ALDOT Aeronautics:
Northwest Alabama Regional Airport

Pavement Maintenance Program

GARVER

TABLE OF CONTENTS

General Plan Overview Page

Introduction…… 1
Pavement Maintenance Classifications…… 1
Airport Site Evaluations…… 2
Airport Evaluation Analysis…… 3
Pavement Condition Index Diagram 3
Pavement Distress Chart 4
Distress Photographs 5-13
Standard PCI Rating Scale 14
PCI Deterioration & Maintenance Assumptions…… 14
Asphalt Deterioration Curve & Rates 15
General Airport Recommendations…… 16
Conclusion…… 16
References…… 17

Northwest Alabama Regional Airport Pavement Maintenance Program Page

Introduction…… 18
Pavement History…… 18
PCI Inspection…… 18
Pavement Sketch 18a
Extrapolated Distresses…… 19
Photographs…… 22
PCI Prediction…… 30
Recommended Maintenance Plan & Predictions…… 32
PCI Prediction Charts 35a-q
Summary…… 36

Appendix A

Airfield Asphalt Pavement Condition Survey Data Sheet

Pavement Maintenance Program
General Plan Overview

Introduction

In 2008, the Alabama Department of Transportation – Aeronautics Bureau (ALDOT Aeronautics) embarked upon a plan to develop and implement pavement maintenance programs for the purpose of maximizing the lifespan of airfield pavements constructed of asphalt. ALDOT Aeronautics enlisted the services of Garver, LLC to assist in the development of these plans. This program was designed to create a five year pavement maintenance schedule for each subject airport.

Pavement Maintenance Classifications

As stated in FAA AC 150/5380-6B, while pavement deterioration from "usage and exposure to the environment cannot be completely prevented, a timely and effective pavement maintenance program can minimize this deterioration. Adequate and timely maintenance is the greatest single means of controlling pavement deterioration."

The pavement maintenance program proposed herein is designed to extend the life of the pavement by scheduling rehabilitation activities before the pavement deteriorates beyond the point at which the pavement will need global rehabilitation activities such as an overlay or reconstruction. The reconstruction of existing pavements is estimated to 4-5 times more expensive than rehabilitation.

There are several types of maintenance activities which can enhance and increase the lifespan of airfield pavements; Localized Preventative Maintenance, Localized Stop-Gap Maintenance, and Global Preventative Maintenance. Localized Preventative Maintenance activities include maintenance in small, localized areas in an effort to prevent further deterioration. Localized Stop-Gap Maintenance activities include small, localized areas of maintenance intended not necessarily to improve the pavement, but to resolve safety issues. Global Preventative Maintenance activities include surface treatments applied to an entire pavement area in an effort to prevent and reverse deterioration, and thereby extend the life of the pavement

The following pavement maintenance program (PMP) will consist of Localized Preventative Maintenance and Global Preventative Maintenance. The need for Localized Stop-Gap Maintenance will need to be evaluated, and if necessary, performed by the airport on an as-needed basis.

For the purpose of the PMP, pavement maintenance will be defined as proven, routine and low-cost procedures that are performed to extend the useful lifespan of asphalt pavements. Typical pavement maintenance procedures for this program include the following:

1. Localized crack and joint cleaning and sealing
2. Global asphalt rejuvenation
3. Global asphalt slurry-seal
4. Pavement marking application

Airport Site Evaluations

Each distinct area of airfield pavement was evaluated separately. Only those taxiway(s), taxilane(s) and aircraft parking ramp(s) that are open to the public were evaluated. Taxiway(s) and/or parking ramp(s) that are used exclusively by an individual airport tenant and/or privately constructed were not subject to evaluation. Automobile parking areas and airport access or internal circulation roads were not included in the evaluation or recommendations.

The PMP has been organized into a hierarchical structure as shown below:

1. The Airport, as a whole, is the "**Network**."
2. Each Network is subdivided into "**Branches**". Each Branch represents a distinct pavement area on a particular airport in the ASPMP (e.g., primary runway, secondary runway, taxiway(s), aircraft parking ramp(s)).
3. "**Sections**" represent portions of the pavement area in a particular Branch (e.g., original runway construction, runway extensions, etc.).
4. Each Section includes smaller areas, roughly 5,000 (+/- 2,000) square feet each, called "**Sample Units**".

Utilizing sketches and aerial photographs, approximately 10% of the sample units were randomly selected for evaluation before the inspection began. Additional sample units were added during the inspection if warranted. After evaluation, the distresses from each randomly selected Sample Unit were combined and extrapolated over the entire Section for overall results.

Within a three-month period during the summer of 2009, Garver trained and sent inspectors to analyze the asphalt runways, taxiways, taxilanes and aprons at Airports across the state of Alabama.

Garver's pavement inspectors worked individually or in teams, depending on the size of the airfield. Some sites required less than a day to inspect, while others demanded two days of inspections. Each inspection included a pavement inventory to verify the pavement's size and use; pavement history, complete with sponsor and patron interviews (if available); visual assessment and identification; and pertinent photographs.

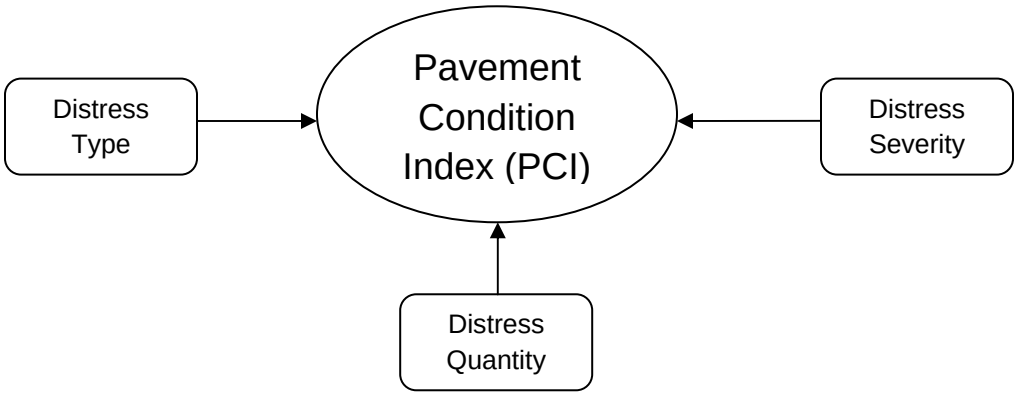
Airport Evaluation Analysis

In evaluating the pavements, Garver used the Pavement Condition Index (PCI) evaluation method developed by the U.S. Army Corps of Engineers. This method involves a non-destructive, visual inspection of the pavement areas. Garver also employed the Corps' MicroPAVER 6.1 software to catalog and appraise pavements.

The PCI method of evaluation of airport pavements concentrates on identifying certain standard asphalt deficiencies or failures that contribute to shortening a pavement's lifespan. Such deficiencies or failures include, but are not necessarily limited to:

- Surface defects – raveling, flushing and/or polishing
- Surface deformations – rutting, distortion, rippling, shoving, settling, and/or frost heave
- Cracks – thermal cracks, reflection cracks, slippage cracks, joint/edge cracks, block cracks, and/or alligator cracks.
- Patches and potholes

There are three items which determine the Pavement Condition Index: the distress type, distress severity and distress quantity.



The standard for categorizing airfield asphalt distresses is outlined in ASTM D 5340, Standard Test Method for Airport Pavement Condition Index Surveys. This standard is also recommended by the FAA in AC 150/5380-7A Airport Pavement Management Program and AC 150/5380-6B Guidelines and Procedures for Maintenance of Airport Pavements.

See Appendix A for a sample Distress Data Sheet utilized for the airfield evaluations. This form was obtained from the MicroPAVER 6.0 User Manual, Appendix E, page 134.

In performing a PCI inspection, random sample sections from each pavement area are visually inspected for distress types, severity and quantity. These distresses include the following:

Distress	Quantity	Severity	Possible Cause
Alligator Cracking	Sq. Ft.	Low/Med/High	Load. Fatigue failure of the asphalt surface under repeated traffic loading.
Bleeding	Sq. Ft.	N/A	Excessive AC in the asphalt at the time of placement and/or low air-void content.
Block Cracking	Sq. Ft.	Low/Med/High	Climate. Shrinkage of the asphalt and daily temperature cycling.
Corrugation	Sq. Ft.	Low/Med/High	Traffic movements combined with an unstable pavement surface or base.
Depression	Sq. Ft.	Low/Med/High	Settlement of the foundation soils or construction upon uneven base.
Jet Blast	Sq. Ft.	N/A	Bituminous binder has been burned or carbonized by jet blast.
Joint Reflection/Cracking	Ft.	Low/Med/High	Climate. Movement of a PCC slab under the asphalt caused by thermal and/or moisture changes.
Longitudinal and Transverse Cracking	Ft.	Low/Med/High	Shrinkage of the AC surface due to low temperatures or hardening of the asphalt; poorly constructed paving joints; or reflection of underlying cracks (including those caused by PCC which are not at joints).
Oil Spillage	Sq. Ft.	N/A	Deterioration or softening of pavement surface caused by the spillage of oil, fuel or other solvents.
Patching	Sq. Ft.	Low/Med/High	Utility cuts and patching, etc.
Polished Aggregate	Sq. Ft.	N/A	Repeated traffic applications.
Weathering/Raveling	Sq. Ft.	Low/Med/High	Climate. The wearing away of the pavement surface caused by the dislodging of aggregate particles and loss of asphalt or tar binder.
Rutting	Sq. Ft.	Low/Med/High	Load. Consolidation and/or lateral movement of materials due to traffic loading.
Shoving	Sq. Ft.	Low/Med/High	Gradual opening of joints as they are filled with incompressible materials that prevent them from closing.
Slippage Cracking	Sq. Ft.	N/A	Low-Strength surface mix and/or poor bond between the surface and the next layer of the pavement structure.
Swelling	Sq. Ft.	Low/Med/High	Frost action in the subgrade or by swelling soil.

Below are photographs of some of the more common distresses encountered during the pavement inspections, though not necessarily at each airport.

Alligator Cracking:

Block Cracking:

Depression:

Joint Reflection Cracking:

Longitudinal & Transverse Cracking:

Oil Spillage:

Patching:

Rutting: