

HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

PAVEMENT

PREVENTIVE MAINTENANCE

GUIDELINES

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**MATERIALS TESTING AND RESEARCH BRANCH
2530 LIKELIKE HIGHWAY
HONOLULU, HAWAII 96819**

I. DEFINITION

Preventive Maintenance (PM):

AASHTO definition: Preventive maintenance is the planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without substantially increasing structural capacity).

II. PROGRAM

The Preventive Maintenance Program is to extend the life of good pavements by applying low-cost preventive maintenance treatments. PM should be performed at the optimal time or intervals to preserve pavement condition throughout its service life or to extend the life of the pavement. Ride improvement and preservation of serviceability are key elements of the program. PM techniques and strategies selected should be easily constructible in order to minimize traffic disruption and should provide relief from intensive repair activity. PM treatments include reducing the amount of water infiltrating the pavement structure, protecting the pavement system, slowing the rate of deterioration, and correcting surface deficiencies. PM projects should not include reconstruction of pavements, traffic operations improvement, safety betterments, or any activity that significantly increases the structural capacity of the existing pavement. The following are key points of the PM Program:

- PM Projects should use easily constructed corrective strategies – Hot mix asphalt overlays, seal coats, Micro-Surfacing and open graded friction courses for flexible pavement. Diamond grinding, dowel bar retrofitting, and resealing pavement joints for rigid pavements.
- Concentrate on treating pavements exhibiting fair to good ride and minor distress.
- Extend pavement service life approximately three (3) to seven (7) years.
- Improve ride quality and serviceability of pavements.
- Reduce repair effort.
- Be without geometric enhancements or upgrades.
- Not degrade any safety or geometric aspects of the facility.
- Apply to both Interstate and Federal Aid Non-Interstate routes.

III. PREVENTIVE MAINTENANCE PROGRAM EXPECTATIONS

Maintains the pavement in a serviceable and safe condition for the public motorists.

- Correct minor ride and/or minor structural defects.

Pavement Preventive Maintenance Guidelines

- Slows the progression of minor problems to major rehabilitation needs.

Makes effective use of limited resources.

- Correct minor deficiencies early in a pavement's life, rather than wait until a road has major problems in need of costly rehabilitation or reconstruction.
- Utilizes Federal participation with State funds on PM projects.

Allows Hawaii Department of Transportation (HDOT) to manage pavement conditions.

- Creates the ability to postpone costly reconstruction and rehabilitation activities by extending the remaining service life of the original pavement.

IV. PREVENTIVE MAINTENANCE TREATMENTS

A. Asphalt Concrete (AC) Pavement

- Crack filling and crack sealing
- Slurry seals
- Micro-Surfacing
- Hot-mix asphalt overlay
- Drainage preservation

B. Portland Cement Concrete (PCC) Pavement

- Joint resealing
- Crack sealing
- Spall repair
- Diamond grinding
- Full-depth repair
- Dowel bar retrofit
- Drainage preservation

Existing pavement condition levels for utilizing each PM treatment are recommended and noted below.

A. Flexible Pavement (AC)

1. Crack Filling and Crack Sealing

Description: Crack filling consists of cleaning cracks in the pavement surface and placing the specified materials into and fill the crack to substantially reduce infiltration of water and to reinforce the adjacent pavement. Crack sealing consist of cutting the desired reservoir shape at the crack in the pavement surface, cleaning the cut surfaces and placing the specified materials into the cavity to prevent the intrusion of water into the pavement.

Pavement Preventive Maintenance Guidelines

Purpose: The purpose of filling and sealing cracks and joints in the pavement surface is to prevent water from entering the pavement structure. By keeping the water out of the pavement, deterioration of the crack is slowed and less water is available to saturate the base.

Existing pavement condition: The pavement surface should be relatively new, with no base failures or rutting. Visible surface distress may include: fairly straight open longitudinal and transverse cracks and low secondary cracking and low raveling at the crack face, and no patching or very few patches in excellent condition.

Performance limitations: Generally, all transverse cracks in the traveled lanes should be sealed and other cracks in the travel lanes and the shoulder areas filled.

2. Slurry Seal

Description: Slurry seal is a mixture of asphalt emulsion, aggregate, mineral filler, water, and other additives, properly proportioned, mixed, and placed on a paved surface.

Purpose: Slurry seal will retard oxidation, reduce the intrusion of water and improve surface friction in the pavement surface. Slurry seal can perform under low traffic volumes.

Existing pavement condition: The pavement should have no base failures or rutting. The visible surface distress may include moderate cracking, polished surface and/or low raveling.

Pavement surface preparation: Surface preparation includes protection of raised pavement markers and patching for large voids and potholes.

Performance limitations: Slurry seal should not be used on a pavement with heavy surface cracks.

3. Micro-Surfacing

Description: Micro-Surfacing is a mixture of polymer modified asphalt emulsion, 100 percent crushed aggregate, mineral filler, water, and other additives. A self-propelled continuous loading machine or a truck-mounted machine is used to proportion and mix the materials and apply the mixture to the pavement surface.

Purpose: A single course of Micro-Surfacing will retard oxidation, moderate raveling, reduce the intrusion of water, improve surface friction and remove minor surface irregularities in the pavement surface. A multiple course Micro-Surfacing is used to correct pavement surface deficiencies including rutting and minor surface profile irregularities. Micro-Surfacing can perform under all traffic volumes.

Pavement Preventive Maintenance Guidelines

Existing pavement condition: The pavement should not exhibit any base failures. The visible distress may include low cracking, rutting, minor surface irregularities, flushed or polished surface and/or moderate raveling.

Performance limitations: A standard Micro-Surfacing formulation should not be used on a pavement with moderate to high surface cracks.

4. Hot Mix Asphalt Overlay

Description: A dense graded hot mix asphalt mixture limited to 1-1/2 inches.

Purpose: A hot mix asphalt overlay is the highest type of surface treatment available in the flexible pavement preventive maintenance program. It will provide some protection to the pavement structure, reduce the rate of pavement deterioration, reduce permeability, correct surface deficiencies improve the ride quality and add some strength to the existing pavement structure.

Existing pavement condition: The pavement should exhibit a good base condition. The visible surface distress may include moderate to high raveling, moderate surface rutting, low longitudinal and transverse cracks and low amounts of block cracking. Load associated distress may be present. The pavement may have some minor base failures and depressions.

Pavement surface preparation: Preparation work should be limited to the repair of the localized base failure and depressions, the filling of voids in the pavement surface, the removal of any patched area with poor adhesion. Pavement areas of very high asphalt content or moderate to severe raveling should be milled.

Performance limitations: A hot mix asphalt overlay should not be placed on the following existing conditions: severely distressed pavement, severely rutted bituminous pavement, pavement with a weak base, or a bituminous surface that is debonding.

5. Drainage Preservation

Description: This work consists of cleaning silt, debris and vegetation at under-drain outlets, as well as replacing crushed or destroyed outlets as needed.

Purpose: This activity is intended to preserve and maintain the performance of the pavement drainage system.

Existing drainage condition: This activity should be conducted on all pavements that have under-drain systems, as a routine maintenance item. Drainage preservation is a critical activity for pavements, especially those constructed with a permeable base.

B. Rigid Pavement (PCC)

1. Joint Resealing

Description: This work includes the removal of the existing joint seals, and resealing the transverse and longitudinal joint with preformed neoprene or silicones.

Purpose: The purpose of resealing the concrete pavement joints is to prevent water and incompressible from entering the pavement structure, thus slowing the rate of deterioration of the concrete pavement.

Existing pavement condition: Joint faces must be in good condition with very little to no spalling. Joints should not be open more than 1 inch at any temperature throughout the year. Resealing with neoprene can be done when the concrete pavement is fairly new.

Resealing with silicones is typically done on older concrete pavements (more than 10 years old). Self-leveling silicone can be used in joints where spalls are less than 1 inch deep and less than 1-½ inches wide (as measured from the joint face). If spalls exceed these limits, joint spall repair must be done in order to use silicones.

2. Crack Sealing

Description: Crack sealing involves the sawing or routing, cleaning and sealing of cracks in the concrete pavement that are greater than 12 inches in length and greater than 0.1 inch in width. If the crack width is greater than 0.4 inch, a backer rod must be used.

Purpose: The purpose of sealing the cracks in the concrete pavement is to reduce the water and incompressible from entering the pavement structure and thus slowing the deterioration rate of the pavement.

Existing pavement condition: Concrete pavement that exhibits a slow rate of deterioration should have a high priority for crack sealing.

3. Spall Repair

Description: This work is to repair spalled concrete by removing all unsound concrete, cleaning the area, and placing a filler material consisting of a fast-set mortar or a rapid setting polymer concrete.

Purpose: Spall repair is done to remove distress from the pavement. The cause of spalling should be determined to assure a proper repair.

Existing pavement condition: The pavement should exhibit low spalling. The amount of spalling needs to be quantified to make an accurate estimate of the project cost.

4. Diamond Grinding

Description: This work consists of diamond grinding the entire lane width as specified in the contract.

Purpose: Diamond grinding is used to restore the surface longitudinal profile and improved ride quality of a concrete pavement. Benefits from diamond grinding include: the removal of joint crack faults and improvement of skid resistance.

Existing pavement condition: The pavement should not have corner breaks, spalling or popouts. The visible surface distress may include low crack level and faults not exceeding 0.25 inch, and moderate to severe polishing.

Performance limitations: Diamond grinding should generally not be used on concrete pavements where the faulting is greater than 0.25 inch. Diamond grinding should not be used as a one step solution to treating the deficiencies of the concrete pavement.

5. Full Depth Repair

Description: This work shall include full depth concrete pavement repairs and diamond grinding.

Purpose: The treatments not only repair distress, but also prevent or slow the recurrences of distress.

Existing pavement condition: The concrete pavement will likely display deterioration that requires a combination of various treatments to correct distresses. Select a repair strategy that considers costs, longevity and future maintenance and reconstruction options.

6. Dowel Bar Retrofit

Description: Dowel bar retrofit is an operation in which slots are cut into the concrete pavement across faulted joints and cracks, and dowel bars are placed in the slots to restore the load transfer. The work consists of six operations: cutting the slots, preparing the slots, placing the dowel bars, backfilling the slots, diamond grinding the pavement surface and opening the pavement to traffic.

Purpose: A dowel bar retrofit treatment is used to maintain jointed concrete pavement before serious deterioration is present. This treatment is used to restore the effective load transfer at faulted joints and cracks, significantly reduces the recurrence of faulting and increases the structural capacity of the pavement.

Existing pavement condition: The jointed concrete pavement should be in good to fair condition with no serious deterioration present. There should be very little to no spalling

along the joint or crack. Crack widths should be less than 0.25 inch and faulting less than 0.1 inch.

7. Drainage Preservation (See description under Flexible Pavement above.)

V. PROCESS AND PROJECT SELECTION

The highway inventory and pavement condition survey performed for the Pavement Management System (PMS) will be used to aid project selection for PM treatments. Refer to the Pavement Survey Procedures Manual dated January 1993 for details of pavement condition survey.

To fulfill the purpose of the PM program, only pavement sections with low level of service severity, ranking of 8 to 12 based on the ranking matrix for pavement evaluation criteria in the PMS program will be selected for PM treatments. A summary list of pavement sections with a ranking of 8 to 12 will be sent to Hawaii, Kauai, Maui and Oahu District. The District Engineer shall select pavement sections for PM treatments from the summary list. The District Engineer shall inform the Materials Testing and Research Branch (HWY-L) of the selected pavement section(s). Once a project has been selected, HWY-L will provide recommendations on PM treatments.