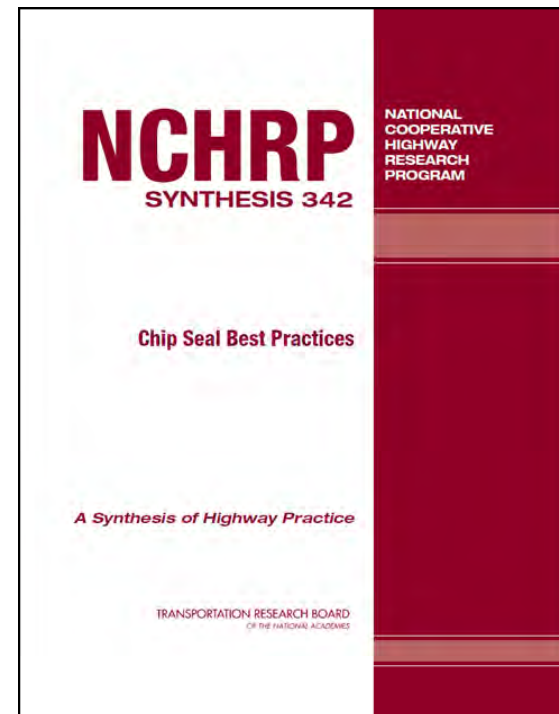
# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Chip Seal Designs

- Hanson (1934)*
- Kearby (1953)*
- McLeod (1969)*



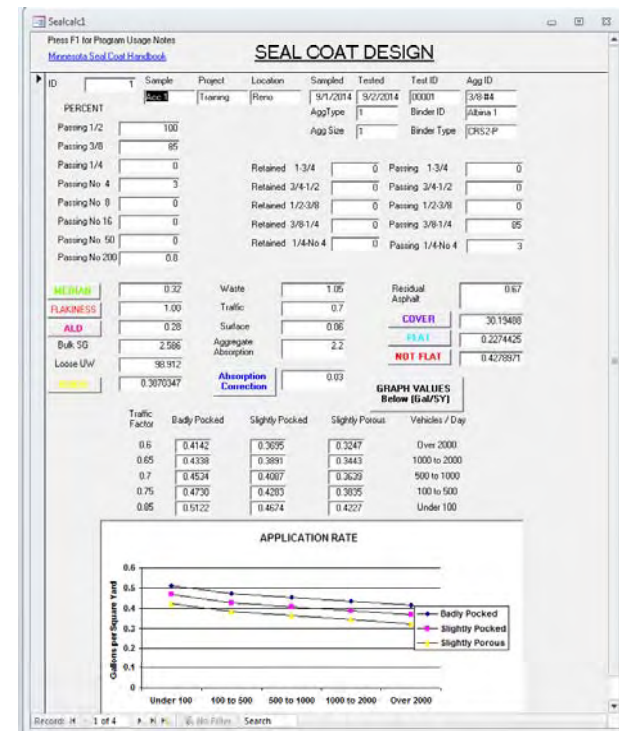
# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### McLeod Method

- Aggregate Properties
- Binder Residual
- Pavement Factors
- Traffic Volumes



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Aggregate Properties

- Median Particle Size*
- Flakiness Index*
- Average Least Dimension*
- Voids in Loose Aggregate*





# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Aggregate Production

- Cubical Shape*
- 2 Face Fracture*
- Excessive Fines... P200*
- Stockpile Contamination*



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Asphalt Emulsions



- Chip Seals using an emulsion are temperature sensitive.*
- Night time air temperatures less than 60°F will delay the cure time.*
- Day time air temperatures more than 100°F will delay the set time.*

# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### AC Chip Seal vs. Emulsion Chip Seal

- Thermal Differential vs. Evaporation Rate
- Hydrophobic vs. Hydrophilic
- 100% Binder vs. 60% Binder
- Pre-Coated vs. Un-coated Chips



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Asphalt Cement Chip Seals.... “Hot Seals”

- Higher ADT traffic volumes*
- Residential/Urban areas*
- More residual binder*
- Very little fugitive dust*
- Accelerated striping*



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Choke Stone



A layer of smaller size aggregate applied to the chip seal after the cover stone has been rolled.

- Fills in the voids*
- Keys in the cover stone*
- Prevents tracking and pick up*
- Provides a finer wearing course*
- Helps prevent "Fly Rock"*

# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

### Equipment Requirements

#### Steel Wheel Rollers

- Macadam Construction
- Behind Choke Application
- Hot- Applied Chip Seals



# Quality Assurance / Quality Control

## Assurance of Quality

### Design Criteria

#### Fog Seal



Fog sealing is a light application of an asphalt emulsion to an existing paved surface.

- Helps prevent shedding, “Fly rock”*
- Additional layer of waterproofing*
- Provides contrast for paint lines*
- Positive public perception*

# Quality Assurance / Quality Control

## Quality Control Plan

### Roadway Preparation



Quality Assurance requires the action....

The Quality Control Plan describes how.....

- Crack Sealing*
- HMA Patching*
- Chip Seal Patching*



# Quality Assurance / Quality Control

## Quality Control Plan

### Crack Sealing



- Cracks have to be clean*
- Cracks have to be dry*
- Cracks need a defined vertical edge*
- Pavement temperature has to “warm...ish”*
- Sealant has to be a proper temperature*
- Sealant shall be applied flush to the surface*

Product effectiveness is directly related to proper application.

# Quality Assurance / Quality Control

## Quality Control Plan

### Crack Sealing

Final Chip Seal effectiveness is directly related to proper application of the Crack Seal.

Keep over banding to a minimum.



# Quality Assurance / Quality Control

## Quality Control Plan

HMA Patching

Tack Coat

Studies show that not using a tack coat is detrimental to pavement service life.



It can not be over emphasized that bonding two layers together is paramount.

# Quality Assurance / Quality Control

## Quality Control Plan

### HMA Patching

### Asphalt Paver



- No quarter crowns*
- Heating of the screed*
- Do not overload screed*
- Consistent head of material*
- Watch for segregation*
- Truck Bumping the paver*
- Depth checks*
- Use of Automatics*
- Racking takeoffs and joints*

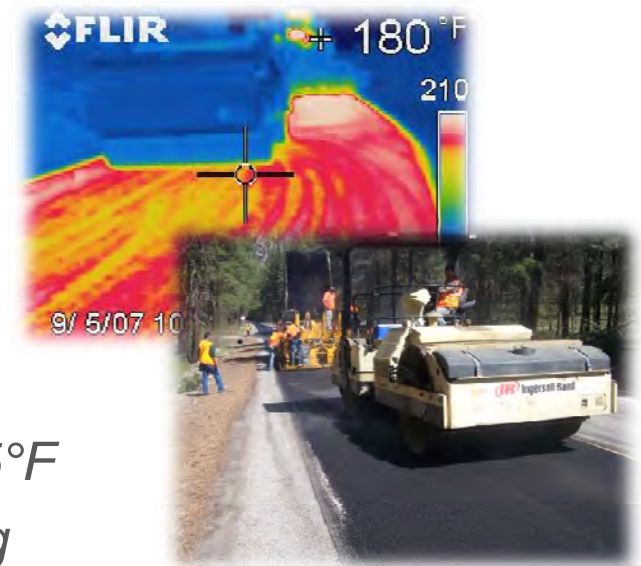
# Quality Assurance / Quality Control

## Quality Control Plan

### HMA Patching

### Paving Temperatures

- From the Plant, 300°F to 325°F
- At Laydown, Not cooler than 285°F
- Air temperatures, 40°F and rising
- Pavement temperature, 40°F and rising



# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal Patching

#### “Double Shot”

Chip Seal patches consist of layering one to two additional applications to distressed areas prior to the application of the final layer.

Each layer should be cured and broomed before applying the next layer.



# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Aggregates

- Crush enough and expect to lose quantity in the floor
- Water the piles if you are using CRS-2P
- Dry rock if using an AC, MC or HF
- Some Gradations Segregate
- Watch for Contamination



# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Aggregates

Apply rock light enough that you can see the asphalt through it, but heavy enough that you are not leaving a black stripe in the wheel paths.

Calibrate rock application rate



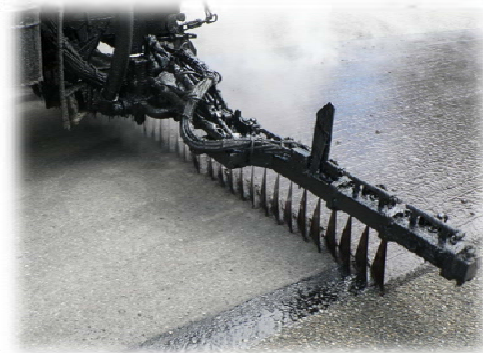


# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Asphalt Binder



- Apply enough oil to end up with the rock embedment of approximately 70%.
- Adjust “shot rate” for various conditions.
- Check binder application rate often

# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Asphalt Binder

Construct an 8" wide meet line to tie the pulls together.

Place meet line in center of lane or on the lane line



Do not place meet line in wheel path

# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Asphalt Binder

- Check temperature of binder
- Check for feathering of fans
- Check height of spray bar
- Check size of spray nozzle
- Check pump pressure

Corn Rowing / Drilling



# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Rolling, Particle Alignment

- Offset tire tracks
- Stay off meet line
- No sharp turns....
- Do not lock up brakes
- Cover entire application

Use loaded trucks effectively



You can not over roll!

# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

#### Rolling, Particle Alignment

Rollers set the production rate

- Maintain correct roller pattern
- Roller speed 5 to 8 mph
- Roll entire application
- No sharp turns



Keep rolling even if spreader stops

# Quality Assurance / Quality Control

## Quality Control Plan

### Chip Seal

### Pick-up Broom

- Environmentally sensitive areas
- Residential areas with sidewalks
- Curb and gutter areas
- Bridges



# *Applying and Inspecting Chip Seals*

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