

Revised Airport Licensing

A Summary Report for the Aeronautics Bureau of
The Alabama Department of Transportation

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Contents

Contents	iii
List of Tables	v
List of Figures	v
Executive Summary	vi
1.0 Introduction.....	1
1.1 Study Purpose	1
1.2 Methodology.....	2
1.3 Report Organization.....	3
2.0 Historical Overview.....	4
2.1 Alabama in Aviation History	4
2.2 What is General Aviation?.....	4
2.2.1 Facts about General Aviation (GA).....	4
2.3 General Aviation Airports.....	5
2.3.1 Airport Facilities	5
2.4 Airports and Community	5
2.4.1 Safety Impacts.....	6
2.4.2 Economic Impacts.....	6
3.0 Literature Review.....	8
3.1 Literature Review Methodology.....	8
3.1.1 Other State’s Approaches	8
3.1.2 FAA Regulations	8
3.1.3 Web Resources.....	9
3.2 Resources for Pilots	9
3.2.1 Airport/Facility Directory (AFD)	9
3.2.2 The 5010 Database.....	10
3.2.3 Airnav.com.....	10
3.2.4 Comparison of the Three Sources.....	11
3.3 State Airport Agency Web Sites.....	12
4.0 Methodology.....	15
4.1 Referring Comparable Inspection Manual.....	15
4.2 Role of the ALDOT Inspector	16
4.2.1 Field Test One.....	16
4.2.2 Field Test Two	17
4.2.3 Field Test Three	17

4.3	Paving Conditions.....	18
4.4	Making Algorithm Online.....	20
4.4.1	Obtaining Latest Inspection Report.....	21
4.4.2	Conducting Online Inspections.....	21
5.0	Pavement Inspection System.....	25
5.1	Literature Review.....	26
5.1.1	Pavement Management System and PCI.....	26
5.2	MicroPAVER® 5.0.....	26
5.2.1	ASTM and GASB Standards.....	27
5.2.2	Decision to Adopt MicroPAVER® 5.0.....	27
5.3	MicroPAVER® Overview.....	27
5.3.1	Inventory.....	28
5.3.2	Work Button.....	29
5.3.3	PCI.....	30
5.3.4	Reports.....	33
5.3.5	Prediction Modeling.....	34
5.3.6	Condition Analysis.....	34
5.3.7	M&R Plan.....	35
5.3.8	Selection Tools.....	35
5.4	How MicroPAVER® Generates PCI.....	35
5.5	Airport Pavement (Runway) Inspections Using MicroPAVER®.....	37
5.5.1	Inspection Report – Bibb County Airport (0A8), Centreville, Alabama.....	38
5.5.2	Inspection Report – George Downer Airport (KAIV), Aliceville, Alabama.....	40
5.5.3	Inspection Report – Eutaw Municipal Airport (3A7), Eutaw, Alabama.....	42
6.0	Conclusions and Recommended Scope for Further Work.....	46
6.1	Results.....	46
6.2	Recommended Scope for Further Work.....	47
7.0	References.....	48
Appendix A: Web Site Information on Airport Licensing.....		49
Appendix B: GASB Statement 34.....		56

List of Tables

Number	Page
2-1 Alabama aviation accident statistics (1997-2001)	6
3-1 Comparing 5010 Database, http://www.airnav.com , and Airport Directory	12
3-2 State general aviation licensing information available on Web.....	13
4-1 Preliminary weighting factors and points allotted	16
4-2 Inspection algorithm for lighted airports (final layout)	19
4-3 Inspection algorithm for lighted airports (final layout)	19
4-4 Inspection algorithm for day-only airports (final layout)	20
4-5 Inspection algorithm for day-only airports (final layout)	20
5-1 PCI range and pavement rating.....	32

List of Figures

Number	Page
4-1 Web page showing airport list	21
4-2(a) Tuscaloosa Municipal Airport inspection report	22
4-2(b) Tuscaloosa Municipal Airport inspection report	23
4-3 Web page layout of online inspection (partial).....	24
5-1 MicroPAVER® 5.0 screen	28
5-2 Inventory screen for defining pavement network, branch and section	29
5-3 MicroPAVER® work screen for defining work required and history.....	30
5-4 Condition survey data sheet provided by MicroPAVER® 5.0 manual	31
5-5 MicroPAVER® inspection data entry window	32
5-6 MicroPAVER® assessment results	33
5-7 MicroPAVER® reports	34
5-8 Deduct curve for asphalt pavement, alligator cracking	36
5-9 Deduct curve for asphalt pavement, block cracking.....	36
5-10 Bibb County Airport, Centreville, Alabama.....	39
5-11 Severe alligator cracking that caused potholes	40
5-12 Poorly patched potholes.....	40
5-13 George Downer Airport, Aliceville, Alabama.....	42
5-14 Grass sprouting along cracks	43
5-15 Weathering and raveling caused due to loss of pavement binder.....	43
5-16 Weathered pavement with grass sprouting along cracks	43
5-17 Longitudinal cracks connected by transverse cracks.....	44
5-18 Water seeping out through longitudinal crack due to load application	45
5-19 Mild asphalt bleeding along pavement strip	46

Executive Summary

A series of three projects developed a new annual inspection system for the Aeronautics Bureau of the Alabama Department of Transportation (ALDOT), for use on Alabama's general aviation (GA) airports. An inspection rating algorithm was developed, a web site was designed, and a new inspection database was created and hosted online. The airport inspector can report the inspection results and post them within a matter of hours. This will help the flying public obtain the latest information on any airport in the State. Other major tasks in the overall project included testing the inspection reporting system and incorporating a pavement management system using Micro PAVER 5.0 to develop pavement condition index values. The project team helped the airport inspector become familiar with the inspection software during his regular inspections, and the system will be used for future GA airport licensing in the State.

For convenience sake, the report reviews and repeats the accomplishments of the first two projects prior to the detailed discussion of the third project. An overview of all three projects is given below:

- UTCA project 01111, "Comparing Airport Licensing Developments: Alabama vs. Selected States and the FAA." This project evaluated Alabama's GA criteria compared to a nationwide sample and made recommendations to the ALDOT Aeronautics Bureau.
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Section 1

Introduction

Aviation has played a dominant role in worldwide transportation over the past few decades. As aviation has grown, accidents and incidents have become more numerous and safety has emerged as a primary matter of concern. This has resulted in the establishment of agencies by state and federal governments with the objectives of improving aviation safety, capacity, and efficiency.

The civil aviation sector is divided into two categories: commercial aviation and general aviation (GA). Commercial aviation comprises scheduled and chartered operations, while all other flying falls into the GA category. GA constitutes an important role in air traffic. Since World War II, there has been a relatively high growth in the number of people using small aircraft for personal transportation as well as recreation in the United States. This has resulted in growth in the number of GA public use airports throughout the nation.

Today there are more than 5,025 public use airports (averaging roughly 100 per state) and 9,433 private use airports in the USA, for a total of 14,458 general aviation airports (Transportation Research Board, 2001). Public use airports are open to the public and the state government has the responsibility to ensure that they operate according to prescribed safety measures with minimal risk to the safety of the flying public.

The State of Alabama currently has 96 public-use airports and 181 private-use airports. The Aeronautics Bureau, part of the Alabama Department of Transportation (ALDOT), oversees the safety aspects of public-use airports. There is only one official, designated as “airport inspector” in this report, to ensure airport safety and to issue annual operating licenses to these airports.

The airport inspector is hard pressed to conduct recurring inspections, traveling throughout the state and conducting laborious inspections. The paperwork necessary to prepare the licensing information status for distribution to the public is extensive, and often delays the reporting of the airport licensing status. This delay could become a safety and economic issue.

1.1 Study Purpose

This project was conducted by the University Transportation Center for Alabama (UTCA) to create a revised method of inspecting and licensing public-use airports in Alabama, using Web-based technology. The primary objective of the project was to generate an algorithm for airport inspection using appropriate weighting factors for various inspection features, by working in unison with the airport inspector. After developing the algorithm, a spreadsheet program was developed and field-tested on various conditions at different airports.

The spreadsheet program was transferred to the ALDOT Web page, where the inspection results may be placed online. This will reduce inspection paperwork and allow the public to determine the latest licensing status of any airport in the state.

1.2 Study Methodology

The following methodology was adopted to accomplish the overall study objectives:

- i. Conduct a three-phase literature review on the following topics: (a) Investigate licensing procedures in Alabama, other southeastern states and the FAA. (b) Examine existing standards of the Federal Aviation Administration (FAA) for GA airports that qualify for and participate in the national Airport Improvement Program (AIP). (c) Review GA airport licensing standards and procedures adopted by most states in the United States, to identify potential improvements for methods being used in Alabama.
- ii. Accompany the airport inspector on airport inspections and identify the critical factors of airport licensing.
- iii. Develop an algorithm for all important factors, and assign weighting factors to each feature according to its importance.
- iv. Embed the algorithm in a spreadsheet, field test it, and make necessary revisions for practicality.
- v. Repeat the field test for lighted/non-lighted airport conditions, and update the algorithm.
- vi. Prepare a database in MS-Access® and post the algorithm on the ALDOT Web site while maintaining web security privileges for the airport inspector.
- vii. Develop a database on all airports in the State with information which will be helpful for flying public and make the database online.
- viii. Implement a pavement management system (using Micro PAVER 5.0) for determining the Pavement Condition Indices of different airports.
- ix. Connect the algorithm, airport information database and supply the PCI value of airports that are inspected through the web to the public

The overall research effort was conducted through a series of three projects. For convenience sake, this report reviews and repeats the accomplishments of the first two projects prior to the detailed discussion of the third project. An overview of all three projects is given below:

- UTCA project 01111, “Comparing Airport Licensing Developments: Alabama vs. Selected States and the FAA.” This project evaluated Alabama’s GA criteria compared to a nationwide sample and made recommendations to the ALDOT Aeronautics Bureau.
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1.3 Report Organization

Section One (Introduction): Provides an overview of the report, including the study purpose and various work steps.

Section Two (Historical Overview): A detailed description and definition of general aviation concepts, and the status of Alabama in comparison with other states.

Section Three (Literature Review): An examination of the different phases of the literature review conducted for this study.

Section Four (Methodology): A discussion of the various meetings, field trips, airport features considered, different phases of algorithm development, and details of converting the algorithm to the ALDOT Web page.

Section Five (Implementing MicroPAVER®5.0 for Airport Inspection): Explains the various features of MicroPAVER 5.0, and reviews how it was applied to Alabama airports and tested with three field inspections.

Section Six (Conclusions and Scope of Further Work): Conclusions are presented for this project, along with the scope of further work to enhance the airport licensing procedure.

Section 2

Historical Overview

This section provides a historical overview on aviation in Alabama, and defines general aviation along with a perspective on national trends in GA.

2.1 Alabama in Aviation History

Alabama holds a very important place in aviation history since the inception of modern-day engine-driven aircraft. On December 17, 1903, two innovative self-motivated engineer brothers, (Orville and Wilbur Wright), flew successfully after yearlong flight experiments. Just seven years after the historic flight of the Wright brothers, Wilbur Wright traveled to Montgomery, Alabama to open a temporary civilian flying school. This flying school was located near “Douglasville” a small village northwest of Montgomery. By the end of February 1910, one of the world’s earliest flying schools was opened in Alabama. It subsequently became Maxwell Air Force Base.

Today the transportation infrastructure of Alabama is dependent on a network of airports spread across the state. The network consists of eight commercial airports and numerous GA airports. The commercial airports offer scheduled commercial service and are governed by the Federal Aviation Administration . Of general aviation airports, 96 are open to the public and another 181 are privately owned and maintained. In Alabama, the Aeronautics Bureau oversees the licensing of public use airports.

2.2 What is General Aviation?

The International Civil Aviation Organization defines general aviation as:

An aircraft operation other than a commercial air transport operation or an aerial work operation is termed as general aviation. Aerial work is defined as specialized commercial aviation operations performed by aircraft, e.g. flying training, agriculture, construction, photography, surveying etc.

The Aircraft Owners and Pilots Association defines General Aviation as:

All civilian flying except scheduled passenger airlines and military aircraft operations.

2.2.1 Facts about General Aviation

- Three out of four take-offs at United States (US) airports are by GA aircraft.
- More than 92% of US civil aircraft are registered as GA aircraft; GA is the largest aviation sector, regionally and nationally
- .GA serves as a springboard for many of the world’s commercial pilots in learning how to fly. Roughly 70% - 80% of pilots in commercial aviation come through the GA field.

- GA includes diverse flying such as air ambulances, business flying, recreation flying and medical repatriation.
- GA assists in personal transportation as it offers speed, productivity and flexibility, unlike any other mode of travel.
- GA is the most efficient and cost-effective way to conduct environmental activities such as surveying wildlife, fighting forest fires and sampling air quality. It also helps highway commuters by traffic reporting, and by providing advanced traveler information regarding upstream gridlocks or accidents
- GA boosts production of the nation's agriculture through chemical application, and it also helps law enforcement in federal, state and local jurisdictions.

2.3 General Aviation Airports

General Aviation airports include public as well as privately owned airports that do not offer commercial scheduled or chartered air transportation services. Most have paved runways and a few have lighted runways that are capable of conducting operations at night. The United States averages one airport for every 50,000 people, or about one for each 700 square miles. However these airports differ significantly in their overall conditions, facilities provided, and safety characteristics.

2.3.1 Airport Facilities

An airport has landside and airside facilities. Airside facilities are those that are instrumental in directly supporting aircraft or flying needs, or that play a critical role in serving airside needs. Airside facilities consist of runways, taxiways, aprons, aircraft parking places, maintenance buildings, hangars, fueling stations, air traffic control facilities and navigational aids. Landside facilities serve those who use the aircraft or provide better coordination of activities on the airside. Examples include cargo buildings, access roads, automobile parking lots and similar facilities for passengers or other airport users.

Some key indicators of a functional airport include runway condition (e.g., paved, lighted, sufficiently long), navigation aids, traffic control facilities and passenger facilities and amenities.

2.4 Airports and Communities

Airports have a direct impact on nearby communities from a safety and economics point of view. The most important is the safety of those who fly to and from these airports. However, the economic aspect can be far-reaching in terms of industry attraction and economic development. Alabama has been gradually transformed from a raw materials provider to a service and finished products provider. In this transformation, general use airports have become an important fixture for providing flexibility for corporate aircraft to reach remote factory destinations.

2.4.1 Safety Impacts

A variety of factors determine airport safety, such as length of runway, condition of runway pavement, approach path slope, whether runways are paved, lighted or unlighted, and other pertinent airside conditions. Airport features such as navigation aids, traffic control and safety services are considered critical factors to commercial airports, and they are of equal value for improving public safety at all airports during reduced visibility and bad weather.

Table 2-1 provides statistics on accidents in Alabama from 1997-2001 (National Transportation Safety Board Data). Of the 116 accidents listed, 113 were in the GA sector which resulted in 48 fatalities. The National Transportation Safety Board cites a variety of reasons as causes of these accidents, with the primary factor being pilot error. However, for many accidents unsafe airport operating conditions were also contributing factors.

Table 2-1. Alabama aviation accident statistics (1997-2001)

Year	Accidents	General Aviation (GA)	Commercial Aviation (CA)	Fatalities	
				GA	CA
1997	17	17	-	7	-
1998	27	25	2	7	-
1999	30	30	-	14	-
2000	17	16	1	2	-
2001	25	25	-	18	-
Total	116	113	3	48	-

Current airport safety information is essential to those flying to an unfamiliar airport. In other words, furnishing the public with information about the current operating status of an airport will assist in proper flight planning and contribute to the overall safety of flight operations. Quite often, the most recent information regarding the condition of a general aviation airport may not be available.

2.4.2 Economic Impacts

Most GA flights are conducted for business services that need more flexible transportation than commercial airlines can offer. The GA aircraft is the mainstay of a \$20 billion-a-year industry which generates \$64 billion in economic activity. Thousands of communities benefit as their local airports create positive effect on the local economies and businessmen take advantage of rapid, flexible air transportation.

In Alabama, GA airports generate billions in indirect economic benefits, and some \$800 million annually from businesses using these airports, paying airport fees, buying aviation fuel, and other purchases that fliers make in the community.

Most corporations will not locate a plant, headquarters or distribution center in a town without an airport. It is no coincidence that many of the world's most profitable companies operate their own aircraft to improve their productivity and to increase the flexibility to travel quickly, cost-effectively and by the most direct route.

GA airports definitely have an economic impact on the communities where they are located. From the economic point of view, potential industrial users of the airport may overlook its improvements and forego opportunities to develop the airport or adjacent areas. In other words, having an airport will not be a primary reason for a city to get onto the shortlist for industrial development, but not having a good airport will definitely keep a city off the shortlist.

Section 3.0 Literature Review

3.1 Literature Review Methodology

A three-phase review was conducted using Web sites, library sources, and personal contact with authorities in various states.

3.1.1 Other State's Approaches

The first phase consisted of reviewing the airport licensing requirements for the states which were studied previously in UTCA project 01111. Since those states (Florida, Kentucky, Georgia, Michigan, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, Wisconsin) had regulations on airport licensing procedures that were comparable to Alabama, they were reviewed for potential information on Web-based licensing procedures.

3.1.2 FAA regulations

The second phase of the work was conducted by examining FAA regulations and guidelines on GA airport licensing procedures. The FAA has standards for participating in the Airport Improvement Program (AIP) conducted nationally. The FAA provides funds or bears partial expenses for improving state GA airport conditions.

Basically, the only requirement of the FAA in the construction or alteration of an airport is filing of FAA Form 7480-1, "Notice of Landing Area Proposal" (Federal Aviation Administration form). The main purpose of this document is to allow the FAA to evaluate the federal airspace requirements for the airport. All landing areas, whether public-use or private-use, must register this document with the FAA. Licensure for public-use airports not falling under 14 CFR Part 139 is under the control of the individual states. However, the FAA gives guidance to the states for the development of standards for non-primary airports in Advisory Circular (AC) 150/5100-13A (Federal Aviation Administration, Advisory Circular), which is the standard adopted by most states.

AC 150/5100-13A provides development of state standards other than those for safety of approaches, dealing with factors such as pavement design (including the use of state highway standards for paving airport surfaces), drainage, and construction (materials). It recommends that AC 150/5300-13 be followed for configuration standards, but deviations may be approved which conform to terrain or expected use of a facility. Standards that must conform to federal regulations without state deviation relate to safety of approaches, and consist of (but are not limited to) runway and taxiway lighting configurations; runway and taxiway markings and signage; visual aids; approach size, surface, and slope; and obstruction removal and protection. Despite the fact that the FAA mandates the standards in these areas, they are still inspected by state aviation officials and not the FAA. There are rare instances in which deviations are made

from these standards for airports if they serve a vital purpose (e.g., forest firefighting) and can still be used by the general public, but severe restrictions are placed on the airport (e.g., restriction to day-only use, one-way runways, etc.) and strict warnings are published.

Airports capable of serving air carrier operations with more than 30 seats are governed by the FAA in 14 CFR Part 139. They are inspected by the FAA and not by a state-run aviation authority. These airports must conform to federal standards (Federal Aviation Administration, Airport Certification)

3.1.3 Web Resources

The third phase of the review was conducted by searching for licensing procedure information for all states. An extensive review was conducted to find public information available on the Web regarding the licensing status of GA airports. No such information about airport status was available in two Web resources or a handbook.

3.2 Resources for Pilots

Currently, the flying public relies on three sources for checking airport status:

1. The official “Airport/Facility Directory” (AFD) published through a joint effort by the United States Department of Transportation (USDOT), FAA and National Aeronautical Charting Office (NACO).
2. The “5010 Database” published in accordance with the FAA Airport Master Record, and
3. A privately maintained Web resource, referred to as “Airnav.com.”

The flying public and state aeronautics authorities rely mainly on the two web sites to obtain the operating status of airports.

3.2.1 Airport/Facility Directory

The AFD is an official United States Government flight information publication in the form of a handbook. Agencies such as USDOT and NACO are involved in publishing it, in accordance with specifications and agreements approved by the FAA. The handbook is published once every 56 days and is sold for a nominal fee through mail order subscription, a network of “Chart Agents” conveniently located at principal civil airports, or through airport Fixed Base Operator (FBO).

The publishers divided the nation into seven different regions and different handbooks are released for each region. The regions are Northwest, North Central, North East, East Central, South West, South Central, and South East (including Puerto Rico and the US Virgin Islands). Each region contains five to thirteen states and Alabama falls under the South East US region.

The directory contains a sketch of most airports, location details (latitude and longitude), runway details such as number of runways and their orientations, and general remarks and relevant information to assist pilots in safely reaching their destination.

Of all the three resources identified, the AFD is the only FAA-recognized official source of information for pilots. The only downfall of the AFD is that its information is taken directly from the FAA Airport Master Record (FAA Form 5010-1) which is updated by individual states. General aviation airports in Alabama are directly under the jurisdiction of the state Aeronautics Bureau. There is no current commitment from state authorities to update the FAA sources for airport status or licensing information. Hence the information in the AFD is not always the most recent. Further information on the AFD is available at “<http://www.naco.faa.gov>.”

3.2.2 The 5010 Database

The 5010 database is published in accordance with the FAA Airport Master Record and is available online at “<http://www.gcr1.com/5010web>.” A private firm, GCR & ASSOCIATES, INC, maintains it. The airport data accessible via this site are structured in accordance with the FAA Airport Master Record (FAA Form 5010-1) and are unedited information derived from the National Flight Data Center (FAA, 800 Independence Avenue, S. W., Room 634, Washington, D.C. 20591).

The date of the data set matches the date of the most recent AFD. Any known criteria may be used to access the data for specific airports. The search can be performed by entering the location identifier, airport name, city, or state and the system will give a list of all airports associated with that name.

The search will bring general information on the airport selected, such as the location map, address, location info (latitude and longitude), information regarding services and facilities, based aircraft and operations, runway information, lighted or non-lighted runway conditions, approach path obstructions, and general remarks.

The shortcoming of the 5010 database is that it relies on an airport’s licensing authority to relay the information for the FAA to disseminate and report. Therefore, the information is not always the most recent.

3.2.3 Airnav.com

Of all the Web resources available, Airnav.com is the most extensively searched or used by pilots and the flying public. This private Web site is maintained by an individual and contains necessary airport information for aviators. Apart from providing a geographical location map, the website provides a photograph of the airport including the runway pattern. Information on airport operations, airport communications, radio navigation aids, airport services (e.g. fuel, service, restaurants, hotels, etc.), and runway conditions is typically included. The URL for the website is “<http://www.airnav.com>.” The web user can browse and procure detailed information in four categories, including Airports, Nav aids, Airport Fixes and Aviation Fuel.

The airport status is usually obtained from the airports section of the site by searching using the location ID, airport name, or city name. The amount of information Airnav.com provides is vast and includes all information from the other Web sites. Moreover, data on airport inspection, airport operational statistics, and services or businesses available at the airport can usually be

obtained. Often the Web site provides the user with fuel prices, and it may even allow the user to reserve a hotel accommodation through a hot key on the Web site.

Although the Web site provides useful information, the drawback is the same as the other two sources. For most of the airports, the inspection date is two - three years old and obsolete. For example the Aeronautics Bureau closed the Freddie Jones Field Airport at Linden, Alabama at the beginning of 2002 because of its poor runway surface. But at the time of this report, Airnav.com lists the airport as "Open to Public," does not mention the indefinite closure of the airport, and states the date of the last inspection as 27 March 2000. For those who completely rely on Airnav.com, this shortcoming may cause a serious safety risk.

The cause of the discrepancy is weak and sporadic communication of data between the states and the FAA. It is noteworthy that the owner of the Web site uses a disclaimer that claims no accuracy of information and encourages everyone to cross check the information disseminated:

This information may not be accurate or current and is not valid for navigation, flight planning, or for use in flight. Always consult the official publications for current and correct information. Check NOTAMS before flying. No warranty of fitness for any purpose is made or implied.

3.2.4 Comparison of the Three Resources

The information provided by the three above-mentioned sources was compared for a few airports. Recently, Alabama authorities revoked the operating license of eight general aviation airports due to a variety of safety problems. The issues embraced poor runway condition, obstructions to the approach path, insufficient runway markings and poor lighting. The airports whose licenses were revoked as of October, 2002 included:

1. Abbeville Municipal Airport, Abbeville
2. Atmore Municipal Airport, Atmore
3. Bay Minette Municipal Airport, Bay Minette
4. Camden Municipal Airport, Camden
5. Roy Wilcox Airport, Chatom
6. Chambers Municipal Airport, Lanett
7. Pine Hill Municipal Airport, Pine Hill, and
8. Franklin Field Airport at Union Springs

These airports are currently under probation and the ALDOT Aeronautics Bureau has given concerned airport authorities 360 days to correct safety flaws. The conditions leading to the license revocation are too important to be ignored. Yet, none of the three resources mentioned the operating status of these airports. Three other airports in Alabama are indefinitely closed for safety reasons (see Table 3-1):

1. Red Bay Municipal Airport
2. Freddie Jones Field Airport, Linden, Alabama, and
3. Mallard Airport, York Alabama

The Red Bay Municipal Airport is not listed in the three data resources, and no current information on the closure of the Linden Airport is given in the three resources. The closure of the York Airport is stated by all three sources, probably because of its extended period of inoperability.

Table 3-1. Comparison of 5010 Database, Airnav.com, and AFD

Closed Airport	5010 Database	Airnav.com	AFD
Red Bay Linden Mallard	Not Listed Not Mentioned Mentioned	Not Listed Not Mentioned Mentioned	Not Listed Not Mentioned Mentioned

3.3 State Airport Agency Web Sites

The third-phase of the review consisted of examining the licensing status of airports. Since web-based licensing was planned for this project, a thorough Web search was conducted to determine the licensing methods of all 50 states.

The data were collected from all 50 states and compiled in Table 3-2, (Alabama is not shown). The Web sites from which the data were collected are shown in Appendix A, along with a synopsis of available information.

The following conclusions were drawn as a result of the Web search:

- I. No state aviation bureau or transportation division has a Web-based licensing procedure and this project is a pioneering work in this area.
- II. Very few states have a dedicated Web page for the aeronautics (Alabama Aeronautics Bureau has a separate Web page under ALDOT's Website).
- III. Eighteen states (36%) display only contact information and other insignificant information for the GA users. This causes users to depend on other resources that are not regularly updated and accurate. The Alabama Aeronautics Bureau Web site provides better information when compared to these states.
- IV. Fourteen states list useful FAA and state licensing information and application forms, which can be downloaded for an airport license application.
- V. Four states link officially to Airnav.com or the 5010 Database, to help users obtain information from other resources.
- VI. Five states have information on runway pavement conditions.
- VII. Three states (California, Florida and Maryland) provide extensive information about state aviation on their Web sites.

Table 3-2. State GA licensing information available on Web site

(Legend: ✓ = available, ✗ = not available)

State	Licensing Info (On web)	Online Licensing	Information Available
Alaska	✗	✗	Moderate
Arizona	✗	✗	✗
Arkansas	✗	✗	✗
California	✗	✗	Extensive
Colorado	✗	✗	Moderate
Connecticut	✓	✗	Moderate
Delaware	✗	✗	Moderate
Florida	✓	✗	Extensive
Georgia	✗	✗	Moderate
Hawaii	✗	✗	✗
Idaho	✗	✗	✗
Illinois	✓	✗	Moderate
Indiana	✓	✗	Moderate
Iowa	✓	✗	Moderate
Kansas	✗	✗	Moderate
Kentucky	✗	✗	✗
Louisiana	✗	✗	✗
Maine	✓	✗	Moderate
Maryland	✓	✗	Extensive
Massachusetts	✗	✗	Moderate
Michigan	✓	✗	Moderate
Minnesota	✗	✗	Moderate
Mississippi	✗	✗	✗
Missouri	✗	✗	✗
Montana	✗	✗	Moderate
Nebraska	✗	✗	Moderate
Nevada	✗	✗	Moderate
New Hampshire	✗	✗	✗
New Jersey	✗	✗	✗
New Mexico	✗	✗	✗
New York	✗	✗	Moderate
North Carolina	✗	✗	Moderate
North Dakota	✓	✗	Moderate
Ohio	✓	✗	Moderate
Oklahoma	✗	✗	Moderate
Oregon	✗	✗	Moderate
Pennsylvania	✓	✗	Moderate
Rhode Island	✗	✗	Moderate
South Carolina	✗	✗	✗
South Dakota	✗	✗	Moderate
Tennessee	✗	✗	Moderate
Texas	✓	✗	Moderate
Utah	✗	✗	✗
Vermont	✗	✗	Moderate
Virginia	✓	✗	Moderate
Washington	✗	✗	Moderate
West Virginia	✗	✗	✗
Wisconsin	✗	✗	Moderate
Wyoming	✗	✗	✗

- VIII. Ohio provides extensive information on airport pavement conditions and reports on MicroPAVER® 5.0 (a software that provides the Pavement Condition Index (PCI) value), while North Carolina developed and uses its own software called LEDGA (Layered Elastic Design for General Aviation) for runway conditions.
- IX. The California Department of Transportation delivers vital information on runway conditions using Geographic Information System (GIS) mapping.
- X. Though a few states link to the 5010 Database and Airnav.com, no state directly supplies state license information.

Section 4

Methodology

This section outlines the procedure adopted for the recommended new airport inspection algorithm. An overview on regulations and instructions which govern the periodic inspection and documentation of annual airport inspections is also supplied.

4.1 Comparable Inspection Procedures

Development of the inspection algorithm was based on an initial examination of similar procedures in place at ALDOT. A similar work was identified in the inspection of transportation structures. Inspections of bridges across the state are conducted to ensure the safety of these structures and thereby the public's safety. The researchers for this project reviewed the "Bridge Inspection Manual" and found that it had an extremely comprehensive description of the procedures adopted for regular inspection, and that it referred to a software program used by inspectors statewide.

A general idea for the deliverable of the airport inspection project was obtained from review of the "Bridge Inspection Manual." The general outline of the online airport inspection form was also derived based on the bridge inspection program.

The general layout proposed for developing the airport inspection algorithm was to analyze the different factors that the airport inspector takes into account during an airport inspection, and to assign points for each factor. It was decided to develop a computer program in simple spreadsheet format with validations for each factor. The program developed would be connected to a database to enable the inspector to store the data and to compare it to the previous inspection reports.

The various factors considered for granting the license were identified and weighting factors were assigned to each. Also, a decision was made to alter the factors based on night or day operations of the airport. If an airport was found to be posing a safety threat for night operations (e.g., due to lighting disorders) but the same airport functioned well for day operations, the inspection algorithm should generate an appropriate score and report for both the day and night operating modes. A spreadsheet program was developed to organize the data. The fields of the table and the weighting factors allotted to each factor are shown in Table 4.1, "Weighting Factors and Points Allotted."

Table 4-1 was developed from the information in section three of UTCA Report 01111, "Comparing Airport Licensing Requirements: Alabama vs. Selected States and the FAA." The procedure gave appropriate weight to standard airport dimensions, lighting standards, and safety and convenience facilities stipulated for GA airport design.

Table 4-1. Preliminary weighting factors and points allotted

Weighting Factors	Max. Score
Paving Conditions	15
Primary Surface	9
Approach Path Slope	10
Runway Protection Zone	10
Approach Path Length	10
Runway Safety Area	9
Runway Threshold	9
Runway Markings	10
Approach Zones Owned by 2005	1
Fire Extinguisher	2
Grounding Cable for Fuel Area	3
Defect Free Fuel Hoses	3
Runway End Identifiers	10
Edge Lights	7
Lighted Beacon	10
Lighted Windsock	3
Windsock	9
Total	130

4.2 Role of the ALDOT Airport Inspector

Several consultations with the airport inspector were used to apportion the preliminary weighting factors shown in Table 4-1. The factors were analyzed and revised during meetings with the inspector, and a few minor factors were removed from the table. After several such meetings, it was decided to test the revised table during a regular airport inspection.

4.2.1 Field Test One

A field-test was conducted at the Richard Arthur Field Airport in Fayette, Alabama. The inspector found that the airport was operating under safe conditions. The inspection algorithm was tested and some minor revisions were suggested. Data fields such as “Approach Path Length,” “Runway Protection Zone,” “Approach Path,” and “Runway Threshold” were removed since other areas of inspection covered them. This helped to simplify the algorithm and program. Of all the features the inspector considers for granting the license, certain ones deserve more weight than the rest. These factors are considered critical because their failure to meet the specified standards could cause a continual threat to safety. During this project, the key aspects that primarily determine licensing status were designated as “Approach Path Slope” and “Runaway Pavement Conditions.”

The approach path slope is defined as the vertical angle to the runway, above which no obstructions can be present. A 20:1 slope is considered to be a fair representative for ALDOT inspection purposes. If any obstructions are present, such as trees or rising construction,

hindering the safe approach and landing of flights, the inspector will require that the obstructions be removed. The airport will be kept under probation until the obstructions are cleared.

Runway pavement conditions apply to the status of the runway or landing area. A variety of reasons can render the paved runway or turf unsafe for landing, such as loose or cracked pavement or inadequate primary surface. The inspector will determine the operating status of the airport depending on pavement conditions, such as when surface distresses are causing a hazard to safe airport operation.

4.2.2 Field Test Two

A closed airport was chosen as the second test site so that failing conditions could be easily recognized. Mallard Airport at York, Alabama was selected for testing the revised program. It was shut down due to unsafe pavement conditions as well as obstructions for landing. Project researchers concluded that if all other features were adequate, but if the two critical features received failing grades, then the airport should fail the inspection procedure. Hence the majority of total points were distributed between the two critical safety features. The passing score was set at 70%, and the two critical factors shared 70% of the score. If either of these factors fails to generate a passing score, the license will be revoked or the airport will be placed under probation until the inadequacies are corrected.

Based on the Mallard Airport field test, a few additional changes were made to the overall scoring system. Separate programs were developed for lighted and non-lighted inspections. If the lights are not operating as required by ALDOT standards, the inspector will license the airport for day operations only. This will result in revoking the operating status during night or low-visibility conditions. The lighting conditions are not significant to the overall score for day-only operations. In addition, scores for other features such as availability of fire extinguishers, defect-free fuel hoses, grounding cables for fuel area, etc., were lowered because they are less important from a safety point of view. Failure of any of these lower risk features will not cause an airport to lose its license.

4.2.3 Field Test Three

The revisions made as a result of the second field test resulted in a different program, so a third field test was conducted. This time a functional airport conducting day and night operations was chosen, the Walker County - Beville Field Airport in Jasper, Alabama. It had adequate safety features such as sufficient approach path slope and well-paved runways, ranking the airport as well maintained. The lighting conditions were found to meet the state standard, and signage and markings were also satisfactory. The inspector tested the algorithm and found that the program (algorithm) was adequate for a well-maintained airport.

The algorithm was developed to organize and standardize the entire airport inspection procedure while maintaining simplicity. Care was taken to ensure that inspection factors received appropriate weights, and that the inspection reports or procedures would not change even if different inspectors license the airport in the future. The inspection will then generate the same

(or very similar) output because of the algorithm. This was not always the case under the previous ALDOT inspection system.

4.3 Paving Conditions and Other Features

The paving condition inspection factor deserves special mention because runway conditions are a critical factor in airport licensing. A variety of factors such as whether the runway is made of asphalt or concrete determine the runway conditions. For concrete runways, distresses range from low-severity to high-severity, with blow-up, buckling, joint or corner spalling, shrinkage, scaling, patching, cracking, faulting and an array of other defects posing a potential risk to safety. For asphalt runways, distresses differ from low-severity to high-severity, with alligator cracking, bleeding, block cracking, and longitudinal cracking determine the relative safety conditions. Most GA airports are not well maintained due to scarcity of funds, and hence have medium to high severity pavement distresses. The seriousness of distresses and the hazards these situations might cause to small aircraft are sometimes disregarded. This may be because of the inspector's inadequate exposure to pavement distress levels, lack of time, or non-availability of required equipment for conducting a detailed inspection. Currently, the airport inspector grants a license if (in his opinion) the pavements do not seriously endanger safety. This is a subjective decision because there is no fixed level at which this determination is made.

A potential method to solve this problem was to adopt a pavement condition index (PCI) as part of the inspection. PCI is a numeric scale ranging from 1-100, which represents the pavement condition for asphalt as well as concrete. A score of 100 denotes an excellent condition or a brand new runway. A PCI score of 35 or lower usually demands closing the runway. A widely used method for determining PCI is to employ software to generate an accurate PCI based on a few inspection inputs. This allows the inspector to utilize a quantitative rating of runway condition rather than a subjective decision. Utilizing such software will yield a more technically sound and standardized procedure.

Other factors contribute toward functionality of airports. Availability of airport communication facilities, radio navigation aids, and airport services such as a pilot lounge, restroom facilities, telephones, helipads, and dependable fuel supplies will determine whether the airport is acceptable from a public point of view. Though these are important, they are not essential to granting the operating license. Hence, they were not included in algorithm development. Aesthetics were not included for the same reason. While airports with an unkempt physical condition are not in keeping with prudent airport management, these factors alone (if apart from the airside facilities) should not cause an airport to lose its license. In these cases, debriefing comments by the inspector may be sufficient to improve the physical appearance of the airport.

Table 4-2 represents the final spreadsheet program developed for the revised airport inspection procedure. The transition from Table 4-1 to Table 4-2 was achieved through systematic steps which were significant in the evolution of the revised inspection procedures. It evolved as a result of numerous telephone conferences, discussions, consultations with professionals across the nation and Canada, and field testing.

Table 4-2. Inspection algorithm for lighted airports (final layout)

Weighting factors for airport inspection (lighted)				
Day Operation	General Inspection Factors	Points (Max.)	Points (Scored)	Section Score
Approach (43)	Approach Path Slope	33	0	0
	Runway Safety Area (RSA)	10	0	
Surface (48)	Paving Conditions	33	0	0
	Primary Surface	10	0	
	Runway Markings	5	0	
General (5)	Fire Extinguisher	2	0	0
	Grounding Cable for Fuel Area	1	0	
	Defect-Free Fuel Hoses	1	0	
	Tank Label	1	0	
Lighting (10)	Lighted Windssock	2	0	0
	Beacon	2	0	
	Taxiway Lights	2	0	
	Edge Lights	2	0	
	Threshold Lights	2	0	
Overall	Total Points	106	0	

Table 4-3. Inspection algorithm for lighted airports (final layout)

Score in Percentage	0.00	
Licensing Status	PASS/FAIL	
Criterion for Licensing	≥70%	<70%

Table 4-4. Inspection algorithm for day-only airports (final layout)

Weighting factors for airport inspection (day only)				
Day Operation	General Inspection Factors	Points (Max.)	Points (Scored)	Section Score
Approach (43)	Approach Path Slope	33	0	0
	Runway Safety Area (RSA)	10	0	
Surface (48)	Paving Conditions	33	0	0
	Primary Surface	10	0	
	Runway Markings	5	0	
General (5)	Fire Extinguisher	2	0	0
	Grounding Cable for Fuel Area	1	0	
	Defect-Free Fuel Hoses	1	0	
	Tank Label	1	0	
Overall	Total Points	96	0	

Table 4-5. Inspection algorithm for day-only airports (final layout)

Score in Percentage	0.00	
Licensing Status	PASS/FAIL	
Criterion for Licensing	≥70%	<70%

4.4 Web-based Inspection and Reporting

An important objective of this project was to promote accurate inspection and prompt reporting of GA airport licensing status in Alabama using Web based resources. This will enable the Aeronautics Bureau to conduct inspections faster and inform the public promptly of potentially unsafe conditions at airports.

To facilitate speedy reporting, it was decided to design a Web page (on the ALDOT server) linked to the inspection database to enable everyone to know the licensing status of airports in

the State. An online database was designed which store the information on airport status, runway information, communication frequencies etc. To accomplish this task the services of a professional Web designer were used to install the program online. Whoever intersted in knowing the operating status will be able to retrieve the latest inspection report on any of the GA airport in the state.

4.4.1 Obtaining the Latest Inspection Report

Anyone can access the ALDOT website to obtain the annual inspection report on any airport. A link is provided which will lead the user to a new page where the user can select an airport from a list of all airports in the State. (Fig 4.1 Web page showing the list of airports to obtain the report)

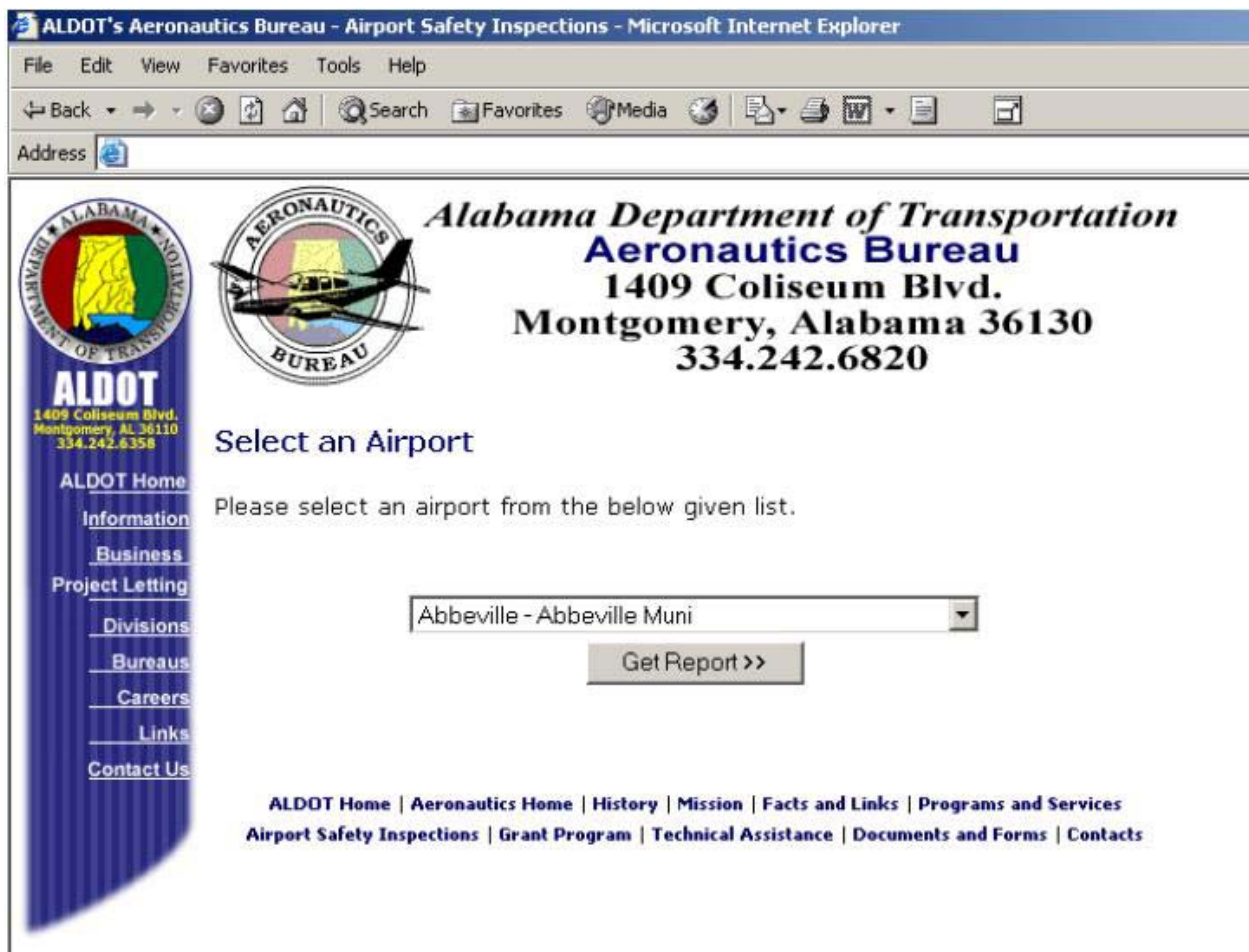



Figure 4-1. Web page showing airport list


The user can select any airport and a report will be immediately generated showing the details of the last inspection. The report gives very vital information such as licensed status, operating status, availability of visual slope indicator etc. Additional available information, helpful to pilots include airport elevation, the number of runways, runway dimensions and surface conditions, whether lighted or not, whether obstacles are present. A contact telephone number is

provided for those who need to talk to someone, to obtain some information on facilities available at the airport. Some relevant information on communication frequencies (including ATIS, APP/DEP, TOWER, GROUND, UNICOM, CTAF, AWOS/ASOS) is also provided. Figures 4-2(a) and 4-2(b) show the inspection report generated on Tuscaloosa Municipal airport, Tuscaloosa Alabama.



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Latest Operating Status and Licensing Inspection Report of the Selected Airport

Please find below the latest operating status of the airport you have selected. A brief licensing inspection report is also given based on the recent annual inspection. You will also find some useful key information on the airport you have selected.

Airport Name and Code: Tuscaloosa Muni - TCL
City: Tuscaloosa
No inspections have been conducted on this airport.
Licensed Status: Full Compliance
Operating Status: OPEN
Visual Slope Indicator: YES
Airport Contact Number: 205-349-0114
Elevation: 170 ft.
Runway 1 Notes: In good condition
Runway 1 Surface Type: ASPH-GRVD
Runway 1 Lighting: HIRL
Runway 1 Surface Condition: GOOD
Runway 1 Obstacles: TREES (22)
Runway 1 WBC: S-90, D-133, DT-200

Figure 4-2(a). Tuscaloosa Municipal airport inspection report

Runway 1 Obstacles: TREES (22)
Runway 1 WBC: S-90, D-133, DT-200
Runway 1 ID; LxW: 4-22: 6499X150
Runway 2 Surface Type: ASPH
Runway 2 Surface Condition: FAIR
Runway 2 Lighting: MIRL
Runway 2 Notes: In good condition
Runway 2 WBC: S-36, D-53, DT-93
Runway 2 ID; LxW: 11-29: 4001X100

Communication Frequencies

ATIS: N/A
APP/DEP: N/A
TOWER: 126.30
GROUND: 121.80
UNICOM: 122.95
CTAF: 126.30 (WHEN TOWER IS CLOSED)
AWOS/ASOS: 132.825

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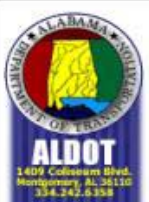
Fig 4-2(b) Tuscaloosa Municipal airport inspection report

4.4.2 Conducting Online Inspections

The developed algorithm (Tables 4-2 and 4-4) was placed online on the Aeronautics Bureau Web page which will help the airport inspector to conduct quick inspections and generate reports more rapidly. The inspector tested the program during regular inspections and found that it functioned satisfactorily. Fig 4-3 gives a general view of the Web page layout. For security reasons, accessibility to the inspection Web site is limited to the airport inspector and concerned Aeronautics Bureau officials. The algorithm was linked to a database, where the inspection details and the inspection report will be stored as soon as the inspection is completed.


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New Inspection

Please fill in the following information for your new inspection. Maximum points per item and section are shown in blue.

Airport Name

Approach (43 points max)

Approach Path Slope (33)

Runway Safety Area (RSA) (10)

Surface (48 points max)

Paving Conditions (33), PCI (1-100)

Primary Surface (10)

Runway Markings (5)

General (5 points max)

Fire Extinguisher (2)

Grounding Cable for Fuel Area (1)

Defect-Free Fuel Hoses (1)

Tank Label (1)

Lighting (10 points max)

Lighted Windsock (2)

Beacon (2)

Taxiway Lights (2)

Figure 4-3. Web page layout of online inspection (partial)

Section 5.0

Pavement Inspection System

This section of the report deals primarily with the third project in the overall research effort. It developed a pavement inspection system for GA airports in Alabama using nationally accepted standards

As discussed previously, airport pavement condition (runway, taxiway and apron) is a critical factor in GA airport licensing. The other critical factor is “Approach Path Slope” and hence the major portion (70%) of the total score for the inspection algorithm is distributed between “Pavement Condition” and “Approach Path Slope.” In fact, these two factors exclusively determine whether the airport will pass the licensing inspection. In other words, failure of one of these critical factors will result in revoking the airport license. Poor pavement condition is a major safety consideration that causes risk to the aircraft and their occupants.

5.1 Literature Review

The literature review consisted of analyzing how other states handle airport pavement management, to identify features that could be adopted by the Aeronautics Bureau. The review established that only one state, Ohio, provides extensive web based pavement condition information on all airports in the state. It uses state-of-the-art software known as MicroPAVER® for managing airside pavements, and provides a color-coded map of GA airports to clearly depict pavement conditions.

The Institute for Transportation Research and Education at North Carolina State University developed procedures for nondestructive evaluation and design of GA airport pavements using LEDGA (layered Elastic Design for General Aviation airport pavements). LEDGA allows experienced engineers to perform structural analyses of GA airport pavements. The software is based on modifications of the FAA’s LEDFAA (Layered Elastic Design by FAA) computer program.

LEDGA does not use a pavement condition index scale for systematically ranking or standardizing the pavement, and generates a result based on the structural analysis of the pavement. No state (other than North Carolina) uses this software or this method. Moreover, LEDGA was not supported by any national testing agency.

ALDOT employs the same software/program as Ohio (MicroPAVER®) for pavement management of highways through the services of a consultant (currently The Roadware, Inc. of Canada). Few other states deploy this system for highway and airport pavement management.

The UTCA project team contacted several eminent consultants in the field such as The Roadware Inc., Roy D. McQueen and Associates, Pavement Consultants Inc. and Garver Engineers Inc. seeking assistance for deploying such a system for the airport inspection. The responses were not very beneficial. The firms expressed interest in entering into an annual contract for pavement

management and maintenance of all 96 airports in the State. This was a very expensive task and the Aeronautics Bureau declined it. This left the option of pursuing the implementation of pavement management and inspection single-handedly using MicroPAVER®.

5.1.1 Pavement Management System and PCI

A pavement management system (PMS) provides a systematic, consistent method for selecting maintenance and rehabilitation treatments and for prioritizing the optimal time for repair by predicting future pavement condition. If maintenance is performed during the early stages of pavement deterioration, the total cost will be reduced and the life of the pavement will be increased. Moreover the PMS alerts concerned authorities about the critical point in a pavement's life cycle. The advantage of using a PMS is that it can not only determine the current condition of a pavement, but can also predict its future condition. The prediction is derived from an objective, repeatable rating system based on the pavement's present distresses.

The pavement distress condition rating procedure is termed the Pavement Condition Index, which is better known as the PCI value. This is a numerical value ranging from 0 to 100, based on the results of a visual condition survey in which the distress type, distress severity, and distress quantity are identified. The PCI was developed to provide an index of the pavement's structural integrity and surface operational condition. The PCI condition survey also provides an insight into the causes of distress, such as weather related or load related.

The use of PCI for rating airfield pavement, roads and parking lots has received wide acceptance and has been formally adopted as standard procedure by numerous agencies across the world. These include the FAA, the U. S. Department of Defense (Air Force and Army), the American Public Works Association (APWA), and several cities.

5.2 MicroPAVER® 5.0

Pavement management research and development has been in progress since the early 1970s by various organizations and agencies. These efforts have been sponsored and funded by several agencies such as the US Air Force, US Army, US Navy, FAA, Federal Highway Administration (FHWA), and American Public Works Administration (APWA). The US Army Corps of Engineers developed a mainframe time sharing system software named MicroPAVER® at their Construction Engineering Research Laboratory in Champaign, Illinois for road and airfield pavement maintenance management on military bases.

In 1979, the APWA research foundation initiated a technology transfer with the cooperative effort of 80 agencies from the US and Canada by testing and evaluating the PAVER® software. This resulted in modifications to PAVER® for use on microcomputers and was re-titled as MicroPAVER®. It is currently used by more than 600 cities, counties, airports and numerous consulting firms. It provides a consistent method for pavement condition rating and is an effective tool for determining maintenance and repair needs and priorities. MicroPAVER® uses the PCI methodology for pavement condition rating. PCI is determined from existing distresses in the pavement and agrees closely with the collective judgment of experienced pavement maintenance engineers.

5.2.1 ASTM and GASB Standards

MicroPAVER® was used as the basis for the American Society for Testing and Materials (ASTM) standard D5340-93 for rating the condition of airfield pavements. Micro PAVER 5.0®'s recent receipt of ASTM standard designation D6433-99 makes it the only PMS to receive such a designation, and it is the only pavement rating methodology recognized for rating road and parking lot pavements. The two ASTM designations make Micro PAVER 5.0 ®'s PCI the unique standard for describing the condition of all pavement uses.

Micro PAVER 5.0 ®'s pavement maintenance and management system fully complies with the modified approach to accounting for infrastructure in the Government Accounting Standards Board (GASB) Standard 34 (see Appendix B).

5.2.2 Decision to Adopt Micro PAVER 5.0®

The project team was convinced of the benefits of using MicroPAVER® and decided to deploy the software for generating PCI values during airport inspections. The software was purchased and installed and a team member was sent to a designated training site (University of Illinois at Urbana-Champaign) to gain hands-on experience and assistance under an instructor to enhance productivity in using the software. The training helped the team member become acquainted with the software and to gain information on the sophistication, capabilities and functions that can be performed using MicroPAVER® in pavement management and maintenance.

Consequently, the presentations were made at the University of Alabama and the ALDOT Aeronautics Bureau on various tasks that could be fulfilled using MicroPAVER®. Though deploying the software for pavement inspection is complex because of the data and labor-intensive tasks involved, the Bureau agreed to use the software for future airport inspections. The airport inspector would use the software to generate PCI values of airfield pavements during inspections, and in the future, the Bureau may use other software functions as well. It was decided to test the software at a few airports during regular airport inspections to help the inspector gain familiarity with the software. This will enable him to conduct airfield pavement inspections single handedly in the future.

5.3 Overview Micro PAVER 5.0®

Micro PAVER 5.0® is an automated PMS that uses Microsoft Windows components. The user interface follows standard Windows protocols. Like any Windows program, all common program features are accessible using drop down menus, as shown in Figure 5-1.

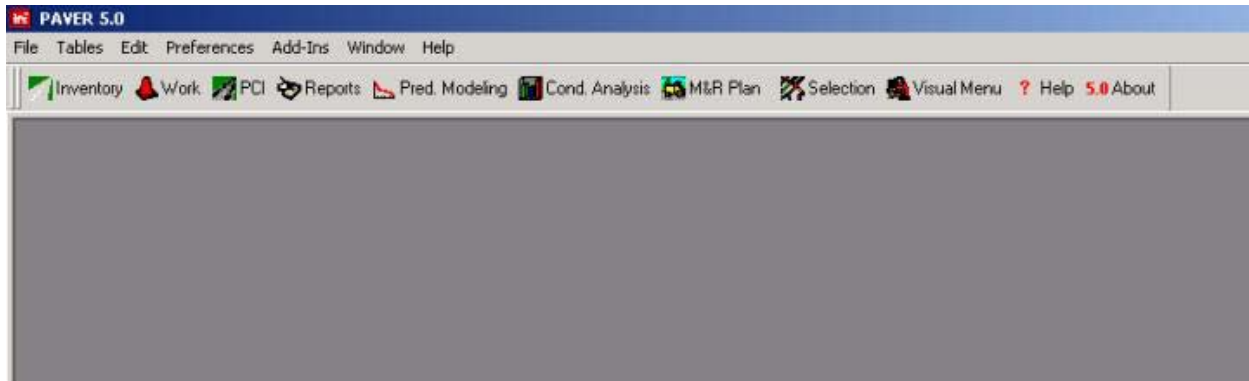


Figure 5-1. MicroPAVER® 5.0 screen

Functionally, MicroPAVER® acts as a decision making tool for the deployment of cost-effective maintenance and repair alternatives for asphalt or concrete pavements. It provides a variety of functions, such as:

1. Pavement Network Inventory
2. Pavement Condition Rating
3. Pavement Condition Deterioration Models
4. Present and Future Pavement Condition Analysis
5. Determining Maintenance and Rehabilitation (M&R) Needs, and
6. Work Planning

The key features are accessible via nine buttons arrayed in logical sequence on the desktop window. The button array, referred to as the PAVER Button Bar, has the following components:

1. Inventory - Inventory data entry and summary charts
2. Work - Work required and history
3. PCI - Inspection data entry to generate the PCI
4. Reports - Reports and summary charts
5. Prediction Modeling - Build condition prediction models
6. Condition Analysis - Condition analysis report
7. M&R Plan - Maintenance and repair planning report
8. Selection - Pavement selector using GIS
9. Visual Menu - Detailed menu with all options

5.3.1 Inventory Button

The inventory button provides a tool to view, edit and define the pavement network, branch and section. The first step in the analysis is to identify and define the pavement network. A network can be defined as a group of pavements that should be managed together, such as a city's network of roads, or an airport comprised of runways, taxiways, aprons etc. The next step is to define the branches and sections. A branch is the part of the network that has a well-defined function such as a parking lot or a runway or a taxiway. A section is the smallest management unit within a branch. Sections are based on pavement type, construction date, condition, traffic density, etc. A network is the parent of a branch, which in turn holds the same relation to a section. Figure 5-2 shows the network screen used to define the network, branches and sections for a pavement evaluation conducted at the Bibb-County Airport, Centreville, AL.

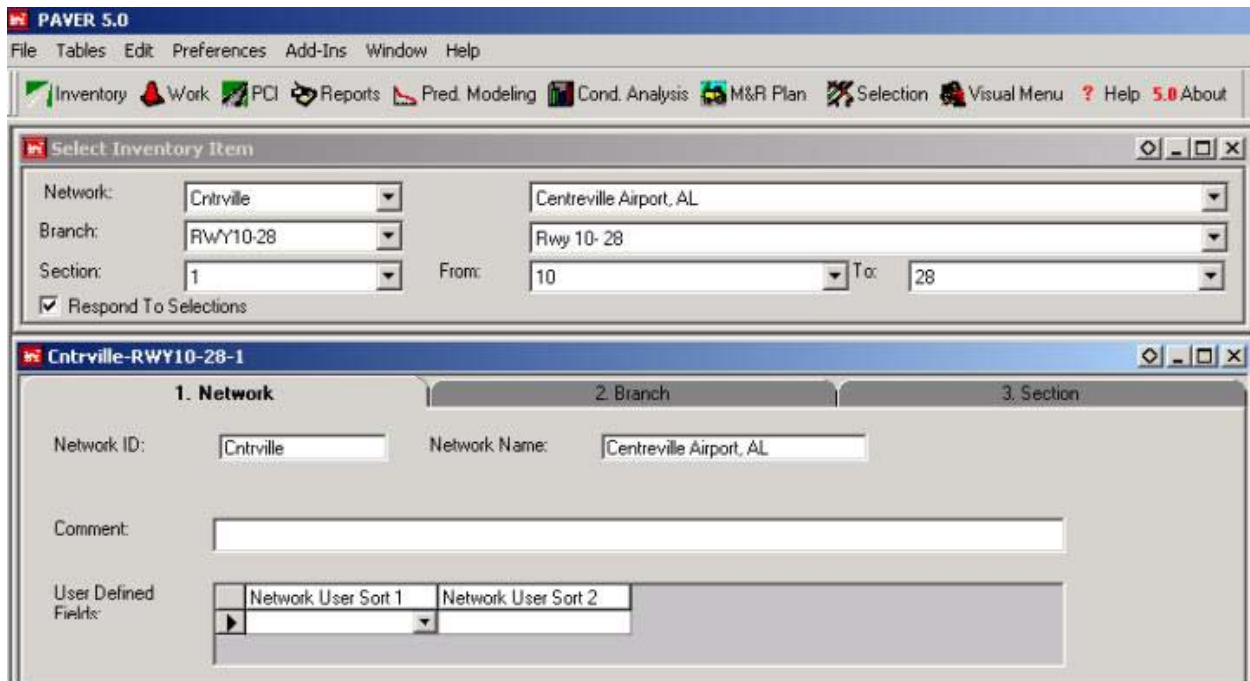


Figure 5-2. Inventory screen for defining pavement network, branch and section

5.3.2 Work Button

There is an extensive relation between the pavement construction date and the predicted PCI. The “Work” button links the date of construction and the predicted PCI of the pavement. Maintenance, repair and construction activity are recorded using the “Work” button. For the “Work History” and “Required” forms, drop down menus provide an interface for easily entering work history data for a particular pavement section. This is illustrated by Figure 5-3. Future or planned work is entered using the “Work Required” menu. Upon completion of the work, the data can be transferred into “Work History” data. MicroPAVER® also provides a graphical component for each section’s pavement condition and work history.

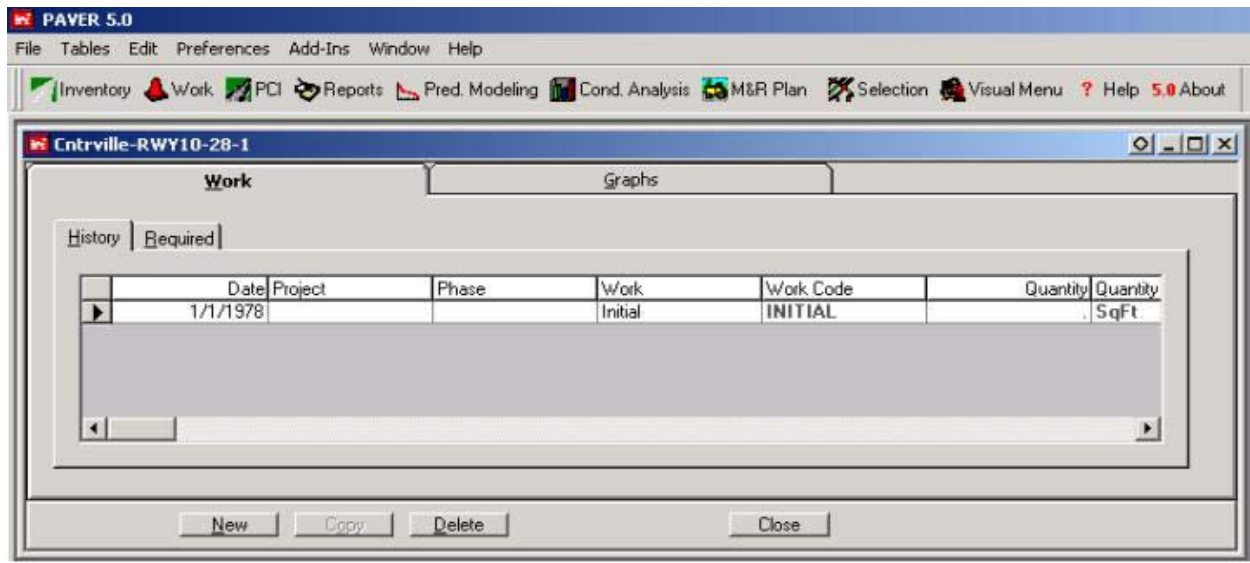


Figure 5-3. MicroPAVER® work screen for defining work required and history

5.3.3 Generation of PCI and Pavement Condition Values

C\collecting and recording off-field inspection data are probably the most important tasks in a pavement evaluation project. MicroPAVER® calculates the PCI value of each section separately, based on the inspection of a representative sample of the whole section. Depending on the condition of the pavement, a sample of 20-30% of the total area is inspected. Prior to inspection, the inspector should conduct a general reconnaissance survey to select the sample area to be inspected. The PCI generated for the sample units is extrapolated to generate a PCI of the whole section. The size of the sample depends on the inspector’s decision and the confidence level he chooses. The larger the area, the more accurate the PCI value will be.

The section to be inspected must be divided into sample units, placed evenly across the section. The area of each sample unit should be 2500 ± 1000 square feet for unsurfaced and asphalt surfaced roads (including asphalt over concrete), and 5000 ± 2000 square feet for asphalt-surfaced airfields. For concrete roads and airfields with joints spaced greater than 25 feet, the recommended sample unit size is 20 ± 8 slabs. (Shahin, 2000) It should be noted that sample units close to the recommended mean are preferred for accuracy.

After selecting the survey area and the number of sample units, the inspector carefully conducts condition surveys on all samples. The distresses found in each sample unit are tabulated, based on the severity and extent of distress. MicroPAVER® recommends using the “Condition Survey Data Sheet” provided in the inspection manual for tabulating the distresses and their severities. Separate data sheets are provided for concrete and asphalt airfields and roadways. (Figure 5-4 is a data sheet for asphalt airfield pavement.) The datasheet provides a list of distress types ranging from alligator cracking to swelling. For each type, the inspector enters the severity level (such as low, medium or high), and the affected area in square feet or linear feet.

Airfield Asphalt Pavement

AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET FOR ONE SAMPLE UNIT					SKETCH	
BRANCH _____		SECTION _____		SAMPLE UNIT _____		
SURVEYOR _____		DATE _____		SAMPLE AREA _____		
41. Alligator Cracking (SF)	42. Bleeding (SF)	43. Block Cracking (SF)	44. Corrugation (SF)	45. Depression (SF)		
46. Jet Blast (SF)	47. Joint Reflection Cracking (LF)	48. Long. and Trans. Cracking (LF)	49. Oil Spillage (SF)	50. Patching (SF)		
51. Polished Aggregate (SF)	52. Weathering and Raveling (SF)	53. Rutting (SF)	54. Showing from PCC (SF)	55. Slippage Cracking (SF)		
56. Swell (SF)	COMMENTS					

Figure 5-4. Condition survey data sheet provided in MicroPAVER® Manual

Separate data sheets must be used for each sample unit. Upon finishing the inspection, the distress types and severities are input using a data entry window. Figure 5-5 shows data input for the inspection of Bibb County Airfield at Centreville, AL, for sample unit number one.

The data entry window is a user friendly interface that allows the user to add comments on the sample units; to add, delete or replace distresses; and to link images (pictures or photographs) made during the inspection. The data input procedure must be repeated for all sample units. After the data input process is completed, the “Calculate Conditions” button is clicked and the software generates the PCI value of the section and displays it in a separate window. Figure 5-6 is an assessment screen that shows the result of the PCI evaluation conducted at the Bibb County Airfield for runway 10-28. The section generated a PCI value of 65, which was rated as “Good” by MicroPAVER®.

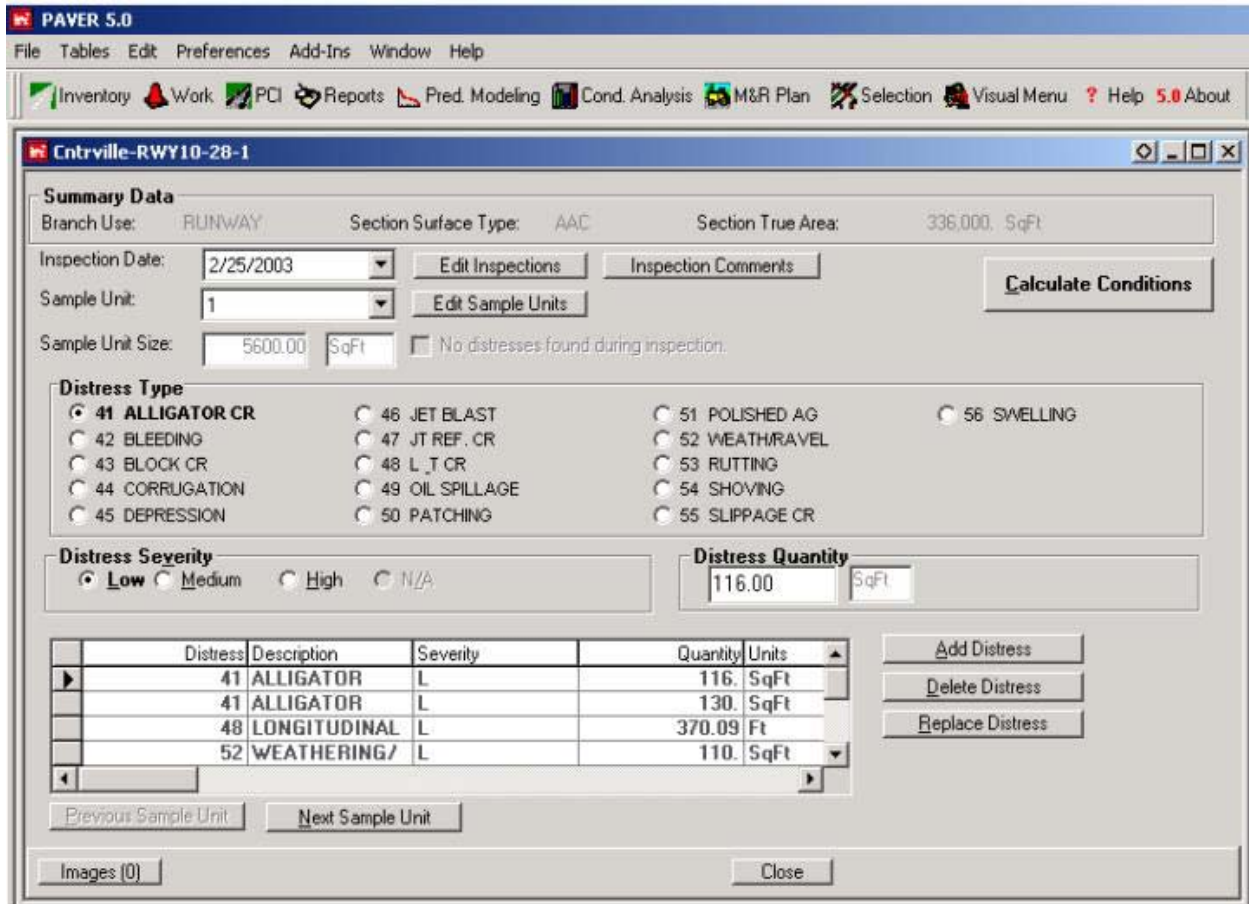


Figure 5-5. MicroPAVER® inspection data entry window

There are different tabs in the assessment window, such as “All Indices” (PCI for the whole section), Individual Distresses, Extrapolated Distresses, Sample/Distress Summaries, and Sample Info (which gives general data about each sample). The pavement assessment window, in addition to the PCI value, shows key information such as Network ID, Branch ID and Name, Section ID and Area, Section Length and Width, etc. It also shows the standard deviation of the PCI value and a rating of the pavement such as “Excellent,” “Very Good,” “Good,” etc., based on the PCI range. Table 5-1 lists the pavement ratings that MicroPAVER® assigns based on the PCI value.

Table 5-1. PCI Range and Pavement Rating

PCI Range	Pavement Rating
85-100	Excellent
70-84	Very Good
55-69	Good
40-54	Fair
25-39	Poor
10-24	Very Poor
0-9	Failed

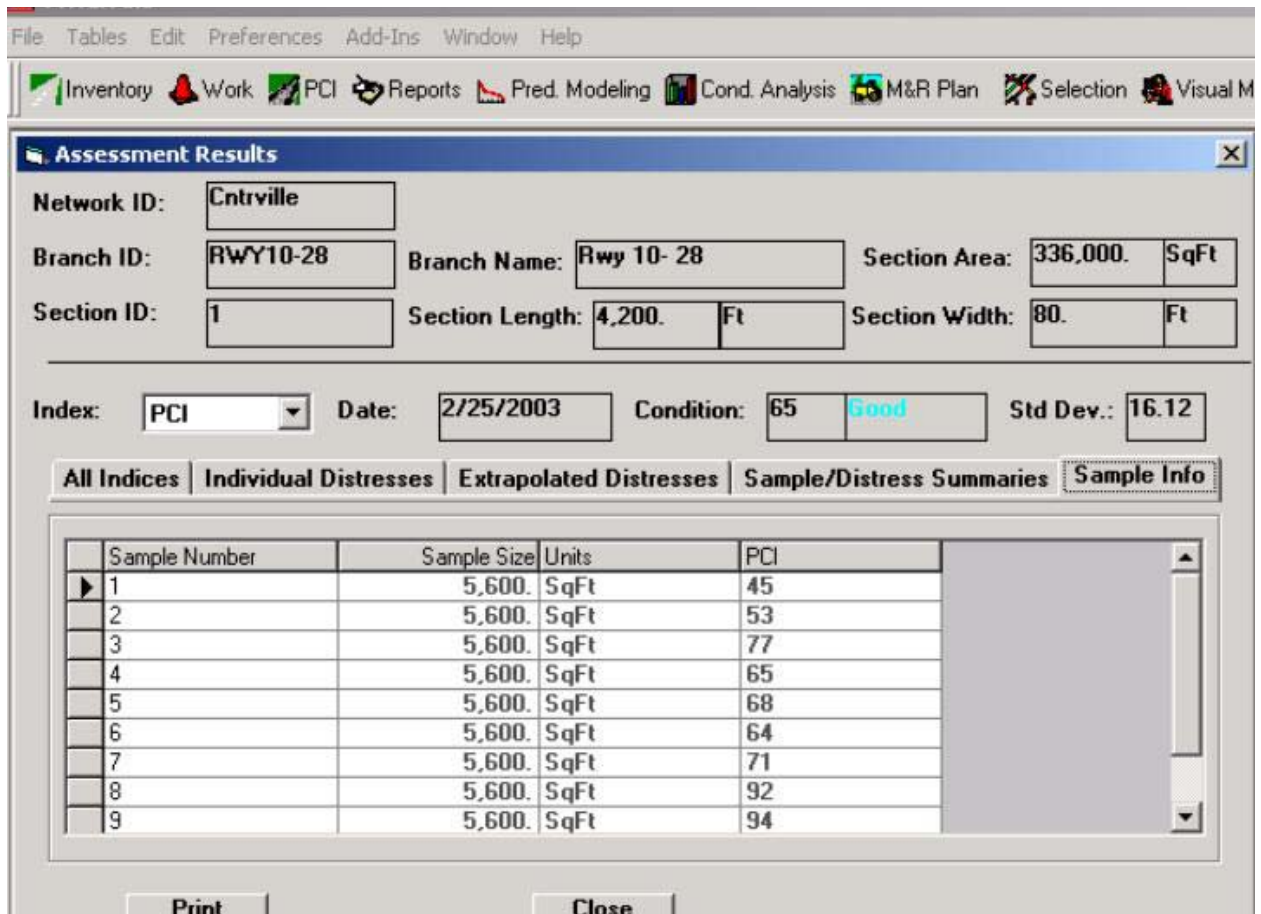


Figure 5-6. MicroPAVER® PCI assessment results

5.3.4 Reports

MicroPAVER® permits the user to create customized reports that provide basic pavement information for a pavement network. The different types of reports that can be created using MicroPAVER® are listed below, and are shown in Figure 5-7:

- I. Summary Charts,
- II. Standard Reports,
- III. Re-inspection Reports,
- IV. User-defined Reports and
- V. GIS Reports.

Summary charts allow the user to plot and compare any two attributes of the database. A standard report generates information about separate units in four classes, such as branch listing report, work history report, branch condition report and section condition report. Re-inspection reports provide information about the previous inspection for each section included in the report. The user-defined reporting tool gives the ability to create the user's own report. The results of the report are displayed in tabular form that can be printed or exported to another application (such as MS-Excel®). The GIS Reports are a series of preset views that allow the inspector to see a variety of information about the database in a graphical display. They are only available if a map is linked to the database.

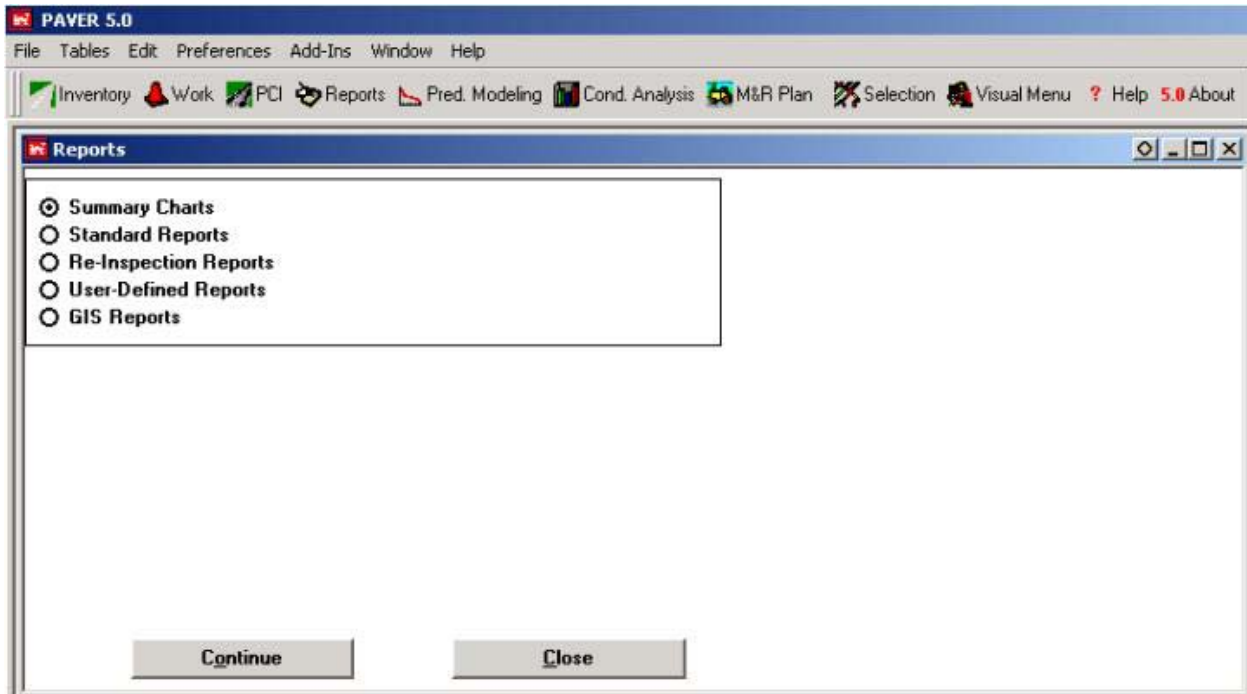


Figure 5-7. MicroPAVER® reports

5.3.5 Prediction Modeling

The essence of the prediction modeling process is to identify and group pavements of similar construction that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. The historical data on pavement condition can be used to build a model that can accurately predict the future performance of a group of pavements that possess similar attributes. The Prediction Model is designed to allow users to blend unique knowledge about their pavements, measured local condition information, and powerful modeling tools to produce highly accurate estimates of future pavement life.

5.3.6 Condition Analysis

MicroPAVER®'s condition analysis feature analyzes the condition of the pavement based on prior inspection data, interpolated values between previous inspections, and projected conditions. This feature helps predict the deterioration of pavements over the time span for which it is intended to be used. The prediction is provided as a report, which can be saved for future references. The starting year for the report and the number of years to predict can be specified by the user. The starting year can be either a past year, the current year, or a future year. The report can also be based on the arithmetic average of section conditions or on the weighted average of section conditions.

5.3.7 M & R Plan

The M & R plan, which stands for maintenance and repair (or rehabilitation) is a tool for planning, scheduling, budgeting and analyzing alternative pavement maintenance and repair activities. The M&R plan utilizes basic inventory data combined with inspection information, maintenance policies, maintenance costs, and predictions about future pavement condition. All factors used in determining future M&R, construction activity, or associated costs can be configured to reflect local pavement management practices and costs.

5.3.8 Selection Tools

Selection tools have been added to MicroPAVER® to assist users in selecting pavement sections and to provide an improved user interface. This tool is used only when internal “GIS based selection” has been added along with a “Windows Explorer” type of tree selection tool. The need for this tool arises primarily when multiple sections and branches are analyzed using MicroPAVER® and separate sections need to be identified for data viewing or editing.

5.4 How MicroPAVER® Generates the PCI

PCI can be calculated manually or by software based on the condition survey conducted. MicroPAVER® 5.0 calculates the PCI by following the same algorithm as in a manual calculation, but using the MicroPAVER® database and its program. The PCI calculation uses deduct values or weighing factors from 0 to 100 that indicate the impact each distress has on pavement condition. A deduct value of 0 indicates that a distress has no effect on the pavement, while a value close to 100 indicates a serious distress. The deduct values are subtracted from a base value of 100 to obtain a PCI.

The deduct values are determined from standard deduct value curves. The curves differ for each distress, depending on its severity and also whether the pavement material is asphalt or concrete. Based on the extent of the area which the distress affects, a different value is extrapolated for each distress identified in a sample unit. The deduct value is high for distresses generated by load (e.g., alligator cracking) compared to temperature or climate caused distresses. Figures 5-8 and 5-9 show the deduct value curves for asphalt pavement for alligator cracking and block cracking. (Source <http://www.ce.cmu.edu>).

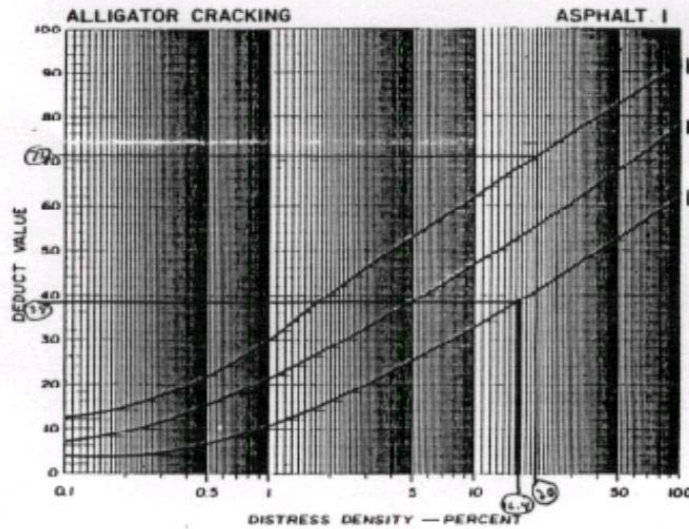


Figure 5-8. Deduct value curve for asphalt pavement, alligator cracking

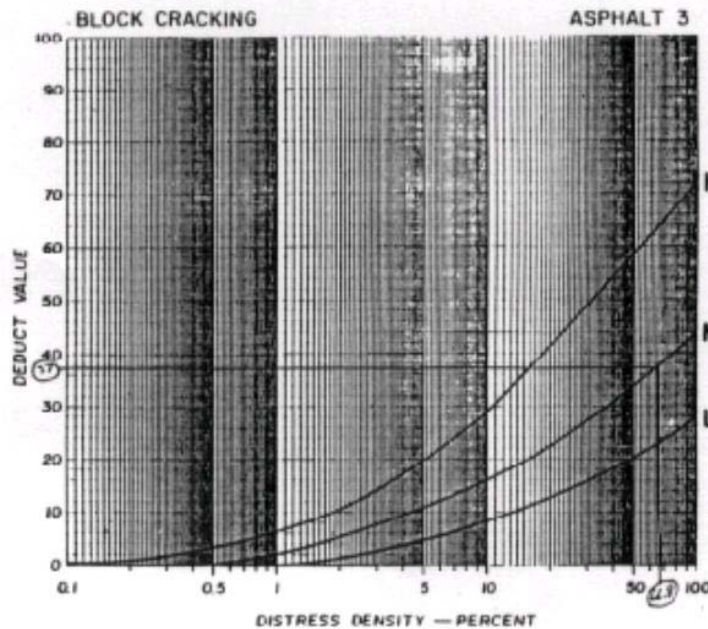


Figure 5-9. Deduct value curve for asphalt pavement, block cracking

The PCI of the whole section is computed by averaging the PCIs of all sample units. When a pavement is inspected by the sampling method, the values are extrapolated over the entire pavement section by MicroPAVER® to obtain the PCI. Hence special care should be taken while determining the random sample units which represent the whole section. The sample units should be a fair representation of the whole section, and if there is any unit which is not comparable to the remaining sections (due to the high severity deterioration), that sample should be taken as an additional unit.

MicroPAVER® uses the following equation for calculating the weighted average of the whole section when there are random samples as well as additional samples in a section inspected.

$$PCI_s = \frac{(N - A) \cdot PCI_r + PCI_a}{N} \quad \text{[Equation 5-1]}$$

Where: PCI_s = PCI of pavement section
 PCI_r = average PCI of random samples
 PCI_a = average PCI of additional samples
 N = total number of samples in the section
 A = number of additional samples inspected

Computing the PCI manually for all the sample units is a tedious task and is time consuming. Micro PAVER calculates the PCI once the distress information is entered . The program automatically calculates the PCI of each sample unit surveyed and determines an overall PCI value for a section as well as extrapolated distress quantities. The program also determines the percentage of deduct values based on distress mechanism (based on load, climate, etc.). The Aeronautics Bureau currently uses PCI as a deciding factor for determining which airports deserve funds for maintenance from state or federal funds allotted to the airport improvement program.

5.5 Airport Pavement (Runway) Inspections using MicroPAVER®

This section documents several “field test” inspections conducted using MicroPAVER® as part of regular inspections conducted by the Aeronautics Bureau inspector. Three airports were selected for runway evaluation, and the following sections briefly outline the inspections:

1. Bibb County Airport (0A8),
2. Centreville, Alabama George Downer Airport (KAIV), Aliceville, Alabama and
3. Eutaw Municipal Airport (3A7), Eutaw, Alabama

These airports were selected for a variety of reasons, such as airport pavement conditions (Centreville airport has a runway with a few potholes in the middle of the runway), airport operation (Aliceville has a flight training school while the Eutaw airport has very few operations), proximity, and ease of accessibility for the team to conduct multiple investigations.

A three-member team is recommended for inspecting an airport with less than 5,000 feet of runway. This allows completion of the investigation within 5-6 hours, while a two member team will prolong the inspection time since there are many tasks to be performed. It is recommended that the inspectors use collective team judgment and expertise, since distress type and severity decisions should be made in a consistent manner. The inspection should begin with a quick preliminary survey and a decision about the percentage of area to be inspected.

The next step is selection and marking of sample sections. The equipment used for inspection includes a measuring wheel, a large straight edge (wooden bar), and a steel tape. Other necessary items include a laptop computer with MicroPAVER® software, condition survey data sheets, a calculator, fluorescent spray paint for marking temporary locations, and a digital camera

for recording distresses. A camera is highly recommended, since it will preserve how the inspector arrived at his conclusions and can greatly enhance future decisions for funds allotment.

5.5.1 Inspection Report - Bibb County Airport (0A8), Centreville, Alabama

The Bibb County Airport located in Centreville, AL was inspected on Tuesday, February 25, 2003. The inspection team included the research team from the University of Alabama and the airport inspector from the Aeronautics Bureau. The inspection started at 10:00 am and was completed by 3:00 p.m.

The Bibb County airport is a low traffic, general aviation airport with a single runway (runway 10-28) having dimensions of 4200 by 80 feet, performing day and night operations. The weight limitation for the airport is 18,000 pounds and the runway has a displaced threshold of 90 feet at the end of runway 10. The runway surface material is asphalt and it appeared to be in fair condition, as indicated by Figure 10. There were a number of longitudinal and transverse cracks along the entire length of runway. At one end there was a substantial amount of deposited material that could be categorized as foreign object debris that could cause rider discomfort. According to available records, the last maintenance was conducted in 1977.

For MicroPAVER® input the whole airport was designated as a single network and the whole runway as a single branch. Since there was no information available on runway construction details (whether the runway was constructed as separate segments), it was decided to assign the whole runway as a single section. It was also decided to limit PCI calculation to the runway due to a variety of reasons, including time and manpower constraints. Moreover, the funds for airport improvement will be available primarily based on runway conditions, and from the safety perspective, a runway's pavement condition is the critical factor in determining licensing status.



Figure 5-10. Bibb County Airport, Centreville, Alabama

The initial reconnaissance survey found that the runway as a whole had deteriorated at a uniform rate except for a particular portion located in the center. Hence it was decided to inspect 15% of the whole runway for input into MicroPAVER® to obtain a representative PCI value for the entire runway by extrapolation. The inspection area was determined as nine random sample units of dimensions 70 by 80 feet placed evenly along the length of the runway, at a distance of 446 feet apart.

An “additional” sample unit of similar dimensions was chosen for the central portion where the deterioration was found to be comparatively higher than the rest of the runway. Each sample unit was carefully inspected and the distresses were noted on condition survey data sheets. The measuring wheel was used to measure the linear feet of distress. Depending on width and depth of crack, severity values were assigned to each distress as high, medium or low. The dominant distresses were found to be longitudinal and transverse cracks, with some cases of alligator cracking and a few patches. All of the distresses were entered on the condition survey data sheets.

The additional sample unit had some extreme cases of potholes which were the result of high severity alligator cracking without timely maintenance. A few potholes were patched using loose aggregates but were of inferior workmanship. (See figure 5-11 and 5-12). All of the inspection details were entered into the MicroPAVER® software and the PCI was calculated as 43, which falls into the classification of “Fair.” This relatively low PCI value suggests that the runway requires some immediate attention such as patching the potholes and sealing the medium and high severity longitudinal cracks. These types of maintenance actions will significantly increase the life of runway pavement. The high severity alligator cracking in the additional sample and the low and medium severity alligator cracking in other sample units will also require maintenance. The high severity alligator cracking, which is a load bearing distress in the middle of the runway, is believed to be due to high exposure to landings and takeoffs.



Figure 5-11. Severe alligator cracking that caused potholes



Figure 5-12. Poorly patched potholes

5.5.2 Inspection Report - George Downer Airport (KAIV), Aliceville, Alabama

The George Downer Airport located at Aliceville, Alabama was inspected on Tuesday, March 11, 2003. The inspection team included UTC representatives and the airport inspector from the Aeronautics Bureau. The inspection began at 11:00 a.m. and lasted almost four hours.

This airport is located two miles southwest of the Town of Aliceville and is the home of a flying school with 15 to 20 GA planes on the apron and in the hangar. There are regular flight operations as part of flight training and recreational flights. The airport provides day and night

operations. The runway dimensions are 4934 by 80 feet, identified as runway 6-24. A general photograph of the runway is shown in Figure 5-13.

The asphalt pavement appeared to be in fair condition, with distresses that will require early attention. There were low and medium severity longitudinal and transverse distresses originating along the paving joints. The dominant distresses were longitudinal and transverse cracks, some block cracking and few patches. According to available records, the last maintenance was done in 1993.



Figure 5-13. George Downer Airport, Aliceville Alabama

The longitudinal distress along the pavement joint was widened by grass sprouting along the cracks, as shown in Figure 5-14. The transverse cracking originated from the longitudinal crack, and is forming a block pattern of low severity which will eventually result in severe pavement deterioration. Runway 6 had a displaced threshold. The runway region was also exposed to significant raveling and weathering due to loss of asphalt or pavement binder (Figure 5-15).

As in the previous inspection case, the whole runway was considered as a single section and the airport as a single network. It was decided to inspect the runway alone to obtain the PCI value. The whole runway was deteriorating at a uniform rate and the team decided to inspect 15% of the total area to obtain a representative PCI value. The inspection area was determined as ten sample units 75 by 80 feet, placed evenly 465 feet apart. Since the distresses were uniform along the entire of runway and there were no exceptional cases of deterioration, no additional sample units were chosen for inspection.

The sample units were measured, marked, inspected and the distresses were noted. The inspection data was entered into MicroPAVER® and a PCI value of 43 was obtained which was classified as “Fair.” The primary reason for such a low PCI value was the presence of low and medium severity weathering and raveling along all of the sample units. It was clear that the

runway required immediate attention, and that a surface treatment would help arrest the current deterioration.



Figure 5-14. Grass sprouting along cracks



Figure 5-15. Weathering and raveling caused due to loss of pavement binder

5.5.3 Inspection Report - Eutaw Municipal Airport (3A7), Eutaw, Alabama

The Eutaw Municipal Airport at Eutaw, Alabama was inspected on March 18, 2003 by the UTCA research team along with the airport inspector from the Aeronautics Bureau. The airport is located two miles southeast of Eutaw. It has very few regular operations and there is no fixed base operator at the airport. The asphalt pavement looked very old and had experienced a great amount of weathering. There were no load related distresses visible along the pavement.

The runway length is comparatively short (3600 ft by 80 feet) and is identified as runway 16-34. The last pavement maintenance was conducted in 1990 according to available records. The

runway is made up of five joined asphalt pavement strips. The joints have cracked to the extent that they were treated as medium severity longitudinal cracks running along the whole length of runway. At a few points along the longitudinal distress, there was grass sprouting in the crack (Figure 5-16).



Figure 5-16. Weathered pavement with grass sprouting along cracks

A few longitudinal cracks running parallel to the runway were interconnected by transverse cracks (Figure 5-17). The longitudinal cracks towards the edge of the runway showed water seepage due to pumping action caused by load applications during aircraft movements. This caused accelerated deterioration to pavement (Figure 5-18). Asphalt bleeding also occurred in a few places, but was not typical for the entire runway length (Figure 5-18).

Since the deterioration appeared uniform along the pavement length (distresses and severity of longitudinal and transverse cracking), it was decided to choose 15 % of the area to obtain a representative PCI value. The whole runway was considered as a single section and the whole airport as a single network. Eight sample units were chosen and marked, 67 ft by 80 feet, 438 feet apart, evenly placed. Each sample units were inspected, the distresses were recorded on condition survey sheets, and the data were input into MicroPAVER®. The software generated a PCI value of 56 which fell in the “Good” category. The PCI value was primarily attributed to medium severity weathering along the entire runway.

5.6 Acceptance of the Procedure

Following completion of the three field test inspections, both the UTCA researchers and the Aeronautics Bureau staff felt that MicroPAVER® had performed satisfactorily. It was ready for adoption by ALDOT for determination of pavement condition as part of normal airport inspections.



Figure 5-17. Longitudinal cracks connected by transverse cracks



Figure 5-18. Water seeping out through longitudinal crack due to load application



Figure 5-19. Mild asphalt bleeding along pavement strip

Section 6

Conclusions and Recommended Scope for Further Work

6.1 Summary

The objectives of this project included revising the public use airport inspection algorithm, developing a system to enable the airport inspector to conduct quick inspections and release the report online to the public, and implementing a pavement management system using standard software (Micro PAVER®) for generating the runway PCI. Essential revisions included assigning weighting factors, formatting for MS-Excel® and MS-Access® database, and reconfiguring it so that it could be executed and placed on-line by the airport inspector in real time.

The project involved a detailed literature review and analysis of FAA statements given in various Advisory Circulars for public use airports. The project team worked with the state airport inspector to generate an inspection algorithm and to format it in an MS-Excel® spreadsheet. The software was field tested three times during regular airport inspections and was found to work satisfactorily. It replaced previous inspection algorithms and is currently being used by the ALDOT airport inspector. After an intensive investigation of available methodologies, MicroPAVER® was selected to obtain pavement condition values. The team implemented the software and field tested at three airports to obtain PCI values.

6.1 Conclusions

The UTCA project team made the many observations over the course of the project. As a result, the following conclusions were drawn:

1. None of the 50 states has conducted a similar work in the area of GA.
2. The ALDOT “Bridge Inspection Manual” served as a model for developing the procedure.
3. Paperwork involved in conducting airport inspections was eliminated as a result of the on-line algorithm. The MS-Access® database stores inspection information for all airports in the state.
4. The airport inspector issues licenses for different airports by verifying essential factors, of which approach path slope and runway pavement conditions are the most critical for safety. These are considered prominent weighting factors and are the most important inspection scores.
5. The algorithm was based on the conclusion that failure of either critical factor should result in denial of licensing.
6. Airports with defective lighting fixtures will be certified as unfit for night/low-visibility operations, but can be granted permission for day-only operations.
7. The most important outcomes of this project were the introduction of a pavement management system for GA airports in Alabama and the implementation of a Web based airport inspection system.
8. MicroPAVER® was used for generating PCI values for airport pavements.

9. Through the successful completion of this project, ALDOT is now able to provide current and relevant information to the flying public regarding the condition of all general aviation airports across the state.

6.2 Recommends for Further Work

The implemented pavement management system currently enables the airport inspector to generate a PCI value for airfield pavement. This which will help to predict future maintenance requirements. A future task that could be undertaken is to refine the algorithm based on pavement inspections. The pavement inspection factor could be linked with the PCI score, so that the PCI generated by MicroPAVER® could automatically insert a pavement inspection score in the online database. This needs to be done very carefully, based on numerous trial inspections.

Another potential work that could be undertaken is to implement a full-fledged pavement inspection system for all airports in the State using MicroPAVER 5.0 to the fullest extent. That will give a detailed pavement management report along with plots of tentative future deterioration rates. This will help airport owners predict exactly how much money will be needed to for maintenance and rehabilitation over a given time period.

Section 7.0 References

Transportation Research Board Data, Airport Planning and Programming Office, Federal Aviation Administration, August 2001.

National Transportation Safety Board, <http://www.nts.gov>

Federal Aviation Administration Form 7480-1, "Notice of Landing Area Proposal",
<http://www1.faa.gov/ats/ata/ATA400/7480-1.pdf>

Federal Aviation Administration Advisory Circular, AC on development of state standards for non-primary airports, <http://www1.faa.gov/arp/pdf/5100-13a.pdf>

Federal Aviation Administration, Airport Certification details,
<http://www1.faa.gov/arp/certification/index.cfm?ARPnav=cert>.

Shahin, M. Y., Pavement Management for Airports, Roads and Parking Lots, Kluwer Academic Publishers, 2000,

Appendix A

Web site information on airport licensing

1. General Info Pages

- <http://members.tripod.com/~Barusa/transprt/states.htm>
- <http://www.rmlibrary.com/db/agencydot.htm>
- Links to 50 state DOTs and other transportation-related sites

2. Alaska

- <http://www.dot.state.ak.us>
- No licensing procedures
- No online licensing
- Thorough website – vital for remote airstrip operations
- Link to GCR & Associates 5010 Database

3. Arizona

- <http://www.dot.state.az.us/ABOUT/aero/index.htm>
- No licensing procedures
- No online licensing
- No airport info
- Not much usable information

4. Arkansas

- <http://www.ahtd.state.ar.us/>
- No aeronautical information

5. California

- <http://www.dot.ca.gov/hq/planning/aeronaut/htmlfile/index.html>
- Licensing and permitting procedures and forms – masses of info
- No online permitting or licensing system
- Has a nice GIS state map with airports shown
- http://www.gcr1.com/ca_aims/
- Variety of airport information
- No licensing info

6. Colorado

- <http://www.colorado-aeronautics.org/>
- No licensing procedures
- No online licensing
- Individual airport information
- Aerial photos
- Road map of area
- Vital info for small mountain airstrips

7. Connecticut

- <http://www.dot.state.ct.us/bureau/ap/ap.html>
- Licensing and permitting forms online
- No online licensing
- Limited info on a few airports – Airnav.com style

8. Delaware

- <http://www.drbaairports.com/>
- No licensing procedures
- No online licensing
- Limited info on a few airports – Airnav.com style
- No authority or contact found for other airports

9. Florida

- <http://www11.myflorida.com/aviation/>
- Licensing procedures online
- Very comprehensive site
- <http://www.florida-aviation-database.com/>
- Masses of airport info – Airnav.com style
- Actual 5010s.
- Extremely informative and excellent site

10. Georgia

- <http://www.dot.state.ga.us/dot/plan-prog/intermodal/aviation/index.shtml>
- No licensing procedures
- No online licensing
- No airport info
- Not much useful information, more of a master plan

11. Hawaii

- <http://www.hawaii.gov/dot/airports/index.htm>
- No licensing procedures
- No online licensing
- No airport info
- Not much information

12. Idaho

- <http://www2.state.id.us/itd/aero/aerohome.htm>
- No licensing procedures
- No online licensing
- No airport info
- Not much information

13. Illinois

- <http://www.dot.state.il.us/aero/index.html>
- Licensing and permitting forms and procedures online
- No online licensing
- Limited information on a few airports – Airnav.com style

14. Indiana

- <http://www.in.gov/dot/modetrans/>
- Licensing procedures online
- No online licensing
- No airport information

15. Iowa

- <http://www.iawings.com/>
 - Licensing procedures online
 - No online licensing
 - Limited info on a few airports – Airnav.com style
16. Kansas
- <http://kdot1.ksdot.org/public/kdot/divaviation/index.html>
 - No licensing procedures
 - No online licensing
 - Airport information links to Airnav.com
17. Kentucky
- <http://www.kytc.state.ky.us/Aeronautics/home.htm>
 - No licensing procedures
 - No online licensing
 - No airport information
 - Not much information
18. Louisiana
- <http://www.dotd.state.la.us/intermodal/aviation/index.shtml>
 - No licensing procedures
 - No online licensing
 - Limited contact information for individual airports, no vital info
19. Maine
- <http://www.state.me.us/mdot/opt/airport/homepage.htm>
 - Licensing procedures online
 - No online licensing
 - Good FAQ page
 - No airport information
20. Maryland
- <http://www.marylandaviation.com/>
 - Licensing procedures online
 - No online licensing
 - Very large site with masses of information
21. Massachusetts
- <http://www.massport.com/airports/>
 - No licensing procedures
 - No online licensing
 - Limited traveler info for large airports under Massachusetts Port Authority
 - Does not include all airports, cannot find information on controlling authority
22. Michigan
- <http://www.michigan.gov/aero/>
 - Licensing forms and procedures online
 - No online licensing
 - Information on individual airports, airport diagrams
23. Minnesota
- <http://www.dot.state.mn.us/aero/>
 - No licensing procedures

- No online licensing
- Links to 5010 Database
- 24. Mississippi
 - <http://www.mdot.state.ms.us/>
 - No aeronautical information
- 25. Missouri
 - <http://www.modot.state.mo.us/trans/trans.htm>
 - No licensing procedures
 - No online licensing
 - No airport information
 - Not much information
- 26. Montana
 - <http://www.mdt.state.mt.us/aeronautics/>
 - No licensing procedures
 - No licensing information
 - Extensive pavement information – PCI reports
 - <http://www.mdt.state.mt.us/aeronautics/airplan.html>
- 27. Nebraska
 - <http://www.aero.state.ne.us/>
 - No licensing procedures
 - No online licensing
 - Basic airport information
- 28. Nevada
 - <http://www.nevadadot.com/traveler/aviation/>
 - No licensing procedures
 - No online licensing
 - Basic airport information
 - Very nice airport diagrams, detail locations of pavement conditions
- 29. New Hampshire
 - <http://www.state.nh.us/dot/>
 - No aeronautical information
- 30. New Jersey
 - <http://www.state.nj.us/dot/aviation/index.htm>
 - No licensing procedures
 - No online licensing
 - No airport information
 - Not much information
- 31. New Mexico
 - http://nmshtd.state.nm.us/general/gen_depts/gen_depts_aviation/default.asp
 - No licensing procedures
 - No licensing information
 - No airport information
 - Not much information
- 32. New York
 - <http://www.dot.state.ny.us/pubtrans/airhome.html>
 - No licensing procedures

- No licensing information
 - Limited contact information for individual airports, no vital info
33. North Carolina
- <http://www.ncdot.org/transit/aviation/>
 - No licensing procedures
 - No licensing information
 - No airport information
 - Masses of information
 - Will soon have Airport Pavement Management System (APMS) report online.
 - <http://www.ncdot.org/transit/aviation/what/development/initiatives.html>
 - Developed own APMS software – LEDGA (Layered Elastic Design for General Aviation)
 - <http://www.ncdot.org/transit/aviation/what/development/ledga.html>
34. North Dakota
- <http://www.state.nd.us/ndaero/>
 - Licensing procedures online
 - No online licensing
 - Links to Airnav.com for airport information
35. Ohio
- <http://www.dot.state.oh.us/Aviation/>
 - Licensing procedures and forms online
 - No online licensing
 - EXTENSIVE PAVEMENT CONDITION REPORTS - MICROPAYER
 - No airport info (except for pavement conditions)
36. Oklahoma
- <http://www.okladot.state.ok.us/aeroinfo/index.htm>
 - No licensing procedures
 - No online licensing
 - Pavement Management System
 - University of Oklahoma
 - Broken web links – cannot view
 - Airport information, Airnav.com style
37. Oregon
- <http://www.aviation.state.or.us/>
 - No licensing procedures
 - No online licensing
 - Vital warning airport (backcountry) information
38. Pennsylvania
- <http://www.dot.state.pa.us/internet/PdotBOA.nsf/HomePageAviation?OpenForm>
 - Licensing procedures and forms online
 - No online licensing
 - Airport regulations online
 - Airport information, Airnav.com style
39. Rhode Island
- <http://www.dot.state.ri.us/WebTran/index.html>
 - No licensing procedures

- No online licensing
- Traveler information for airports, no pilot information
- 40. South Carolina
 - <http://www.dot.state.sc.us/>
 - No aeronautical information
- 41. South Dakota
 - <http://www.sddot.com/fpa/Aeronautics/index.htm>
 - No licensing procedures
 - No online licensing
 - Basic airport information, Airnav.com style
- 42. Tennessee
 - http://www.tdot.state.tn.us/aeronautics_division/index.htm
 - No licensing procedures
 - No online licensing
 - Basic airport information, Airnav.com style
- 43. Texas
 - <http://www.dot.state.tx.us/AVN/avninfo.htm>
 - Online licensing forms
 - No online licensing
 - Includes Airport Pavement Management (APM) handbook
 - <http://www.dot.state.tx.us/avn/pavementmanagement.htm>
 - No airport information
- 44. Utah
 - <http://www.udot.utah.gov/aer/default.htm>
 - No licensing procedures
 - No online licensing
 - No airport information
 - Not much information

- 45. Vermont
 - <http://www.aot.state.vt.us/maint/aviation/air.htm>
 - No licensing procedures
 - No online licensing
 - Vital info on public-use airports, Airnav.com style
- 46. Virginia
 - <http://www.doav.state.va.us/>
 - Licensing procedures online
 - No online licensing
 - Not much information
- 47. Washington
 - <http://www.wsdot.wa.gov/aviation/>
 - No licensing procedures
 - No online licensing
 - Vital info on state-owned airports

- Vital for safe operation from mountain airstrips
- 48. West Virginia
 - http://www.wvdot.com/1_airports/1_airports.htm
 - No licensing procedures
 - No online licensing
 - No airport information
 - Not much information
- 49. Wisconsin
 - <http://www.dot.state.wi.us/dtid/boa/index.htm>
 - No licensing procedures
 - No online licensing
 - Basic airport information
- 50. Wyoming
 - <http://dot.state.wy.us/web/aero/index.html>
 - No licensing procedures
 - No online licensing
 - No airport information
 - Not much information

Appendix B

GASB Statement 34

Governmental Accounting Standards Board Statement No. 34

Basic Financial Statements—and Management’s Discussion and Analysis—for State and Local Governments

Statement 34 establishes new requirements for the annual financial reports of state and local governments. The Statement was developed to make annual reports easier to understand and more useful to the people who use governmental financial information to make decisions (or who may do so in the future): legislators, their staff, and members of oversight bodies; investors, creditors, and others who provide resources to governments; and citizen groups and the public in general.

Statement 34 is firmly rooted in GASB Concepts Statement No. 1, Objectives of Financial Reporting, published in 1987. Some of those objectives affirm the importance of the information governments currently include in their annual reports, whereas others call for new information to fulfill the unmet needs of decision makers. Statement 34 strives to meet those objectives by requiring governments to retain much of the current information, in addition to offering new and different financial data. The Statement accomplishes many of the objectives set forth in 1987, and lays the groundwork for meeting the remaining objectives in the future.

Debuting New Information

Governments will report all capital assets, including infrastructure, in the government-wide statement of net assets and will report depreciation expense—the cost of “using up” capital assets—in the statement of activities.—Qualifying governments will make disclosures about infrastructure assets in required supplementary information (RSI), including the physical condition of the assets and the amounts spent to maintain and preserve them over time.