QUALITY CONTROL AND PROCEDURES MANUAL

for the

Florida Department of Transportation

Aviation Office

Statewide Pavement Management Program

Prepared for:

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Prepared by:

URS Corporation, Inc.
MACTEC Engineering and Consulting, Inc.
Planning Technology, Inc.

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Appendix B: Job Safety Analysis Development Guidelines

GLOSSARY

AAC	Asphalt Overlay on Asphalt Concrete
AC	Asphalt Concrete
ADO	Aviation District Office
AICP	American Institute of Certified Planners
AIRPAV	Eckrose/Green, Inc. Pavement Management Software
AP	Apron
APC	Asphalt Overlay on Portland cement concrete
APWA	American Public Works Association
ASCG	ASC Geoscience
ASTM	American Society for Testing and Materials
CADD	Computer Assisted Design and Drafting
DMS	Department of Management Services
FAA	Federal Aviation Administration
FAA/AC	FAA Advisory Circular
FAD	Florida Aviation Database
FHWA	Federal Highway Administration
FOD	Foreign Object Debris/Damage
FDOT	Florida Department of Transportation
GIS	Geographic Information System
GPS	Global Positioning System
ISDM	Information Systems Development Methodology
JSA	Job Safety Analysis
M&R	Maintenance and Rehabilitation
MACTEC	MACTEC Engineering and Consulting, Inc.
MICRO PAVER	Pavement Management Program Software
NAD	North American Datum
NDT	Non-destructive Deflection Testing
NOTAM	Notice to Airmen
OIS	Office of Information Systems
PAVER	Pavement Management Program
PCI	Pavement Condition Index
PCC/PC	Portland cement concrete
PM	Program Manager
PMS	Pavement Management System
PPE	Personal Protective Equipment
PTI	Planning Technology, Inc. and Panther International, LLC
QC	Quality Control
RP	Ramp
RW	Runway
SHSP	Site Health and Safety Plan
TH	T-Hangar
TL	Taxilane
TW	Taxiway
UNICOM/ MULTICOM	Radio Communication Frequency
URS	URS Corporation, Inc.

URS/MACTEC/PTI Program Manager:	Signature	6/12/05 Date
URS/MACTEC/PTI Project Manager:	Signature	12 July 05 Date
URS/MACTEC/PTI QA Manager:	Charles Stacy Signature	7-12-2005 Date
FDOT Airport Engineering/Statewide Pavement Management Manager:	Signature	7/20/05 Date

1.0 INTRODUCTION

The State of Florida has more than 100 public airports that are vital to the Florida economy as well as the economy of the United States. These public airports range from small general aviation airports to large international hub airports. These airports serve business travelers, tourism, and cargo operations crucial to the daily life of the people of Florida.

There are millions of square yards of pavement for the runways, taxiways, aprons and other areas that support aircraft operations. The timely and proper maintenance and rehabilitation (M&R) of these pavements allows the airports to operate efficiently, economically and without excessive down time. In order to support the planning, scheduling, and design of the M&R activities, FDOT has implemented pavement management system technology.

This document describes the guidance documents and procedures that will be used to ensure that the appropriate engineering and scientific standards of care, quality budget, and schedule requirements are implemented during the performance of the Statewide Aviation Pavement Management Program.

1.1 Purpose

The purpose of the Quality Control and Procedures Manual is to:

- Define and document the Florida Department of Transportation (FDOT) Aviation Office Statewide Pavement Management Program
- Define the selection of public airports participating in the program
- Define the roles and responsibilities of the program's participants
- Provide guidance and procedures to collect, evaluate and report pavement inspection results
- Provide guidance and procedures to verify that the pavement inspection data were collected according to the procedures described herein
- Help airports comply with request by the Federal Aviation Administration (FAA)

1.2 FDOT Aviation PMS Program

In 1992, FDOT implemented a Pavement Management System (PMS) program to improve the knowledge of pavement conditions at public airports in the State system, identify maintenance needs at individual airports, automate information management, and establish standards to address future needs. The 1992 PMS provided valuable information for establishing and performing pavement M&R.

In 1992/1993, and 1998/1999, the FDOT Aviation Office participated in the development of a proprietary software pavement management system and developed and populated a pavement management database that provided valuable information for establishing M&R policies, estimating M&R costs, and developing recommendations for performing routine pavement maintenance. This system is called AIRPAV.

Currently, airports using the Special Airport Improvement Program grant are required by the FAA to develop a pavement maintenance program (FAA/AC 150/5380-6A) using trained personnel to perform a detailed inspection of airfield pavements. The inspections are required to be performed at least once a year or every 3 years if pavement inspection is characterized in the form of a Pavement Condition Index (PCI) survey (such as American Society for Testing and Materials [ASTM] Method ASTM D 5340, current edition).

1.3 Goal

The goal of the Statewide Aviation PMS is to:

- Provide Florida's public airports the data necessary to prioritize pavement M&R
- Determine scheduling of maintenance, materials evaluations, and support design considerations
- Generate a recommended capital improvement plan for current and future use
- Identify current and future cost for M&R
- Identify current and future funding
- Identify the various funding scenarios that can be utilized by the airports for M&R
- Help the airports to comply with the FAA when applying for funding
- Help the engineers and airport personnel understand and monitor pavement conditions

1.4 FDOT PMS Update

In 2004, the FDOT Aviation Office undertook a project to update the PMS Program software utilized for the PMS program. The Aviation Office selected a consultant team consisting of URS Corporation, Inc. (URS), MACTEC Engineering and Consulting, Inc. (MACTEC), Planning Technology, Inc. and Panther International, LLC (PTI), and ASC Geoscience (ASCG) to aid with the implementation of the program update. This project involved a review of the AIRPAV software and other available PMS software. As a result of this review, MicroPAVER was selected as the software for the update project. Data from the 1998/1999 surveys were converted to the MicroPAVER system.

The inventory of the pavement systems and drawings of the pavements were updated to reflect maintenance, rehabilitation, and construction activities since 1998/1999 to the extent that information was available. Procedures for the inspection and collection of pavement data were developed and are included in this manual. A web-site (floridaairportpavement.com) was developed for the input of data under secure procedures. The site also has a public section for dissemination of information to the general public.

1.5 Organization

The FDOT Aviation Office will manage the day-to-day details of the Statewide PMS and the updates. The Aviation Office Airport Engineering Manager will serve as the Program Manager (PM).

1.5.1 Organizational Relationships and Responsibilities

Table 1 describes the role, responsibility, and authority for each task of the Statewide Pavement Management System Program.

1.5.2 Aviation Office Program Manager Role

The FDOT Aviation Office will manage the day-to-day details of the Statewide PMS program. The Aviation Office Airport Engineering Manager will serve as the PM for this project. The PM's responsibilities include managing the program and providing the guidelines for the consultant as needed. The Aviation Office will have review and approval authority for each program task.

1.5.3 Consultant Role

The Consultant (MACTEC Engineering and Consulting/URS Corporation/Planning Technology and Panther International, LLC / ASCGeoscience) will develop a PMS based upon procedures outlined in FAA Advisory Circular 150/5380-6A Guidelines and Procedures for Maintenance of Airport Pavements (FAA/AC) and ASTM D 5340 Standard Test Method for Airport Pavement Condition Index Surveys

(2004). The Consultant will provide technical and administrative assistance to the Aviation Office PM, during the execution of this program, which involves the continuing evaluation and updating of the existing PMS. The Consultant will prepare a system inventory for the existing airfield pavement network; prioritize statewide pavement maintenance and rehabilitation; determine maintenance scheduling; perform material evaluations; support design considerations; and prepare statewide and airport pavement condition status reports. The Consultant may conduct on-site pavement condition surveys to determine the surface conditions based upon visual observations; develop software and input data, provide training, equipment, monthly oversight reviews, and perform quality control, quality assurance and other related services that will be addressed later in this document. Additionally, a web-site for the program will be established and maintained by the consultant.

1.5.4 Airport Role

The airports are the ultimate client for each of the field inspections and reports. Individual airports shall be provided final deliverables that have been reviewed and approved by the FDOT Aviation Office that have been prepared by the Consultant. The Consultant will notify the airport of the tentative and planned field inspection within a manageable time. The airport shall review system inventory drawings in their folder in the pavement management website and add maintenance and rehabilitation activities conducted on airside pavements on the website system inventory form.

1.5.5 FDOT District Aviation Office Role

The FDOT District Offices will provide recommendations to the FDOT Aviation Office, which will reflect their perspective on the needs of the airports in their district relative to the Statewide Pavement Management Program. The FDOT District Aviation Offices should continually inform the FDOT Central Aviation Office and the Aviation Consultant of all pavement rehabilitation and construction related projects for their respective airports. The FDOT District Offices will receive the final reports for the individual airports inspected.

1.5.6 Orlando FAA Airports District Office Role

The FDOT Aviation Office will provide the Orlando FAA Aviation District Office (ADO) final reports for the airport inspections.

1.6 Pavement Types and Pavement Management

1.6.1 Pavement basics

A pavement is a prepared surface designed to provide a continuous smooth ride at a certain speed and to support an estimated amount of traffic for a certain number of years. Pavements are constructed of a combination of natural soils, subbases, bases and surfacing. There are mainly two types of pavements;

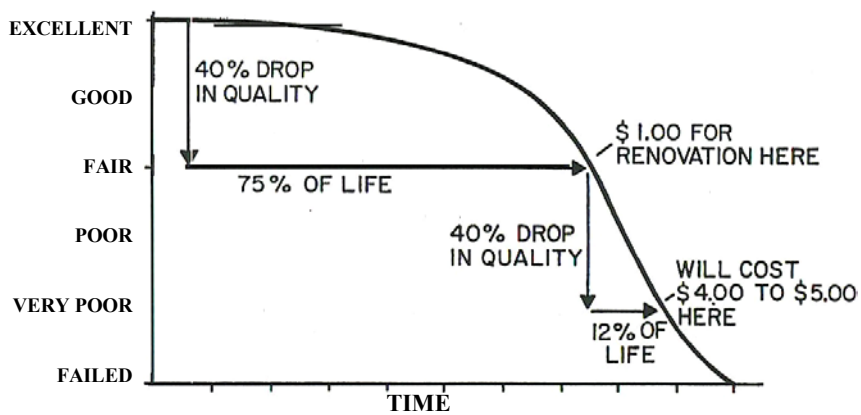
- flexible pavements, composed of asphalt concrete (AC) surface, and
- rigid pavements, composed of Portland cement concrete (PCC) surface.

Both pavement types use a combination of layered materials and thicknesses in order to support the traffic loads and protect the underlying natural subgrade soil. Flexible pavements (AC) dissipate the load from layer to layer until the load magnitude is small enough to be supported by the subgrade soil. In rigid pavements (PCC), the Portland cement concrete supports most of the load, the base or subbase layer is mainly constructed to provide a smooth and continuous platform for the concrete. Due to the different nature of both pavement types and their materials, flexible and rigid pavements have different distresses and failure mechanisms. Understanding the mechanics and failure modes of both pavement types will assist engineers in making adequate and long lasting repairs or rehabilitation to the pavement structures.

1.6.2 Pavement Management System Concept

A pavement management system (PMS) is a tool to assist engineers, planners and managing agencies in making decisions when planning pavement M&R. The management of pavements involves scheduling pavement maintenance and rehabilitation before pavements deteriorate to a condition where reconstruction (the most expensive alternative) is the only solution. The following excerpt from FAA/AC 5380-7 Pavement Management System illustrates how a pavement generally deteriorates and the relative cost of rehabilitation at various times throughout its life. Note that during the first 75 percent of a pavement's life, it performs relatively well. After that, however, it begins to deteriorate rapidly. The number of years a pavement stays in "good" condition depends on how well it is maintained. The illustration demonstrates the cost of maintaining the pavement above a critical condition before rapid deterioration occurs is much less compared to maintaining pavements after substantial deterioration has occurred.

PAVEMENT LIFE CYCLE



Source: FAA/AC 5380-7 Pavement Management System

As pavements deteriorate at an accelerated rate with increasing traffic and limited M&R resources, planning maintenance and rehabilitation and preventing pavements from reaching deteriorated conditions will help engineers stretch and maximize the use of their budgets and prolong the life of the pavements. A PMS provides a tool to schedule and plan maintenance and rehabilitation based on engineering information and existing and predicted conditions of pavements.

There are several components or elements that are essential to a PMS. The first steps in the implementation of a PMS are to know and clearly identify what needs to be managed, the limits of the managing agency's responsibilities and the condition of the existing pavements. Once the cause and the extent of pavement problems are known, the appropriate maintenance and/or rehabilitation can be planned. By using local unit costs and expected yearly budgets, a multi year M&R plan can be determined.

1.6.3 Pavement Inspection Methodology for PMS

Pavement condition assessment is one of the primary decision variables in any airport pavement management system. Pavement condition assessments generally include visual surveys in accordance with ASTM D 5340, *Standard Test Method for Airport Pavement Condition Index Surveys* and structural evaluation. Pavement condition surveys assess the functional condition of the pavement surface. Typically, most problems within a pavement structure will eventually reflect to the pavement surface. The structural condition and relative support of the pavement layers can be assessed utilizing non-

destructive deflection testing (NDT) as well as other in-depth engineering evaluation or sampling and testing methods.

1.6.4 Advantages of a PMS

Pavements deteriorate even if they do not carry any traffic. Pavement distresses may be attributed to climate, environment, materials, construction or traffic. Knowing the cause, extent and predominance of pavement distresses helps determine the most appropriate maintenance or rehabilitation work needed. Planning and applying preventive maintenance prolongs pavement life and minimizes future pavement repair costs. By projecting the rate of deterioration, a life cycle cost analysis can be performed for various alternatives, and the optimal time of application of the most feasible alternative can be determined. Such a decision is critical in order to avoid higher M&R costs at a later date.

A PMS enables the managing agency to identify and maintain the pavement conditions, keeping them at the upper end of the service life-condition curve. At this point, the total annual costs between maintaining a good pavement above a critical condition is much less than rehabilitating a poor pavement that has rapidly deteriorated beyond a critical condition level.

A PMS is a long-term planning tool that will result in an overall improvement of the pavement network condition and will also result in savings by applying the appropriate maintenance and rehabilitation activity at the appropriate time. Accurate estimates and timely M&R decisions and budgeting are of great importance when managing approximately 300 million square feet of Florida airside pavements.

2.0 REFERENCE DOCUMENTS

The following documents are referenced for the Quality Control and Procedures Manual

2.1 FAA Advisory Circular 150/5380-6A Guidelines and Procedures for Maintenance of Airport Pavements

Available from: *http://www.faa.gov/arp/publications/acs/5380-6A.pdf.*

2.2 FAA Advisory Circular 150/5380-7 Pavement Management System

Available from: *http://www.faa.gov/arp/pdf/5380-7.pdf* .

2.3 ASTM D 5340 Standard Test Method for Airport Pavement Condition Index Surveys (2004).

Available for purchase from: *http://www.astm. org.*

2.4 U.S. Army Corps of Engineers

2.4.1 Unified Facilities Criteria (UFC) O&M PAVER Asphalt Surfaced Airfields Pavement Condition Index (PCI)

The website can be found at http://www.pcase_asp.com.

2.4.2 Unified Facilities Criteria (UFC) O&M PAVER Concrete Surfaced Airfields Pavement Condition Index (PCI)

The website can be found at http://www.pcase_asp.com.

Additional information published by the Army Corps of Engineers can be found at:

*http://www.usace.army.mil/publications/armytm/*Procedures for U.S. Army and U.S. Air Force Airfield Pavement Condition Surveys TM5-826-6 can be found at *http://www.usace.army.mil/publications/ armytm/tm5-826-6/.*

Technical Manual for Pavement Maintenance Management TM5-623 *http://www.usace.army.mil/ publications/armytm/tm5-623/.*

2.5 MicroPAVER Manual

Available for purchase or download from U.S. Army Corps of Engineers can be found at *http://www.cecer.army.mil/paver/* or American Public Works Association can be found at *http://www.apwa.net/About/SIG/MicroPAVER/index.asp*

2.6 FAA Advisory Circular 150/5210-20 Ground Vehicle Operations on Airports

Available from: *http://www.faa.gov/arp/pdf/150/5210-20.pdf*

2.7 FAA Advisory Circular 150/5370-2E Operational Safety on Airports during Construction

Available from: *http://www.faa.gov/arp/pdf/150/5370-2E.pdf*

2.8 FAA Advisory Circular 5200-28B NOTAM Basics

Available from: *http://www.faa.gov/arp/pdf/5200-28B.pdf*

2.9 FAA Advisory Circular 5210-5B Painting Marking and Lighting of Vehicles Used on an Airport

Available from: *http://www.faa.gov/arp/pdf/5210-5B.pdf*

2.10 FAA Online Publication - Reducing the Number of Vehicle/Pedestrian Deviations at Your Airport

Available from: *http://www.asy.faa.gov/runwaysafety/zips/vpdrev.zip*

2.11 FAA Online Publication Airport Ground Vehicle Operations

Available from: *http://www.asy.faa.gov/safety_products/airportground/AGVO-guide.doc*

2.12 FAA Outline Publication Ground Vehicle Guide to Airport Signs and Markings

Available from: *http://www.faa.gov/runwaysafety/order/materials.cfm?ID=2*

2.13 Federal Highway Administration

Illustrations of sample distress types typically found in Florida airside pavements are provided in the United States Department of Transportation – Federal Highway Administration (FHWA) Online Manual, *Distress Identification Manual for the Long-Term Pavement Performance Program*, 4th Revised Edition, 1987

Available from: *http://www.tfhrc.gov/pavement/ltpp/reports/03031/)*.

3.0 SELECTION / CLASSIFICATION / PRIORITIZATION OF INSPECTION OF AIRPORTS IN STATEWIDE PROGRAM

The Florida Department of Transportation Aviation Office has initiated a Statewide Pavement Management Program for all of Florida's publicly owned airports. Participation in the State program is voluntary; however, any airport that requests or receives Federal funds is required by the Federal Aviation Administration (FAA) to implement a pavement maintenance program as described by AC 150\5380-6A. Figure 1 illustrates the general flowchart for the Airport Pavement Inspection for PCI.

3.1 Selection of Airports

Selection of airports included in the statewide pavement management program was made according to the guidelines outlined below. Private owned grass/turf/gravel airfields as well as helistop and seaplane base facilities are excluded from the scope of the Statewide Pavement Management Program. The remaining Private/Public Use facilities and facilities eligible to receive State or Federal funding are included in the program and categorized into three inspection categories as outlined in the next section.

3.2 Classification into Flexible Response Groups

To assist the State's publicly owned airports in complying with the FAA requirement, the Aviation Office is instituting a "flexible response" approach that determines how each airport can best support the pavement inspection process. The airports have been placed into three different "flexible response" categories based on research conducted by the FDOT Aviation Pavement Team and consultation with FDOT District personnel. An evaluation of the capabilities of the participating airports to support the pavement inspection process was made as outlined in Figure 2. Below is a description of each of the "flexible response" categories:

Self Inspection: This category includes airports that have adequate resources (1 to 3 personnel, depending on the size of the airport and number of sample units) to conduct their own inspection of pavements. The airports conducting self-inspections will receive training in properly identifying pavement distresses, administration, technical support and preparation or assistance in preparation of the pavement management report, and quality assurance reviews from the FDOT Aviation Pavement Team.

FDOT Assisted Inspection: This category includes airports that are capable of providing resources (1 to 3 personnel) to assist in the inspection process which could include performing pavement inspections under FDOT supervision or providing logistical support for the inspectors from the FDOT Aviation Pavement Team. Airports in this category will be provided administration and technical support, training to properly identify pavement distress, and production of the pavement management report.

FDOT Inspection: This category includes airports that are not staffed or capable of providing resources to assist in the inspection process. For airports in this category, the FDOT Aviation Pavement Team will conduct all pavement inspections, provide administration and technical support, and produce the final pavement management report.

For airports participating in each of the three "Flexible Response" Categories the Aviation Office will:

- Schedule inspections and related services through the FDOT Aviation Pavement Team.
- Maintain an inventory of airside pavements showing location of all runways, taxiways, aprons, and a condition map that contains colors to reflect the current pavement condition at the airport.
- Maintain inspection records from the PCI surveys for a minimum of 5 years and utilize the pavement inspection to prepare a pavement management report (one report required every 3 years).

- Identify funding and other resources available to provide remedial and preventive maintenance activities.

Airport field inspection personnel that will assist the FDOT/Consultant staff will receive training, administrative and technical support, and quality assurance reviews from FDOT or their designated representative as outlined in Chapters 7 and 8 of this manual. The quality assurance requirements outlined in Chapters 7 and 8 are also applicable to airport staff or other consultants/professional organizations working for self-inspecting airports.

Based on the categorization outlined in Figure 2, the airports included in the PMS program were placed into one of the flexible response categories. Listing of the airports is provided by FDOT in Tables 2, 3 and 4 for the FDOT Inspected Group, the FDOT Assisted Group and the Self-inspected Group, respectively.

3.3 Prioritization of Inspections

3.3.1 Flexible Response Groups

The Consultant will develop a preliminary schedule of inspections for the FDOT inspected and FDOT assisted groups. The initiation of field inspections shall be dependent on completion of the training and certification of the Field Inspection Team Leader. The Self-Inspection Group schedule will be dependent on coordination of the quality assurance/quality control (QA/QC) requirements and the appropriate scheduling requirements for the QA/QC personnel. The preliminary inspection schedule will be submitted by the Consultant to FDOT Aviation Office for review.

FDOT Aviation Office will provide feedback on the preliminary schedule. The purpose of the FDOT review is to ascertain where the inspection schedule and prioritization of selected airports meets the requirements of FDOT.

3.3.2 FDOT Districts

When prioritizing airport inspections, the various FDOT Districts should consider its operational activity, the last PCI, the last inspection year, the need for the airport to receive Federal or State funding and the airport's recent work history. The inspection schedule should include all FDOT Districts and account for the time lapsed since last inspection, which airports have low PCI values, their need to receive Federal or State funding and when the most recent work was conducted at the facility in the priority of runway, taxiway and apron. After this prioritization has been developed the airports will be grouped by FDOT District, the last PCI results and recent work history (priority of: runway, taxiway and apron).

3.4 FDOT District Aviation Office Involvement

The FDOT District Aviation Office will be provided their District's flexible response group listing which will allow them to evaluate the list and provide, if necessary, recommendations according to their knowledge of the facilities.

3.5 FDOT Final Approval

A FDOT Aviation Office and District offices comments on the draft schedule will be considered by the Consultant and a final draft of the schedule will be submitted to the Aviation Office for review. The Aviation Office will review the final draft schedule and provide the Consultant any comments. The Consultant will incorporate final draft comments and prepare final schedule.

4.0 SYSTEM INVENTORY

The purpose of this section is to outline the requirements and general procedures for the Consultant to collect, compile and organize records pertinent to construction and rehabilitation of the existing pavement network at the airport facilities included in the PMS program.

4.1 Collection of Records

4.1.1 FDOT Aviation

Consultant will request all available information and records pertinent to the airport facilities including configuration, original construction of pavements, physical boundaries, locations and additions to the original pavements. Records may include electronic and/or hardcopies of construction reports, as-built Computer-Aided Design/Drafting (CADD) drawings, airport plan views, photographs, software program or existing PMS data. The Consultant will initiate this information request in writing to the FDOT Aviation Office.

4.1.2 FDOT Districts

On behalf of the Aviation Central Office, the Consultant will prepare a letter to the District Aviation Office to request copies of available information or their Consultants' contact personnel for to the Consultant's designated office contact.

4.1.3 Airports

On behalf of the Aviation Central Office, the consultant will prepare a letter to the airport asking that copies of available information be sent to the Consultant's designated office contact.

4.2 Review and Compile Records

The Consultant will compile the records, drawings and reports provided by the FDOT offices and the individual airport.

4.3 Contact Airports for Missing Records

If insufficient information was provided by an individual airport, Consultant will notify the individual airport in writing re-requesting additional information. The letter shall request return of available information within 15 calendar days.

4.4 Inform FDOT of Missing Records/Final Status of Request for Information

If insufficient information was provided by an individual airport, Consultant with the approval of the FDOT Aviation Office shall submit another letter to the airport requesting additional information. The FDOT Aviation Office and FDOT District Office shall be copied on the request for further action. This could establish the final state of the request for information from the District and Airport.

4.5 Prepare Draft System Inventory Drawing

The Consultant will prepare a plan view system inventory drawing showing the layout of the airside pavements at individual airports in the statewide pavement management program. The drawing will reference pavement network components (runways, taxiways, aprons, etc.) and will contain basic pavement inventory information.

4.5.1 Georeference Drawing

Georeferencing of the system inventory drawing to be generated will be accomplished in accordance with the procedure outlined in paragraph 4.5.2 Draftsman responsibilities.

4.5.2 Draftsman Responsibilities

4.5.2.1 Definitions

System Drawings: CADD drawings of Florida airport operations areas including runways, taxiways and pavement delineations. Necessary objects such as T-hangars, airport offices, and control tower should be included.

State Drawings: The network definition drawing containing line and polygon representations of runways and a text identifier for each public airport (FAA_FIDPubRwysLL.dwg, i.e. Arcadia Municipal.dwg)). The coordinate system for this drawing is Lat Longs, NAD 83 Datum, Degrees.

Aerial Photographs: Aerial photographs (and their corresponding word files) of the airports and the immediate surrounding areas exported from Maptech Terrain Navigator (or similar) software and then inserted using the AutoCAD Map "Insert Image" command.

Project Drawing: A blank drawing created to query the other objects into.

4.5.2.2 Procedure

1. Identify the units or coordinate systems used in each object.

2. Create the blank project drawing for the selected airport.

3. Attach the state drawing, system drawing and aerial drawing for the selected airport to the project drawing.

4. Assign the coordinate system latitudes/longitudes, NAD 83 Datum, Degrees to the project drawing.

5. Assign the appropriate coordinate systems to the state drawing, system drawing and aerial drawing for the selected airport.

6. Query the items from the attached drawings into the project drawing letting the AutoCAD Map translate the individual drawing objects across the different coordinate systems.

7. When all of the individual pieces are queried into the project drawing, check for accuracy of the overlay. Hold the state drawing as the baseline and if corrections are necessary, adjust the items queried in from the system drawing. Move, rotate and scale these items to fit the state drawing and the aerial photography.

4.5.3 Consultant's Draft Review

Upon completion, the draft drawing shall be reviewed by a senior professional for general accuracy of information provided as reflected into the drawing. The drawing review shall also entail a check for matching of the coordinates.

4.5.4 FDOT Review

Upon completion of the Consultant's draft review, the system inventory drawing will be provided to the FDOT Aviation Office and the District office for their review, and to the FDOT project manager for review and approval. The cover letter for the submittal package will request a review of the attached document and feedback notifying the Consultant of any discrepancies noted within 20 calendar days.

4.6 Verification by Airport

A copy of the system inventory drawing in draft form will be provided to the individual airport contact for review. The cover letter for the submittal package will request, on behalf of the FDOT Aviation Office, a review of the attached document and feedback notifying the Consultant of any discrepancies noted within 15 calendar days.

4.7 Receipt of Verification and Response Documentation

Upon receipt of the information and report of any discrepancies noted by the FDOT offices and the individual airport, the Consultant will review the pertinent information and revise the drawing with regard to the information provided. For those airports that do not respond to the letter requesting information, a copy of the System Inventory Drawing will be sent to the Airport along with a letter requesting the confirmation and a request to provide an annotation of any additional information. If the airport still does not respond, the Airport drawings (System Inventory and Network Definition) will be treated as the most current version.

4.8 Finalize System Inventory Drawing

4.8.1 Draftsman Responsibilities

The Draftsman's responsibilities in the review and finalization phase will consist of making the required changes to the construction information on the drawing as well as georeferencing as requested by the FDOT Aviation Office and the individual airport.

4.8.2 Consultant's Final Review

Upon completion, the finalized system inventory drawing will be reviewed by a principal professional of the consultant for general accuracy of information provided as reflected into the drawing.

4.8.3 FDOT Review/Approval

Upon completion of the Consultant's final review, the system inventory drawing will be provided to FDOT Aviation Office and the District office for their review and final approval.

4.9 Quality Control Documentation

An evaluation of each airport system inventory drawing will be performed to confirm georeferencing accuracy and confirm that the available history has been properly determined and documented.

5.0 NETWORK DEFINITION

Prior to the field inspection process, it is important to update the network definition drawing of the airport pavement, subdividing it by Branch (Facility) and Section (Feature) (FAA/AC 150/5380-6, p. A-4), and sample units. This drawing will serve not only as a primary guide for the airfield inspectors but also as an important historical record. The purpose of this network definition update is to compare the previous airport configuration and history with the current airport configuration and history and update the existing drawings showing network branch, section and sample unit designations to match the current configurations.

5.1 Evaluate and Define Draft Pavement Network

The system inventory layout drawing that is approved through the process outlined in Chapter 4 will be used to assess whether or not new pavement (runway, taxiway or apron) has been added to the airport. The review will confirm that the network drawings contain an adequate number of sample units based on the previous network definition and newly acquired information on the current configuration and history. The network definition will be modified based on the latest sample unit table that contains modifications to existing or newly created Sections and sample units and the available knowledge of branches, sections, use patterns, construction types and history.

5.1.1 Airport (Network)

The network definition for each airport will provide a general description of how the airport pavements are divided and subdivided into manageable units. The following information will be provided. The "Network" field will identify the airport under analysis. The "Category" field will classify the airport according to the type and volume of aircraft traffic, GA - for General Aviation, community airports; RL - for Regional Relievers, small hub; and PR - for Primary, commercial airports. The District field will identify the FDOT District to which the airport belongs.

5.1.2 Branch (Facility)

For each network definition drawing, a Branch will designate pavements that have common usage and functionality, such as an entire runway, taxiway or apron. A Branch or Facility should be clearly named and shown where so identified, such as "Runway 3 – 27", "Taxiway B" or "Terminal Apron" in MicroPAVER; the nomenclature will be as outlined in Paragraph 8.2.4.

5.1.3 Sections (Feature)

For each network definition drawing, the Branch (Facility) will be subdivided into pavement sections that have a common history of construction, cross section, traffic and use. It is important that all pavement areas located in the same section be generally uniform in terms of construction or use. For example, the middle area of some runways may separately be divided as a different Section (Feature), compared to the shoulder portion of the same runways. A Section (Feature) is always contained within a single facility and an additional Section (Feature) boundary may be established during the PCI field inspection where distinct changes in pavement condition are visibly found.

The airside pavements will be assigned in MicroPAVER a priority or pavement rank that will determine the future priority when the pavement section maintenance and rehabilitation plan is developed. Pavement sections will be ranked P - for primary pavements, such as primary runways, primary taxiways, and primary aprons; S - for secondary pavements, such as secondary runways, secondary taxiways and secondary aprons; and T - for tertiary pavements such as "T" Hangars and slightly used aprons.

5.1.4 Sample (Sample) Units

For each network definition drawing the section will be further subdivided into the appropriate number of sample units. A sample unit will be a subdivision of a pavement section that has a standard size of 20 contiguous slabs (variations of ± 8 slabs may be allowed if the total number of slabs in the section is not evenly divided by 20, or to accommodate specific field conditions) for Portland cement concrete (PCC) airfield pavement. For asphalt concrete (AC) and porous friction surfaces, the sample size is typically 5,000 contiguous square feet, usually 50 x 100 ft (variations of ± 2,000 square feet may be allowed if the pavement is not evenly divided by 5,000, or to accommodate specific field conditions).

5.1.5 Consultant's Review

The senior professional will review the network definition and determine whether or not maintenance, rehabilitation or new construction of the pavements have modified the previous network definition and if changes are required to update the network definition and current sample unit table.

5.1.6 Draft Pavement Network Definition Drawing

Based on the required revision, a plan based on the system inventory drawing showing the layout of the pavement network and sample units in the airport will be prepared. The drawing will reference the pavement network and will contain sample unit boundaries and sample nomenclature.

5.1.7 Draftsman Responsibilities – Draft Network Definition Drawing

The Draftsman's responsibilities will consist of making the required changes to the network definition on the drawing.

5.1.8 Consultant's Draft Review

The senior professional will review the network definition and determine whether or not pavements have been added and changes are required for the network definition.

5.1.9 FDOT Draft Review

Upon completion of the Consultant's draft review, the Network Definition drawing will be provided to FDOT Aviation Office for review and approval and to the District office for their information.

5.2 Prepare Final Pavement Network Definition Drawing

Based on the internal and draft reviews a final plan view network definition drawing showing the layout of the pavement network and sample units in the airport will be prepared. The drawing will reference the pavement network and will contain sample unit boundaries and sample nomenclature.

5.2.1 Draftsman Responsibilities - Final Network Definition Drawing

The Draftsman's responsibilities in the review and finalization phase will consist of making the required changes in the network definition on the drawing.

5.2.2 Consultant's Final Review

The principal professional will review the network definition and confirm that the required changes in the information on the drawing were made.

5.2.3 FDOT Final Review/Approval

Upon completion of the internal review, the system inventory drawing will be provided to FDOT Aviation Office for their final review and approval and to the District Office for their information.

5.3 Quality Control Documentation

Evaluation of each airport network definition drawing will be performed to confirm that the changes are incorporated.

6.0 LEGACY DATA – CONVERSION AIRPAV TO MICROPAVER

The Florida Department of Transportation (FDOT) AIRPAV database was converted into a MicroPAVER database by PTI. During this process, the pavement inventory data and the PCI data were converted. A summary of the conversion process and the resolution on issues associated with the conversion are described below.

6.1 Data Conversion

The FDOT AIRPAV database was converted into a MicroPAVER database. During this process, the pavement inventory data and the PCI data were converted. Each conversion process is discussed under separate headings.

6.1.1 Raw Inventory Data

MicroPAVER stores inventory data at three distinct levels: network, branch, and section. A network is an individual system of pavements. In this case, a network represents an individual airport. Within a network are branches. Each branch represents an individual runway, taxiway, apron, or other pavement feature. Branches are further broken down into pavement sections. A description of how the data were converted from an AIRPAV format into a MicroPAVER database at each of these levels follows.

6.1.1.1 Networks

The network identifiers stored in MicroPAVER are the individual unique three-letter FAA identifiers for each airport. The network names were derived from the data stored in AIRPAV. In some instances, different network names were stored in AIRPAV for the same airport (for example "Ft. Lauderdale Executive Airport" and "Ft. Lauderdale Executive"). In these instances, the name most often referenced in the AIRPAV database was stored in MicroPAVER.

6.1.1.2 Branches

The AIRPAV uses a system of numbering for identifying the branches within a network. Numbers less than 4000 were typically identified as taxiway pavements. Numbers greater than 4000, but less than 6000, were typically identified as apron pavement. Numbers greater than 6000 were typically identified as runway pavement.

In converting the AIRPAV database, the branch identifiers were defined in MicroPAVER by the hundredth portion of this number. For example, if a section number was defined as 4105, the branch identifier was defined as 4100.

A problem was encountered when trying to identify the branch name for each branch. In many instances, the name assigned to each branch was not uniform throughout the AIRPAV database. Differences in spelling, abbreviation, and/or numbering occurred throughout the database. For this reason, branch names stored in MicroPAVER were defaulted to the branch use and stored accordingly; "RUNWAY" for runway branches, "TAXIWAY" for taxiway pavements, and "APRON" for apron pavements.

6.1.1.3 Section

Section identifiers were stored directly from AIRPAV data. In the previous example for branches, the section number of 4105 would be stored in MicroPAVER as 4105.

6.1.2 Processed Inventory Data

Due to differences in the database structures between AIRPAV and MicroPAVER, some of the information required by MicroPAVER for defining the pavement inventory was derived from AIRPAV data based on certain assumptions.

6.1.2.1 Section Area

The section area in MicroPAVER is not stored directly as a value in the database. Instead, it is calculated from stored values for length and width and an area adjustment value. However, AIRPAV only stores the overall area of a section in its database. In order to provide MicroPAVER with the information required, section lengths and widths were calculated for each section. Default width values were identified for each facility type. Section areas were divided by these values to calculate section lengths. The default width values for each facility type are as follows:

- Runways – Default width of 100 feet
- Taxiways – Default width of 40 feet
- Aprons – Default width of 200 feet

The area adjustment value for each section was set to "0" for each section. The actual lengths and widths will be corrected in the MicroPAVER during review of the system inventory drawings and finalization of the network definition.

6.1.2.2 Slab Dimensions

For PCC pavements, the average slab width and length values are required in MicroPAVER. These values are not stored in AIRPAV. An average slab dimension was calculated based on total number of slabs in the total area of inspected sample units. The area per slab was calculated and the slab dimensions were identified as the square root of this value.

While the calculated values may not be exactly correct for each individual pavement section, their determination will not adversely affect the performance of MicroPAVER.

6.1.3 Additional Items In Pavement Inventory

MicroPAVER allows the user to define additional items of data pertaining to a pavement inventory. For example, a user may wish to store the classification for each airport in MicroPAVER. Understanding the AIRPAV system and its use, PTI identified two additional data fields in MicroPAVER to store data at the network level.

6.1.3.1 FDOT District

The FDOT district in which the airport is located was defined as an additional data field at the network level in the database. There are seven FDOT districts throughout the state that have been defined and appropriate values have been stored for each airport.

6.1.3.2 Airport Classification

Three airport classifications from AIRPAV are identified: Commercial, Non-Utility, and Utility. These values have been stored for each airport at the network level in the MicroPAVER database. In some instances, multiple classifications were defined at an individual airport. In these instances, the level most often identified in AIRPAV was stored in MicroPAVER. This field is in addition to the field that defines the airport as Primary, Reliever, or General Aviation. In general, Commercial airports are the Primary

airports, non-utility airports are the Reliever airports and utility airports are the General Aviation airports. This field is used to allow reference to legacy data in AIRPAV.

6.1.4 PCI Data

While a majority of the information required for PCI data import into MicroPAVER was stored and easily identified in AIRPAV, one data element required further calculation. The total number of sample units in a section was based on the total section area and the total number of sample units in that section. While this number of sample units may differ slightly in some instances from the actual number, the differences will not adversely affect the performance of MicroPAVER.

Additionally, only one inspection date for an airport is required for automated data import. In the instances where airports were inspected on multiple dates, the first date of inspection was used for all PCI data gathered. Again, this conversion will not adversely affect the performance of MicroPAVER.

Finally, when reviewing the PCI values for each section in MicroPAVER, it is important to note that individual section PCI values may differ slightly from those stored in AIRPAV. The PCI value is based on calculations using deduct values for each individual distress and severity observed in a pavement. These deduct values are obtained from a series of deduct curves for each distress. The exact equation for each deduct curve, as developed for the PCI process, is stored internally in the MicroPAVER programming. The deduct curves used in AIRPAV represent close approximations to the actual deduct curves developed for the PCI process. These approximations do not match the actual curves exactly and in some instances produce slightly different PCI values. The impact of these differences is considered insignificant.

6.2 AIRPAV Data Problems

Occasionally AIRPAV data problems were encountered throughout the conversion process. The cause of these problems varied in frequency and are listed below:

- PCI data for a section that is not defined
- PCI data from an invalid inspection date (old data for a section that no longer exists)
- PCI data stored for a different pavement surface than defined for the section
- PCI data stored as a practice/test input
- Sample unit areas that are greater than total section area
- Distress quantities that exceed the possible quantity for a sample
- Three-letter identifiers not stored in the section data files
- Total number of PCC slabs not stored for a PCC section

The table shown below provides examples of some of the issues and the resolution.

FAA ID	Airport Name	Section	Error/Correction
2J9	Quincy	205	Practice PCI data. Deleted data.
34J	New Smyrna	6426	PCI data/No section data. Not entered.
42J	Keystone	305	PCI data/No section data. Not entered.
42J	Keystone	405	PCI data/No section data. Not entered.
42J	Keystone	6305	1993 PCI data/No section data. Not entered
BOW	Bartow	6125	PCC with asphalt distress types. Changed surface to asphalt.
BOW	Bartow	6130	PCC with asphalt distress types. Changed surface to asphalt.
CRG	Craig	300	PCI data/No section data. Not entered.
LAL	Lakeland	6245	Defined as a PCC pavement. 1 asphalt sample and 1 PCC sample entered. Deleted asphalt sample.

FAA ID	Airport Name	Section	Error/Correction
OPF	Opa Locka	1430	PCC with asphalt distress types. Changed surface to asphalt.
PBI	Palm Beach	4140	PCI data/No section data. Not entered.
PBI	Palm Beach	4145	PCI data/No section data. Not entered.
PNS	Pensacola	211	Surface type of asphalt over asphalt with PCC distress types. Changed surface to PCC.
PNS	Pensacola	213	PCC with asphalt sample type. Re-entered as PCC pavement with PCI equal to 100.
TIX	Space Center	162	PCI data/No section data. Not entered.
TIX	Space Center	408	PCI data/No section data. Not entered.

Data problems and data discrepancies found in the AIRPAV data were reviewed and reconciled by PTI. As an example, any distress quantity stored as a unit of area where the quantity was recorded larger than the total sample area, was adjusted down to equal the sample area. AIRPAV does not allow the user to enter distress quantities larger than the sample area.

In terms of frequency, distress identification numbers 1, 3, and 5 for alligator cracking, block cracking, and depression, respectively, were found in a greater number than the others. The alligator cracking and depression are due to heavy traffic. Block cracking is the result of very old age, many of the pavements were built in World War II, and thermal cracking.

6.3 Summary

Overall, the AIRPAV inventory and PCI data were converted and stored in a MicroPAVER database without issue. Detailed construction history information was not imported due to the extreme difference in which AIRPAV and MicroPAVER store this information. This will require manual entry into the MicroPAVER database. The information is contained in AIRPAV and easily displayed through the use of that software.

PTI performed many cross checks throughout the process to verify that the data were converted correctly. During this process two airports (Williston Municipal and Tri-County) were identified where it appears that FDOT performed an inspection on their own and entered the data after Eckrose/Green delivered the final database.

7.0 TRAINING AND CERTIFICATION

The purpose of this section is to outline the training requirements for the field personnel performing the pavement inspections. The quality control procedures associated with the field personnel training are also included.

7.1 Training

Three types of training will be conducted to facilitate an understanding of the criteria required to evaluate airfield pavements according to the Pavement Condition Index methodology and provide consistency in data collection. The three levels are basic, intermediate and refresher. Field personnel without previous experience in conducting pavement condition inspections using the PCI method shall attend the basic and intermediate levels of training. Field personnel who are experienced in PCI pavement inspections but have not conducted an inspection in the past 12 months shall attend the intermediate level of training. Field personnel experienced in PCI inspections who have performed pavement inspections in the past 12 months shall attend a refresher level of training.

All training sessions will be conducted during the same week for 2.5 consecutive days. Basic training will start on the first day and, Intermediate and Refresher training will start on the second day. Field training will be conducted on the third day.

7.1.1 Basic

Below is an outline of basic training requirement for field personnel without prior exposure to pavement basics, construction materials or pavement inspections. The minimum basic training program includes the following:

- introduction to basic pavement engineering concepts;
- flexible (asphalt concrete) pavement basics;
- rigid (Portland cement concrete) pavement basics;
- definition and basic components of a multi-layered pavement system, subgrade support, drainage and joints; and
- a brief overview of different pavement distress types and general discussion of causes of these distresses.

A copy of the Microsoft PowerPoint course material and handout material developed by the Consultant will be provided to FDOT for review and approval before training is conducted.

7.1.2 Intermediate

Below is an outline of Intermediate training requirement for field personnel with prior exposure to pavement basics and with a basic understanding of construction materials and pavement inspections. The minimum Intermediate training program includes the following:

- description and fundamentals of pavement management and pavement management systems;
- definition of an airfield pavement network, components of airfield pavement systems, planimetric terms;
- airport safety;
- overview of the FAA Advisory Circular 5380-6A and the purpose of the Circular;
- overview of the ASTM D 5340 Pavement Condition Index Survey Method;

- selection of inspection samples and number of samples to inspect;
- identification of distress types and severity of distresses in accordance with the procedures established in the ASTM D 5340 guide along with procedures for measurement of quantities;
- determination of PCI on a sample pavement (field study);
- MicroPAVER software overview;
- purpose of the MicroPAVER Pavement Management Software;
- capabilities of MicroPAVER;
- typical reports provided by MicroPAVER, (Summary Reports, Section Condition Reports, etc.);
- required input types, input fields and formats; and
- a discussion of the field documentation requirements of the program for input to the FDOT MicroPAVER Pavement Management system.

The classroom training will be followed by a classroom test and field training exercise as outlined in Paragraph 7.1.4. The field training exercise will expose the trainee to field procedures, observations and a spectrum of distresses common for Florida airfields serving a range of aircraft and traffic levels. The field training sites will be selected to include concrete and asphalt pavements and to represent a range of conditions. The training sites will be evaluated and selected by a joint team consisting of selected Consultant and FDOT personnel.

Successful completion of the Intermediate level training and the subsequent classroom and field testing will lead to certification of the individual as outlined in Section 7.2 Certification.

A copy of the Microsoft PowerPoint course material and handout material developed by the Consultant will be provided to FDOT for final review and approval before training is conducted.

7.1.3 Refresher

Field personnel performing inspection of airport pavements are required to attend a refresher class covering an overview of the intermediate class subjects and testing every year. Certificate renewal will depend on successful completion of the Refresher class and testing as outlined in Paragraph 7.1.4.

The Refresher level of training will be conducted during the Intermediate training starting with Airport Safety and will include the following:

- airport safety;
- overview of the FAA Advisory Circular 5380-6A and the purpose of the Circular;
- overview of the ASTM D 5340 Pavement Condition Index Survey Method;
- selection of inspection samples and number of samples to inspect;
- identification of distress types and severity of distresses in accordance with the procedures established in the ASTM D 5340 guide;
- determination of PCI on a sample pavement (field study);
- MicroPAVER software overview;
- purpose of the MicroPAVER Pavement Management Software;
- capabilities of MicroPAVER;
- typical reports provided by MicroPAVER, (Summary Reports, Section Condition Reports, etc.);
- required input types, input fields and formats; and
- a discussion of the field documentation requirements of the program for input to the FDOT MicroPAVER Pavement Management system.

Attendees will be required to pass the written and field test offered to the Intermediate class. Refresher class requirement can be waived for every other year and for field personnel who have performed field inspections within the last 6 months of the refresher due date, bringing the refresher & re-testing frequency to 24 months.

7.1.4 Classroom and Field Testing

The effectiveness of the training program and the competency of the trainees will be evaluated with an in-class written test and a field PCI inspection study at the completion of the Intermediate and Refresher training courses.

The in-class written test will be aimed at testing the trainee's understanding of the classroom material presented including: pavement basics; identification of distress types and severity and quantities; purpose of the FDOT PMS program; elements of the FDOT PMS program; MicroPAVER basics and data gathering requirements; ASTM D 5340 and FAA/AC 150/5380-6A requirements; and safe operating procedures in airfield environment.

Subsequent field testing of the trainees will evaluate and validate the accuracy of distress identification and distress severity determinations by the trainees.

The criteria for competency of applicants shall be developed by the Consultant. At a minimum, the criteria shall satisfy the following requirements outlined in the mentioned reference materials.

- **FAA/AC 150/5380-6A**
  Refers to ASTM that requires identify severity of distress 90% of the time
- **ASTM D 5340**
  Identify distress type 95% of the time
  Identify linear distress quantity within 10% if re-measured
  Identify area distress quantity within 20% if re-measured

7.2 Certificates of Completion

Designated field personnel who complete training programs conforming to the outline provided above will receive Certificates of Completion. This training and certificate requirement shall include FDOT's field personnel and airport personnel that will assist FDOT's personnel (FDOT Assisted Group) and self-inspecting airports' personnel. The Certificate of Completion will be under the signature of the FDOT Airport Engineering Manager and the Lead Instructor for the Consultant.

Training programs such as the "Pavement Management Using MicroPAVER" offered by the Office of Continuing Education at the University of Illinois-Urbana Champaign or the American Public Works Association (APWA) will be accepted as an alternate means of in-class training upon review and approval of the course syllabus by FDOT/Consultant and successful completion of the FDOT written test and field inspection portion of the FDOT training.

For other Consultants providing services for self-inspecting airports, the FDOT shall attempt to establish a relationship with each of these airports, encouraging them to provide the results of their field inspections and report. Consultants with a specialty in PCI Inspections and PMS systems that provide these service to Self Inspection airports will be assessed to be qualified to adequately perform PCI inspections for the statewide PMS program.

7.3 Quality Control Documentation

A written record of successful completion of the training program will be provided by the training instructor to FDOT Aviation Office. The record will include the attendee's name, date and location of the training received, course syllabus, a check list of subjects covered, proof of successful completion of an in-class written test and the field PCI inspection.

8.0 COLLECTION OF PAVEMENT DATA

The purpose of this section is to outline the requirements and general procedures for the Consultant and flexible response field (airport) personnel while performing the pavement inspections in the field and the quality control procedures associated with the field inspection. Figure 1 presents a general flowchart for the collection of the field data.

8.1 Coordination of Inspection

8.1.1 Coordination with FDOT Aviation, FDOT District, and Airport

For FDOT Inspected, FDOT Assisted and Self-Inspected Airports the schedule of inspections will be developed in accordance with item 3.3.1 Inspection Schedule in the Scope of Services. An initial notification letter will be issued to the FDOT Aviation Office by the Consultant's scheduler/contact designated for the project. The notification will be submitted on behalf of the FDOT Aviation Office and will be addressed to the airport contact and copied to FDOT. The initial notification shall be forwarded to the airport contact a minimum of 60 days in advance of the initial day of field visit.

The initial notification letter will indicate whether or not the inspection is to be carried out by FDOT personnel only or by FDOT personnel with the assistance of airport personnel. The initial notification letter shall briefly outline the nature of the planned inspection and the intended schedule.

The initial notification letter will request feedback within 30 calendar days regarding the schedule, shutdown requirements, security clearance requirements or escorting necessary for the Field Inspection Team Leader, and the duration of on-site security orientation necessary for safe performance of field inspection.

Based on the response letter from the designated airport contact, the schedule will be finalized and confirmed with a final schedule confirmation letter to FDOT for review and approval. A copy will then be sent to the designated airport contact with a 30 calendar day lead time from the date of initial planned field inspection.

8.1.2 Security Clearance

For airports requiring security clearances from the visiting Field Inspection Team Leader, this requirement shall be outlined in their response to the initial notification letter.

The final schedule confirmation letter will include a list of the individuals in the field inspection team, and the required clearance documentation for each of the visiting Field Inspection Team Leader.

8.1.3 Onsite Safety and Communications

The initial notification letter will request the airport's feedback as to the requirements for on-site orientation necessary for safe performance of field inspection. If required by the airport, the on-site orientation should be provided by designated and qualified airport personnel familiar with the airport operations.

The on-site orientation should include a discussion of the safe performance of the field inspection of pavements and, at a minimum, address the noise and airport traffic safety issues outlined in Chapter 6 Hazards of ASTM D 5340. The inspection team should have personal protective equipment (PPE) for noise and traffic safety, and a radio capable of monitoring and transmitting on the UNICOM radio frequency for tower communications. The onsite transport vehicle (e.g., golf cart or similar vehicle) will

have a flag with an orange "X" and flashing/rotating amber lights and have a sign identifying FDOT/Consultant. The airport orientation shall provide a convention for signage and terms and signals used by airport personnel. A Site Health and Safety Plan (SHSP) is required and is outlined in Chapter 13.

8.2 Field Visit, Location of Sections and Sample Units

8.2.1 Meeting with Airport Contact

Field Inspection Team Leader will report to the designated airport contact upon arrival at the site. Each field inspection team will consist of a Team Leader who is an experienced or qualified FDOT "certified" inspector assisted by another engineering professional or qualified engineering technician as outlined in Section 3.6 of the Scope of Services. Field Inspection Team Leader will be "certified" via successful completion of the training program as outlined in Section 7. Prior to the inspection, the Team Leader will provide the airport contact identification for the members of the field inspection team and confirm the purpose of the visit.

The Field Inspection Team Leader will perform a cursory review of the network definition drawing and previously provided construction data. The purpose of the cursory review is to confirm whether or not the previously gathered information is accurate and up-to-date. Any observed changes from previously documented pavement inventory or conditions, indicated by the airport contact will be marked on the airport's network definition drawing. Changes in the construction history will be documented in writing. Field personnel will document the coordinates of the boundaries of new additions not currently on record using the GPS unit and procedures outlined in Paragraph 8.2.2. This information will be used in updating the network definition drawing upon completion of the fieldwork.

The Field Inspection Team Leader will request the daily/monthly drive-by inspection reports to assist in identifying potential problem areas that may be considered as additional sample units.

The Field Inspection Team Leader will review the existing branches at the airport and confirm that there have not been significant changes in the inventory, use or condition of the branches or sections. If changes are indicated by the airport contact or observed by Field Inspection Team Leader, the Field Inspection Team Leader will modify the plan for selection of samples to represent the existing conditions and document the field changes on the sampling plan. Any modifications in the sampling plan, or additional samples taken, shall be documented for the purpose of updating the network definition drawing upon completion of the fieldwork. Updated drawings will be submitted to FDOT Aviation Office for review, approval and filing.

The Field Inspection Team Leader will communicate with the airport contact the intended preliminary sampling plan outlined in the network definition drawing prior to going out in the field. The purpose of the preliminary sampling plan is to utilize the previously inspected sampled units to the fullest extent possible.

At the end of the field inspection, the Field Inspection Team Leader will meet with the airport contact and provide a briefing of the findings of the field inspection.

8.2.2 Global Positioning System

The Field Inspection Team Leader will locate the sample units included in the sampling plan for the PCI evaluation. If the issued network definition drawing contains georeference information, field personnel will utilize a Global Positioning System (GPS) device when available and the pen-tablet computer equipped with georeferencing software to locate the sample units to be inspected.

If georeference information is not available, the Field Inspection Team Leader will proceed to the general vicinity of the sample units with the help of the airport layout drawing and visual references to adjacent facilities, objects or drainage features or the general shape of the pavement/curves etc. The final determination of the location and the boundaries of the sample unit shall be made by scaling field measurements from the network definition drawing, from nearest pavement features such as an intersection or end of pavement and using the GPS unit to determine the distance from the feature to the sample unit.

Once the general location of the sample is identified a coordinate determination shall be made for the sample. The Field Inspection Team Leader shall utilize a commercially available GPS device with the capability of determining coordinates of a specific point within ±1 meters (±3 feet). The GPS device shall be capable of providing spatial coordinates in terms of the latitude and longitude.

For each sample unit a GPS coordinate determination shall be made for a central point in the sample unit corresponding to the approximate centroid of the sample unit. The boundaries of the sample unit may be located by placing a tape measure/string to connect diagonal corners of the sample unit and marking the corners. Field personnel are to use professional judgment for uneven shaped sample units. The central global positioning coordinates for the sample unit shall be recorded.

8.2.3 Other Methods

If approved by the airport contact, marking of the sample units on the pavements shall be performed by placing discrete paint marks (bracket with arrows pointing to the perimeter of the sample unit) on opposite corners of the sample unit to be inspected. Marking paint should be of color (orange) that would not be confused or interfere with the permanent service marks on the airport pavements. The use of nails, survey flags or other potential Foreign Object Damage (FOD) sources is not acceptable. The purpose of marking the sample units is to allow quality control personnel to easily locate the sample units on the pavement surface for the purposes of quality control, for the field inspection crew to relocate a sample unit or airport to locate an unusual pavement condition. The marking will also aid quality assurance personnel in locating the sample units for verification procedures. For future evaluations of the same sample; however, the GPS coordinate, and the network definition drawing showing the general shape of the sample will remain the primary method of re-locating the sample units.

8.2.4 Nomenclature of Samples

As outlined in the scope of work for the PMS program (The State of Florida Airport Pavement Management Program Update Scope of Services dated August 19, 2004), a common nomenclature terminology will be used for the pavement management system. In Section 3.3 of the Scope of Services the term “facility” was used for “branch” and the term “feature” was used for “section” in the previous PMS (AIRPAV). The nomenclature used in the updated PMS will be in general accordance with the ASTM method and comply with the data entry fields in MicroPAVER. Therefore “Branch” will correspond to previously used “facility” and “Section” will correspond to previously used “feature” as outlined in Section 5.1 and shown below.

Updated PMS System Designation (ASTM D 5340)	Former PMS System (AIRPAV) Designation
Airport	Network
Branch	Facility
Section	Feature

The following general nomenclature codes shall be used in the field notes for nomenclature and documenting samples:

- Airport (Network in Eckrose/Green AIRPAV) ID: 3 letter FAA airport designation. Example: TLH for Tallahassee
- Branch (Facility in Eckrose/Green AIRPAV) ID: The Branch ID shall readily identify the pavement function and use. Branch IDs shall begin with RW for runways, TW for taxiways, TL for taxilanes, AP for aprons, RP for ramps, TH for T-hangars and O for other pavements. Example-RW14R, TWC, TL3.
- Section (Feature in Eckrose/Green AIRPAV) ID shall remain the same as the 1999 AIRPAV database. If a new section needs to be created or if an existing section needs to be divided into two or more sections, the new section numbers should be unique numbers greater than the existing section number, but smaller than the next higher section number. For new pavement sections, the Section ID should be a sequential number – ascending order in increments of 10. New sections will be marked on the field drawings for future database and drawing updates.
- Sample Unit ID: The Sample Unit ID shall be a number in sequential and ascending order. When possible, Sample Unit ID's shall remain the same number as in the 1999 data. Example: 307, 308, 309, Sample: FAA ID, Branch ID-Section ID-Sample Unit ID, Example TLH-RW14-6110-307 for: (Tallahassee Airport, Runway 14, Section 6110, Sample Unit # 307)

Additional information fields associated with each evaluated sample shall contain:

- GPS coordinate: Latitude and Longitude for the approximate centroid point of the sample if used or available. GPS coordinates are to be entered in the comments data field for each sample unit.
- Dimensions of the sample unit. Dimensions of the sample, in a general descriptive sense, shall be entered in the "comments data" field for each sample unit for ease of re-visiting the sample unit during a later evaluation.
- Area of the sample unit square feet (sf) is a standard entry field in MicroPAVER for each sample unit.
- Type of sample, "Random" or "Additional", which is a standard entry field in MicroPAVER for each sample unit.

8.3 Pavement Condition Surveys

8.3.1 Number of Samples to Collect

Included with the network definition drawings provided to Field Inspection Team Leader will be a preliminary sampling plan based on previous sampling and evaluation and the information available prior to the initiation of the field inspection. The preliminary sampling plan can be modified based on the available knowledge of branches, sections, use patterns, construction types and history.

The number of samples necessary for each section depends on several factors:

- airport classification;
- pavement use;
- pavement rank;
- PCI at the last inspection;
- time of last major rehabilitation work; and
- the total number of samples in each pavement section.

The number of samples to inspect will be determined based on the criteria in Table 5.

8.3.2 Pavement Condition Index Survey

The Pavement Condition Index Survey will be conducted as outlined in ASTM D 5340 and the guidelines established in the most recent version of the FAA Advisory Circular 150/5380-6.

8.4 RECORDING FIELD DATA

8.4.1 Pen Tablet

Where possible, recording of field data shall be performed through the use of portable field computers referred to as pen tablets. A pen tablet is a "ruggedized" field computer capable of running the MicroPAVER software. Each field inspection team for FDOT and FDOT Assisted inspections shall be equipped with a minimum of one pen tablet with appropriate field battery backup or a second pen tablet as a backup. Recording of data on paper forms and worksheets shall remain the backup when problems are encountered with the pen tablet or when a pen tablet is not available.

To improve the efficiency and accuracy of the data collection, the latest technology of Pen Tablet should be used during the field inspection. The purpose of using field computers is to input the field data directly into the database and have the ability to calculate PCIs for the sample and section, and to be able to download the inspection data into a master database in an automated and efficient manner. Detailed analyses during fieldwork will not be necessary. The pen tablets will have the legacy data from the past inspections, such as AIRPAV data, with samples already converted with appropriate nomenclature into MicroPAVER and loaded in the pen tablet prior to the initiation of field inspections. Therefore, the field inspection team shall be able to pull up the airport and section information and generate and input the new data under a new inspection date in MicroPAVER. This will enable crosschecking of documented distresses during the earlier survey on one particular sample unit as a field check.

The use of pen tablets and electronic data input into the field computer will eliminate duplication of effort in manual data entry of field forms into the central database. This will also reduce keypunch and transcription errors.

8.4.2 Photographic Documentation

A sufficient number of photographs shall be taken for each airport to represent distresses encountered. Photographs shall also be taken for any additional sample unit. Photographs shall be taken with a digital camera capable of taking pictures using the date stamp function with a minimum resolution of 640 by 480 pixels and saved in jpeg/jpg format prior to submitting to the database. For the viewer, the 12-inch scale listed in Section 5.4 of ASTM D 5340 shall be included in the distress pictures as an object for size reference.

The nomenclature for naming of photographs shall conform to the following guideline. Photographs shall be traceable to the section or sample units per the nomenclature of sample units as outlined in Paragraph 8.2.4.

Photographs of typical distresses and additional sample units will be named as outlined below.

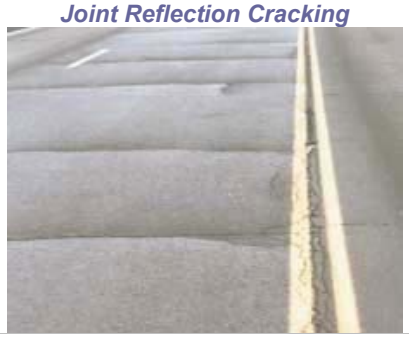
Example: TLH-RW14-6110-307-48-L.jpg

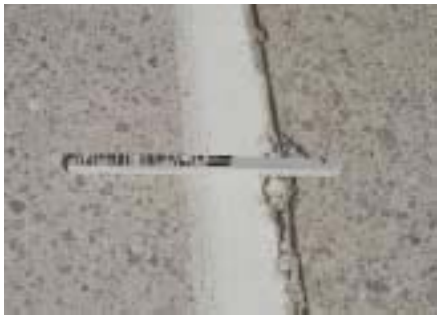
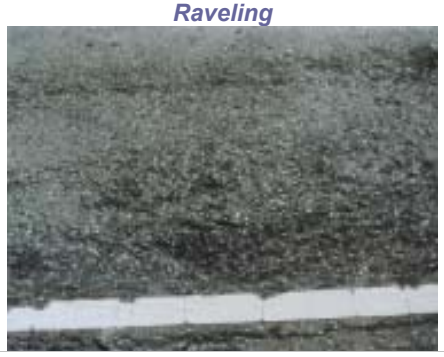
Template: FAA ID--Branch ID-Section ID-Sample Unit ID-DistressType-Distress Severity.jpg

- Airport ID: 3 letter FAA airport designation

- Branch ID: Runway RW, Taxiway TW, Taxilane TL, Apron AP, Ramp RP, TH for T-hangars, Other OT, etc.
- Section ID: as outlined in Paragraph 8.2.4.
- Sample Unit ID: as outlined in Paragraph 8.2.4
- Distress Type Ranges from [41 to 56] for flexible pavements and ranges from [61 to 75] for rigid pavements as outlined in the corresponding worksheets in ASTM D 5340.
- Distress Severity L-M-H as outlined in ASTM D 5340.

Illustrations of highway sample distress types that are similar to those typically found in Florida airside pavements are provided below. (United States Department of Transportation - FHWA Online Manual, *Distress Identification Manual for the Long-Term Pavement Performance Program*, 4th Revised Edition, 1987 *http://www.tfhrc.gov/pavement/ltpp/reports/03031/*). A complete overview and pictures of the distresses and examples for airport pavements illustrating Low, Medium, High severities can be found in ASTM D 5340.

Asphalt Concrete Pavements	Portland Cement Concrete
Alligator Cracking	***Corner Break***
Block Cracking	***Scaling***
Joint Reflection Cracking 	***Settlement or Faulting***

Asphalt Concrete Pavements	Portland Cement Concrete
Rutting	***Spalling at joint*** 
Patching	***Transverse Cracking***
Raveling 	***Joint Sealant Damage***
Transverse Cracking	***Shattered Slab***

8.4.3 Other Methods

Field Inspection Team Leader shall use the network definition drawing issued to them prior to the fieldwork to document the location of undocumented new construction, modifications to the proposed sampling plan and additional sample units. The boundaries of undocumented new construction, modifications to the proposed sampling plan and additional sample units can be located using the GPS unit as outlined above.

The distresses for additional sample units shall be entered in the database using the numbering system outlined on the drawings. Recording of inspection data for sample units on paper forms and worksheets shall remain the backup method for recording field data. Each team shall have a set of paper worksheets as described by ASTM D 5340 as a backup for recording field data.

8.5 Verification of Field Data

Verification of field data will be accomplished through a series of field checks.

8.5.1 Global Positioning System

The Field Inspection Team Leader operating the GPS unit shall perform a GPS coordinate determination at the beginning of each day's inspection at a specific location and again midway through the day's inspection. If the readings are not within 5 feet, the inspector shall contact the Consultant's Project Manager for guidance. Upon completion of the field inspections or at the end of each day, another determination of the GPS coordinate will be performed at the same location. If the reading is not within 5 feet of the day's initial reading, the Inspector shall contact the Consultant's Project Manager for guidance. The purpose of the second and third determinations is to verify that the readings are within tolerance.

8.5.2 PCI Data

In the field, pen tablets will be used to enable calculation of combined section PCIs and standard deviation of sample unit PCIs in one section. Even though the standard deviation of individual sample unit PCIs will not be used to iteratively calculate necessary number of samples for a certain level of confidence in the FDOT program, the ability to calculate the spread provides certain advantages.

The advantage of real-time calculation of PCI values and standard deviations enables the inspectors to determine whether or not the current condition versus the legacy data for the PCI are consistent.

If inspectors encounter situations where guidance is needed, they will immediately contact the FDOT Program Manager and/or Consultant's Project Manager.

8.6 Airport Debrief

The Field Inspection Team Leader shall attend a brief exit interview with the designated airport contact upon completion of the field inspections. The purpose of the exit interview is to notify the airports of the inspection results, whether any significant problems were observed, and to indicate the inspection team has completed the assigned task and vacated the premises.

A qualitative and conceptual overview of findings can be provided to the airport contact; however, survey findings shall not be available to the airport until the review of the data and quality control procedures have been completed.

8.7 Quality Control

Quality and accuracy of the field inspection shall be accomplished through the procedures outlined in the in-class training and field testing sections outlined in Chapter 7.

8.7.1 Personnel Qualifications

The Consultants field inspection crews will consist of a two man team of qualified inspectors. Field crews for Self and FDOT Assist Inspection airports will consist of a two man team that consists of one of the qualified Consultants personnel and one of the airport's personnel that have successfully completed the requirements of the training program outlined in Chapter 7. The Consultant will be the Field Team Leader for teams composed of the consultant and airport personnel.

8.7.2 Engineering Review of a Random Sample of Field Notes and Data

All field data collection must comply with AC 150\5380-6A. Distress definitions measurement methods for determining the PCI of asphalt and concrete airfield pavements must comply with AC 150\5380-6A. Additionally, a field manual describing distress definitions and measurement methods for determining the PCI of asphalt and concrete airfield pavement will be created in Phase II of the Statewide Pavement Management Program.

The field notes and photographs corresponding to 5 to 10% of the sample units from each airport facility will be reviewed by a member of the Quality Control team. The Quality Control team will consist of a combination of FDOT and/or Consultant's personnel with qualifications and authority to evaluate PMS data. The field inspectors will make the required electronic documentation and accompanying field notes to clarify and elaborate on the distresses observed in the field.

8.7.3 Quality Assurance Team Field Inspections

The Consultant will have a Quality Assurance Inspection team perform independent inspections of the evaluations performed by the inspection teams. The Quality Assurance team will not include anyone from the team that performed the original inspection and the Quality Assurance team will not be provided the original inspection data to prevent bias that could influence the Quality Assurance Inspection. It is anticipated that approximately 5 to 10% of the airports inspected will be evaluated by the Quality Assurance Inspection team. The ratings will be compared to the accuracy and repeatability requirements outlined in Chapter 7. In case of a discrepancy, the QA team will notify the FDOT and Consultant's Project Managers who will review the findings of results indicating discrepancy. Based on this review, the Consultant's Project Manager with the approval of the FDOT Aviation Office may elect to contact the airport and/or inspection team and notify them of the discrepancy. The Consultant's Project Manager in consultation with project technical reviewer and final approval from the FDOT Aviation Office will determine if the need for further re-inspection and/or retraining of the Field Inspection Team Leader and companion inspector. In addition, the discrepancy will be noted in the individual airport report.

Quality Assurance Team field inspections can be conducted concurrently with PCI inspections or be conducted at a separate time based on the requirements of the individual airport selected for a QA visit.

8.8 Change of Condition(s) Reporting

If inspectors encounter situations while conducting field inspections, where they need guidance, they will immediately contact the FDOT Program Manager and/or Consultant's Project Manager.

9.0 ANALYSIS OF PAVEMENT DATA - AIRPORT LEVEL REPORT PREPARATION

The purpose of this section is to outline the procedures to be used for the analysis of field inspection data and preparation of an airport level report.

Once the pavement inspection is completed and the data has been analyzed, an Airport Level Report for each airport will be prepared. The final report will include a description of the Airport, pavement inventory, MicroPAVER summary reports, inspection results, network condition, maintenance and rehabilitation planning scenarios and cost, visual aids (e.g., charts and graphs illustrating the pavement conditions, deterioration rates, M&R cost, color maps representing the current and future PCI conditions, maintenance and rehabilitation), photos and recommendations as described in AC 150/5380-6 (current version).

The following elements will be included in each Airport Report:

9.1 Executive Summary

The Executive Summary will highlight the work performed, a summary of the findings, results, and recommendations for M&R planning.

9.2 Network Definition

The network definition will provide a general description of how the airport pavements are divided and subdivided into units by construction and use. The following information will be provided:

- Airport (Network)—The Airport (Network) field will identify the airport under analysis.
- District—The District will identify the airport and its corresponding FDOT District.
- Category—The Category will classify the airport according to the type and volume of aircraft traffic, as follows:
  - GA – for general aviation, or community airports
  - RL – for regional relievers, small hubs
  - PR – for primary
- Branch (Facility) – A Branch will designate pavements that have common usage and functionality, such as:
  - An entire runway
  - An entire taxiway
  - An entire apron
- Section (Feature) – A pavement section is a subdivision of a branch which has consistent history, cross section, traffic and use. A branch may have one or more sections. The section will define the limits of maintenance or rehabilitation activities. However, several sections of a branch may require M&R at the same time.
- Pavement Rank – Pavement Rank in MicroPAVER will determine the priority to be assigned to a pavement section when developing a M&R plan. Pavement sections will be ranked as follows according to their use:
  - P – for Primary pavements
  - S – for Secondary pavements
  - T – for Tertiary pavements

9.3 Pavement Inventory

An inventory of the pavement branches and sections of the airport under analysis will be provided in the report. Elements of the pavement inventory will include: network, branch and section IDs and descriptions; section length, width and area; section rank, surface type, last construction date and last inspection date.

9.4 Pavement Condition

The Airport Report will include a description of the pavement visual inspection process and a summary of PCI for each section of the facility surveyed. The summary table will include the items in the Pavement Inventory plus the corresponding PCI for each section.

Additionally, an Inspection Report for each Section surveyed will be provided. This will be a listing of the types of pavement distresses observed, extent and severities found during the visual inspection.

9.4.1 Recommendations for Additional Engineering Evaluations

If necessary, the Airport Final Report may include recommendations for the development of a plan for further engineering evaluation. If unusual localized distresses are noted in a portion of a pavement section, or a system-wide occurrence of a specific distress is noted that was not previously documented, the Airport Reports may include recommendations for further engineering evaluation to be performed separately from the pavement condition inspection.

The engineering evaluation could be authorized by FDOT, the District or Airport Aviation Office based on the proposed scope and findings and would be reported separately from the Airport Final Report. The development of the scope of engineering evaluation may likely involve the following methodologies.

- Removal and Laboratory Evaluation of Cores: Depending on the nature of the observed distress, the report may recommend removal of cores and appropriate testing of the asphalt/concrete, binder or aggregate through the use of petrographic/microscopic evaluation or mechanistic testing procedures as outlined in the pertinent ASTM test methods.
- Falling Weight Deflectometer Testing/ Joint Load Transfer Efficiency. In situ nondestructive test procedures that determine the stiffness and structural support of the multilayered pavement system such as the Falling Weight Deflectometer and Joint Load Transfer Efficiency testing may be recommended.
- Ride Quality/ Skid Resistance / Friction Testing: Based on the observed condition of the traffic bearing surface testing procedures that determine the riding quality, surface profile or the skid resistance of the surface may be recommended.
- Removal of Cores and Geotechnical Subgrade Evaluation: Depending on the nature of the observed distress, the report may recommend removal of cores to access the subgrade and further testing of the subgrade and base materials. Testing of the subgrade may involve penetration tests, collection of undisturbed and disturbed soil samples for laboratory testing, in-situ dilatometer testing and determination of in-place density of base, etc.
- Drainage Evaluation: If visual observations indicate site drainage to be a problem or visual indications of distresses that may be related to site drainage a civil /site drainage evaluation may be recommended.

9.5 Pavement Condition Prediction

The Consultant will develop or update the pavement performance models using available legacy data and/or new data for the various groups of pavements that meet common criteria. The Consultant will use these models to predict or estimate the condition of the pavement sections in the future.

The predicted condition or deterioration trends for the pavement PCI indices will be developed using existing legacy data and the data collected under the current program. The deterioration information will be updated as new data are collected during the implementation of the system. Generic family curves for pavement types shall be used if insufficient data exists for deterioration analysis.

An estimate of the pavement condition of every pavement section of the airport, over an estimated period will be included in the report. A 20-year duration will be used for preparing budget estimates. The accuracy of the pavement PCI indices and the associated assumptions are reduced in the later years of the estimate. To increase the accuracy of the assumptions it is required that the estimate and PCI indices be collected every 3 years. This estimate will show the condition of each section over time under the assumption that no maintenance or rehabilitation is performed.

9.6 Maintenance Policies

Maintenance policies are sets of rules used to develop repair recommendations for distresses encountered during the visual inspection. The maintenance policy also includes the unit costs to perform the repair. Maintenance policies will be established using FDOT and Consultant's past experience, engineering judgment, ease of construction, and proven performance for flexible and for rigid pavements. The maintenance policy developed by the Consultant will define the maintenance practices, repair and replacement policy to sufficiently define the activities to allow unit pricing and provide a process to obtain consistency within the system. Tables with the maintenance policies will be included in the report. An example is included in Table 6.

Critical PCI levels for different pavement and branch types established upon discussions will be used in development of the M&R plan for the facility. Pavement components above critical PCI levels will receive preventive maintenance while pavements predicted to deteriorate below their respective critical PCI level during the analysis period will be considered for localized repairs or major rehabilitation or reconstruction.

Additional prioritization guidelines for particular pavement ranks, and types will also be incorporated in the development of the M&R plan in case of limited funding.

9.7 Unit Costs

MicroPaver uses the national average construction costs as listed by RS Means. Unit costs for various pavement maintenance and rehabilitation items can also be obtained from FDOT and individual airports past maintenance and repair projects. The reference for the cost utilized in the airport report will be identified in the report and used in the development of the M&R plan.

9.8 Pavement Rehabilitation Needs Analysis

The report will summarize the process and the results of the analysis to identify the pavement maintenance and rehabilitation needed for all pavement sections. This analysis is performed assuming that the facility has an unlimited budget for maintenance and rehabilitation. This analysis does not imply that all the sections will be programmed to receive major rehabilitation.

The MicroPAVER program follows defined criteria for identifying the type of rehabilitation to be applied to a specific pavement section if needed. Critical PCI levels for different pavement uses and branch types established upon discussions will be used in the development of the Needs Analysis and the M&R plan for each airport. Pavement sections above critical PCI levels showing no structural distresses will receive preventive or routine maintenance; sections with structural distresses will receive major rehabilitation. Pavement sections below the critical PCI will receive major rehabilitation; if the budget is insufficient, then the section will receive stop-gap or safety maintenance until it is selected for major rehabilitation.

As a general guideline, typical preventive maintenance may include, but will not be limited to, joint resealing, crack sealing, spall repairs, corner break repairs, patching and grinding for PCC pavements; crack sealing, patching and various surface sealing treatments for AC pavements. Except for the surface sealing treatments, most of the preventive maintenance is meant to correct localized distresses before the deterioration exacerbates over time. When pavements fall below the critical PCI, distresses are extensive and it is no longer cost effective to perform preventive maintenance on all distresses; therefore, stop gap or safety maintenance is applied to only those distresses that may cause a safety related problem. Major rehabilitation, on the other hand, includes reconstruction of the pavements or overlays in order to provide a new pavement or surface and to reestablish or improve the structural capacity of the pavement structure. A list of sections in need of maintenance and rehabilitation will be included in the report.

This analysis will provide not only the pavement sections in need of maintenance or rehabilitation, but also the approximate budget needed to perform the M&R for each airport.

9.9 Maintenance and Rehabilitation Plan

The report will include a maintenance and rehabilitation plan with a 20-year duration. The plan will include recommendations to maintain pavement sections above a pre-determined minimum PCI. The minimum PCI will vary according to the airport's category, the branch's use, and the section's rank. The plan will list the pavement sections indicated in need of rehabilitation, the estimated cost to do the work and the suggested year in which the work is planned to be performed.

The total budget needed for M&R for each airport determined during the Needs Analysis will be used to approximate a yearly budget for the 20-year plan. Adjustments will be made to consider inflation and the deterioration of pavement sections during the 20-year period.

The MicroPAVER program will be used to develop the M&R plan. The program will first be used to perform a Needs Analysis for each airport. Then, using the pavement ranks and priorities defined in Section 5.3, and the established yearly budget, the program will be used to select and schedule the M&R needed for each year in the plan. Sections not selected in year 1 will be deferred to the following year. Based on the section priorities, the predicted PCIs and the available budget for the new year, sections will again be selected for M&R or deferred to the next year, until the 20-year plan is completed.

9.10 Visual Aids

9.10.1 GIS Linked Shape File

The pavement inventory data and pavement condition will be linked to the airport's shape file to graphically show the inventory and condition of the airport via color coding shown on the shape file. The coding provides a visual representation that illustrates the PCIs for each pavement section. The report will also provide a set of maps showing the branches and sections in each airport, the current pavement condition of each section and a summary of the M&R plan. The GIS files will be provided with the report, allowing the FDOT to use them according to the desire need and purpose.

9.10.2 Photographs

Selected digital photographs taken during the pavement inspection will be provided in an Appendix. The photographs will be properly labeled allowing easy location of the sections shown. Some of the photographs will be included in the report providing visual support to special pavement conditions or distress observed during the inspection of the facility and the rest will be included in a CD for storage and future reviews.

9.11 Recommendations

The report will include the MicroPAVER recommendations for maintenance and rehabilitation of each airport.

10.0 STATEWIDE LEVEL REPORT PREPARATION

The purpose of this section is to provide an outline of the statewide airfield network report and the associated analysis. The report will provide the State and FAA as well as individual airports with pavement information and analytical tools to help them identify pavement related needs, optimize M&R objectives over a period of time based on prioritization of projects using the project PCI data and incorporate the pavement M&R priorities into the program implementation.

10.1 Statewide Analysis

The purpose of the Statewide Analysis is to provide proactive management of funds to maintain the condition of the statewide pavement network and assess compliance with regulations regarding pavement maintenance management.

The statewide analysis will describe the overall condition of the current state of pavements as well as predict the condition(s) that may occur over a period of time. This will enable FDOT to make cost effective decisions regarding the pavement network and preservation of the condition of pavement networks.

10.1.1 Deterioration Curves

The PCI deterioration curves used in the statewide summary and network level analysis will consist of area weighted average values for individual section and branch PCI and predicted PCI values developed for analysis of individual airports as outlined in Section 9.

10.1.2 Condition of the Overall Statewide Network by Airport

The statewide system information will be analyzed to illustrate the condition of the overall network. A summary table showing the area weighted PCI of each airport in the system will be provided. An example table is provided in Table 7. Various tables, graphs and figures will be developed to present the condition summaries for different pavements, such as airport types, pavement uses, branch types, etc. The information to be included in the report will be discussed with the FDOT once the data is available and analyzed.

The summary table will contain the current area weighted average PCI for the state and each district as well as a predicted PCI for a 20-year period for the entire state as well as the districts that form the statewide system.

10.1.3 Statewide System in Branch Types

A distribution of the statewide pavement network in terms of percentage area distribution to branch types (runways, taxiways, aprons etc) will be provided in a pie chart. The current and predicted state of different branch types will be provided by using an area weighted average PCI distribution by branch types. Table 8 illustrates a general reporting concept for statewide analysis. Illustration provided in Table 8 is based on readily available information on State of Oklahoma PMS website.

10.1.4 Statewide System in Airport Types

A distribution of the statewide pavement network in terms of percentage area distribution to airport types (general aviation, reliever, commercial hub) will be provided in a pie chart. The current and predicted state of different airport types will be provided by using a weighted average PCI distribution by airport types similar to as outlined above.

10.1.5 Statewide System in Pavement Types, Construction and Predominant Distress Type

The statewide airfield pavement system will also be analyzed in terms of pavement types such as asphalt, Portland cement concrete and combination/overlay (AC, PC, APC, AAC) as well as designations such as primary, secondary, and tertiary pavements, governing distress types and age of construction. The summary report format shall follow the general outline provided in Table 8.

10.1.6 Maintenance and Rehabilitation (M&R) plan

The Maintenance and Rehabilitation (M&R) plan for the statewide system will be based on the statewide budget summary generated by MicroPAVER.

The intent of the M&R plan will be to develop funding allocation scenarios that balance a series of objectives by FDOT. The specifics of the objectives (prioritization of primary pavements, certain pavement types, certain airports, maintain different pavements above different target and critical PCIs) will be developed per FDOT preferences and guidance from the Consultant.

An M&R plan will be presented in this report. The report will include recommendations for a general statewide M&R plan, such as the necessary level of annual funding recommended budgeting/prioritization guidelines for maintenance of critical PCI levels. A maximum of five scenarios may be provided in the M&R plan for evaluation and selection by FDOT.

10.2 Executive Summary

The Executive Summary for the report will provide a synopsis of the current state of the statewide airfield system. Example reporting concept on the statewide system based on readily available information on State of Oklahoma PMS website is provided in Table 9.

10.2.1 Critical PCI values and M&R Recommendations

The Executive Summary shall also outline the critical PCI values required by FDOT for these branches, pavement types and airport types used in development of the M&R recommendations. The executive summary will outline the recommended M&R approach and budgeting as developed by the FDOT PMS system.

10.3 Consultant's Draft Review

The senior professional will review the statewide M&R plan for general compliance with FDOT objectives and priorities as established during project meetings.

The report will be submitted to FDOT Aviation Office for review and feedback.

10.4 FDOT Draft Review

The FDOT Aviation Office will be provided copies of the draft statewide system report for review. The FDOT District Offices will be informed of the statewide M&R report progress by the FDOT Aviation Office and will be provided copies of the draft report and provide guidance to the statewide pavement management program through the FDOT Aviation Office. Upon incorporation of the approved changes and revisions, the final statewide PMS M&R report will be generated.

10.5 Consultant's Final Review

Upon completion, the statewide system report will be reviewed by a principal professional for general compliance with FDOT objectives and approved recommendations and incorporation of suggested revisions and changes.

10.6 FDOT Review/Approval

Upon completion of the Consultant's final review, the statewide report will be provided to FDOT Aviation Office and the District office for their review and final approval.

10.7 Documentation of Review Process

The report will be finalized based on the aggregate feedback from reviewing agencies. Each draft will be issued with a summary cover letter showing suggested changes by each reviewing agency. The changes will be outlined in the strike-out and underline format and will indicate the source of the suggested change. The Consultant will record minutes for meetings held for discussion and review of the statewide report. The Consultant will distribute the meeting minutes outlining the suggested and agreed upon changes by every reviewing agency. Any suggested changes to the recommended M&R policy that received an objection will be discussed in a meeting or a teleconference organized by the Consultant and resolved prior to issuance of the final report. This report should be updated annually.

11.0 PAVEMENT MANAGEMENT SYSTEM CUSTOMIZATION

The purpose of this section is to provide an outline of the statewide airfield network analysis and incorporation of agency preferences and priorities in development of the M&R policies.

11.1 Development of Pavement Performance Models

The predicted condition or deterioration trends for the pavement PCI indices will be developed using existing legacy data and the gathered data under the current program. The deterioration information will be updated as new data is gathered during the implementation of the system. If insufficient historic data exist for deterioration analysis of a specific pavement, generic family curves for the particular pavement type will be used for deterioration analysis. The deterioration curves will be developed under the assumption that no maintenance or rehabilitation is performed. The no maintenance deterioration curves will be used to predict the condition of a specific pavement section over the course of a pre-determined analysis time frame.

The PCI deterioration curves used in the statewide summary and network level analysis will consist of area weighted average values for individual section PCI and predicted PCI values developed for analysis. The predicted PCI values will be compared to the critical PCI values for specific pavement sections. The objective of the resultant M&R policies will be to maintain the pavement sections above critical PCI levels, subject to budget and prioritization constraints of FDOT.

11.2 Development of Prioritization Guidelines and Identification of M&R Policies

The M&R plan for the statewide system will utilize the deterioration information developed under the assumption that no maintenance or rehabilitation is performed as the starting point.

Critical PCI levels for different pavement and branch types will be established upon discussions with FDOT.

The current condition, the predicted condition and deterioration rate of the statewide pavement system components and the necessary budget to keep these components above critical PCI levels will be evaluated. Pavement components above critical PCI levels will receive preventive maintenance while pavements predicted to deteriorate below their respective critical PCI level during the analysis period will be considered for localized repairs or major rehabilitation or reconstruction.

11.3 Identification of Cost

The cost information associated with maintenance activities will be established upon discussions with FDOT or through the use of published construction cost data. Quantities will be based on the findings of the current program. The reference for the cost utilized in the airport report will be identified in the report and used in the development of the M&R plan.

11.4 Consultant's Draft Review

The senior professional will review the M&R plan objectives and prioritization guidelines for general compliance with FDOT priorities as established during project meetings.

11.5 FDOT Review

The Consultant will record minutes for meetings held for discussion and review the prioritization and customization guidelines. The FDOT Aviation Office will be provided copies of the minutes for review. The FDOT District Offices will be informed of the statewide M&R guidelines by the FDOT Aviation

Office. The summary prioritization and customization guidelines will be generated based on feedback from FDOT.

11.6 Consultant's Final Review

Upon completion, the summary prioritization and customization guidelines will be reviewed by a principal professional/reviewer for general compliance with FDOT objectives and incorporation of suggested revisions and changes.

11.7 FDOT Review/Approval

Upon completion of the Consultant's final review, the summary prioritization and customization guidelines will be provided to FDOT Aviation Office and the District office for their review and final approval.

12.0 WEBSITE AND FAD INTERFACE

12.1 Introduction

The goal of the Florida Aviation Database (FAD) is to develop a comprehensive, well-established, and maintained information and data source for use by the Florida aviation community. However, data alone is of little value unless there are appropriate applications available to use and present the data to the users. There are many commercial, off-the-shelf applications that the FDOT use that are capable of accessing the data for particular purposes, such as spreadsheets (Lotus and Excel). Nevertheless, the Aviation Office often has a need to develop specific, custom applications to help conduct the business functions in a more efficient manner. In particular, the adoption and implementation of a commercial off-the-shelf pavement management system and its integration with the FAD is one of these applications.

To aid in doing this, a standardized methodology of application development for aviation programs has been established for the FAD environment. The goal is to improve the quality and efficiency of application development in the aviation office. It establishes deliverables as its goals and focuses on defined methods of production for these deliverables. It provides a common framework for identifying the project, structuring the development process and providing a road map to follow in order that all needed elements are addressed. The development and implementation of the Airport Pavement Management Program software will follow this standard.

12.2 Background

Over previous years, there have been considerable efforts at the federal, state and private level to produce guidelines, standards and methodologies for the development of applications. On the state level, the State of Florida has initiated several actions. The Florida Department of Management Services (DMS) has produced its Information Systems Development Methodology (ISDM). The ISDM describes the specific stages for the entire life cycle of information systems used by the department. It details the methods, documents, deliverables, roles and responsibilities contained in the development cycle. The fundamental stages of this iterative process are:

- Needs Assessment
- Planning
- Design
- Development
- Testing
- Implementation
- Maintenance

The DMS has produced two documents related to the ISDM. Each addresses the details of the process but is presented in different manners.

Similarly, the FDOT Office of Information Systems (OIS) has issued its Application Development Standards Manual, in accordance with Section 44-100.003 Florida Administrative Code. The manual applies to OIS personnel, and Consultant and/or contract personnel working for or under the guidance of the OIS, engaged in information systems development and/or maintenance for any application for which the OIS is, or will be, the custodian. The methodology delineates the full life cycle of application development, allowing the use of techniques developed in support of other, varying methodologies with the information technology industry when techniques can be correlated with the general life cycle. The application development life cycle includes the following stages:

- Identification and Assessment
- Planning
- User Requirements Analysis
- System Design
- Construction
- Implementation
- Production and System Maintenance

The Application Development Standards Manual is a detailed document containing definitions, roles and responsibilities, methodology, naming conventions, technical architecture, system documentation, review and product control, and project management.

12.3 Purpose

As noted above, the Florida Administrative Code requires that certain business technology application developments follow established departmental guidelines. As such, the DMS has created a broad overview as the state initiative and the FDOT has developed a more specific standards manual for OIS application development. Likewise, there is a need to more specifically define a program development standard for the Aviation Office, which consolidates the DMS and FDOT standards into a simplified guideline for aviation applications. Because of the comprehensive and informative nature of the DMS and FDOT documents (included in this report) and their utility as complete references, they provided the foundation for the development of this FDOT Aviation Office Program Development Standard. This standard is intended to provide the guidance for all computer application development projects being done for the Aviation Office. It details the following:

- Program Design Requirements
- Development Plan
- Data Development and Population
- Application Development
- User Training
- Documentation
- Maintenance

These items are discussed in Appendix B. Additional information and clarification can be found in the DMS and FDOT documents. It should be noted that the development process described is general in nature and becomes specific when particular decision point and/or deliverables are identified for the relative application development. Flexibility in the identification of these items is recognized in order to achieve the desired product. The initial list of key decision points for the Airport Pavement Management Program software application development and integration with FAD are shown in the Appendix.

13.0 SAFETY

13.1 State of Florida Statewide Pavement Management System Pavement Condition Index Inspections SHSP

This document addresses the health and safety requirements for the State of Florida Statewide Pavement Management System Pavement Condition Index Inspections. The Consultant will provide PCI inspections at airside pavements throughout the State of Florida. This document outlines safety requirements for Consultant's personnel performing field inspections at FDOT and FDOT Assisted airports as well as when Consultant's personnel are on-site at Self-Inspect Airports.

This SHSP addresses health and safety requirements for this project. MACTEC's Quality Assurance Program Description and all of its invoked documents govern the preparation, approval, and use of this procedure. This document outlines the general framework for safe inspections on airside pavements. All field inspectors shall read and abide by this SHSP. All field inspectors will document their review of the SHSP by signing the Acknowledgement Form shown below.

As outlined in Chapter 8 the airport receiving inspections may choose to provide an on-site briefing or orientation prior to the initiation of field inspections. Applicable sections of this SHSP should be reviewed during this briefing. If requirements of individual airport are more stringent compared to the general operations framework outlined in this document, then requirements of the individual airport will govern.

13.2 Classroom Training Topics on Airport Safety

As part of the training and certification process outlined in Chapter 7 of this document, in class training will include airport safety topics. A review of the information covered in this SHSP and pertinent sections of the referenced advisory circular will be performed during the classroom training. The classroom safety training will likely include the following topics;

Airport Ground Vehicle Operations Basics (FAA/AC 5210-20)

Airfield pavement marking, light and signs basics (FAA Online publication Ref 5)

Operational Safety on Airports (FAA/AC 150/5370-2E)

Radio Communications Basics

Aviation Phraseology (Aviation Alphabet, ATCT Light Signals and Meanings)

NOTAM basics (FAA/AC 5200-28B)

Painting Marking and Lighting of Vehicles used on an airport (FAA/AC 5210-5B)

As a requirement of certification, field inspectors will sign the following acknowledgment statement:

HEALTH AND SAFETY PLAN

REVIEW CERTIFICATION

Acknowledgement Form

_____ have/has reviewed the Health and Safety Plan for
(individual)
Field PCI Inspection Services for the Florida Statewide Pavement Management System and understand that health and safety of our employees is our responsibility and will implement and document compliance with the requirements of this plan.

REVIEWED and APPROVED

_____ DATE _____
(Name)

_____
(Title)

13.3 Job Safety Analysis (JSA)

A JSA must be prepared for each field inspection visit. JSA is an important accident prevention tool that works by identifying hazards before the job is performed. A sample JSA and instructions for development of a job specific JSA is provided in the Appendix C.

The JSA must document that potential safety issues have been covered and must address safety concerns pertinent to the specific job and location. The JSA will be initiated by the Consultant's field professional. All inspectors must sign the job specific JSA prior to initiation of field services.

13.4 Notification of Field Work Schedule and Request for On-Site Orientation

The Consultant will issue an initial notification letter, requesting feedback from the airport on the requirements of on-site orientation necessary for safe performance of field inspection. The initial notification letter (see Section 8.1) shall provide an outline of a job specific safety and operations plan. The letter will include an outline of this SHSP and the training received and request feedback on whether additional training/on-site orientation is needed for safe performance of the field inspection at that specific airport.

The plan will contain the level of effort and a request for temporary shutdown requirements/disruption necessary to complete the pavement inspection of different branches inclusive of the runways, taxiways and the aprons, site contact, communications and information flow procedures, and will outline the necessary orientation, safety procedures security clearance requirements based on the understanding at the time. The airport will be responsible for issuing a Notice to Airmen (NOTAM) for any required temporary shutdowns of runways, taxiways or apron areas.

13.5 On-Site Orientation

If required by the airport, the on-site orientation shall be provided by designated and qualified airport personnel familiar with the airport operations. The on-site orientation should include, the modified traffic flow plan after sections of the airport have been shut down for inspections, site specific requirements for safe performance of the field inspection of pavements, and address the noise and airport traffic safety issues outlined in Chapter 6 Hazards of ASTM D 5340-04 Standard Test Method for Airport Pavement Condition Index Surveys. The airport orientation shall provide a convention for signage and terms and signals used by airport personnel.

13.6 Meeting with Airport Contact, Review of Shutdown and Traffic Plan

The Field Inspection Team Leader will report to the designated airport contact upon arrival at the site. Field personnel will provide the airport contact identification of the members of the field inspection team and confirm the purpose of the visit.

The Field Inspection Team Leader will perform a cursory review of the network definition drawing and the sampling plan. The airport contact will provide the modified traffic flow plan based on the necessary shutdowns for field inspection of pavements.

If the airport requires badges during the field inspection period, the field personnel will request temporary badges to be issued. If required by the airport, badges must be worn above the waist and be visible at all times.

13.7 Vehicle Access in the Field and Equipment provided by the Airport

Consultant's field personnel will be required to use a properly marked vehicle equipped with necessary signage and lighting in accordance with FAA/AC 5210-5B MARKING OF VEHICLE ON

AIRPORT/GROUND VEHICLE OPERATIONS ON AIRPORTS meeting the requirements of FAA AC 150/5210-20 GROUND VEHICLE OPERATIONS ON AIRPORTS while traveling on airside pavements. Warning lights will be turned on upon entering the airside of the airport.

Field personnel will ask to be provided a radio that is capable of monitoring airport communications and transmitting on the UNICOM/MULTICOM radio frequency for tower communications. Radio monitoring will be continuous on throughout the field inspections.

If the airport is in the Self-Inspection or FDOT-Assisted Group, Consultant will ask that the airport personnel assisting the inspection provide the radio and access to the site with a properly marked and equipped vehicle.

13.8 Personal Protective Equipment and Clothing

A shirt with sleeves and long pants must be worn at all times. Clothing must not have loose, torn or dragging fabric and must be suitable for the climate to avoid heat and cold stress.

Protective footwear and headwear is required as appropriate for safety of inspectors. An orange vest must be worn on top of regular clothing and must be visible at all times while performing inspections on the pavement areas.

The inspection team will use approved hearing protection while performing personal protective equipment (PPE) for noise and traffic safety.

13.9 Field Operations

13.9.1 Traveling on Airside Pavements

Consultant's field personnel will comply with the general guidelines and procedures of the FAA AC 150/5210-20 GROUND VEHICLE OPERATIONS ON AIRPORTS while traveling on airside pavements.

13.9.2 Performing Field Inspection:

The Consultant's work on airfield pavements mostly consists of measurement of distresses and photographic documentation. Consultant's field personnel will comply with the general guidelines and principles pertinent to access, egress and safety portions of the outlined for contractors in FAA AC 150/5370-2E OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION.

13.9.3 Completion of Field Inspection:

Upon completion of the inspection, Consultant's field personnel will notify the airport contact and withdraw from the airside pavements. Any tools/materials used by the field personnel must be removed upon completion of field services.

13.10 Emergency Response

Accidents and injuries will be reported to the airport contact and the appropriate emergency response agency. Subsequently the FDOT contact and Consultant's Project Manager will be notified. Contact information is provided below. Each accident or injury will be noted on a safety activity report/log by the Consultant's Project Manager. Corrective measures will be implemented and documented by the responsible party to minimize a reoccurrence. The nearest medical facility and emergency telephone numbers shall be maintained on-site during work. Below is an example of the information and format.

EMERGENCY CONTACTS

Name	Telephone Numbers		Date Of Pre-Emergency Notification (*If applicable*)
Fire Department /Police/Ambulance	911		
Hospital: Request From Site Contact			
FDOT Contact: Vu Trinh Airport Engineering Manager	Office: 850-414-4510	Pager:	Cell: 850-251-7722
Consultant Project Manager:	Office:	Home:	Cell:
Corporate Safety Officer:	Office:.	Home:	Cell:
Other:			

SAFETY REFERENCES

FAA AC 150/5210-20 Ground Vehicle Operations on Airports

FAA AC150/5210-5B Painting, Marking And Lighting of Vehicles Used on an Airport

FAA AC150/5370-2E Operational Safety on Airports during Construction

FAA Online Publication Reducing the Number Of Vehicle/Pedestrian Deviations At Your Airport
http://www.faa.gov/runwaysafety/zips/vpdrev.zip

FAA Online Publication Airport Ground Vehicle Operations
http://www.asy.faa.gov/safety_products/airportground/AGVO-guide.doc

Ground Vehicle Guide to Airport Signs and Markings
http://www.faa.gov/runwaysafety/order/materials.cfm?ID=2

FIGURES AND TABLES

Figure 1: Florida Airport Pavement Inspection

AIRPORT PAVEMENT INSPECTION FOR PCI FLOWCHART

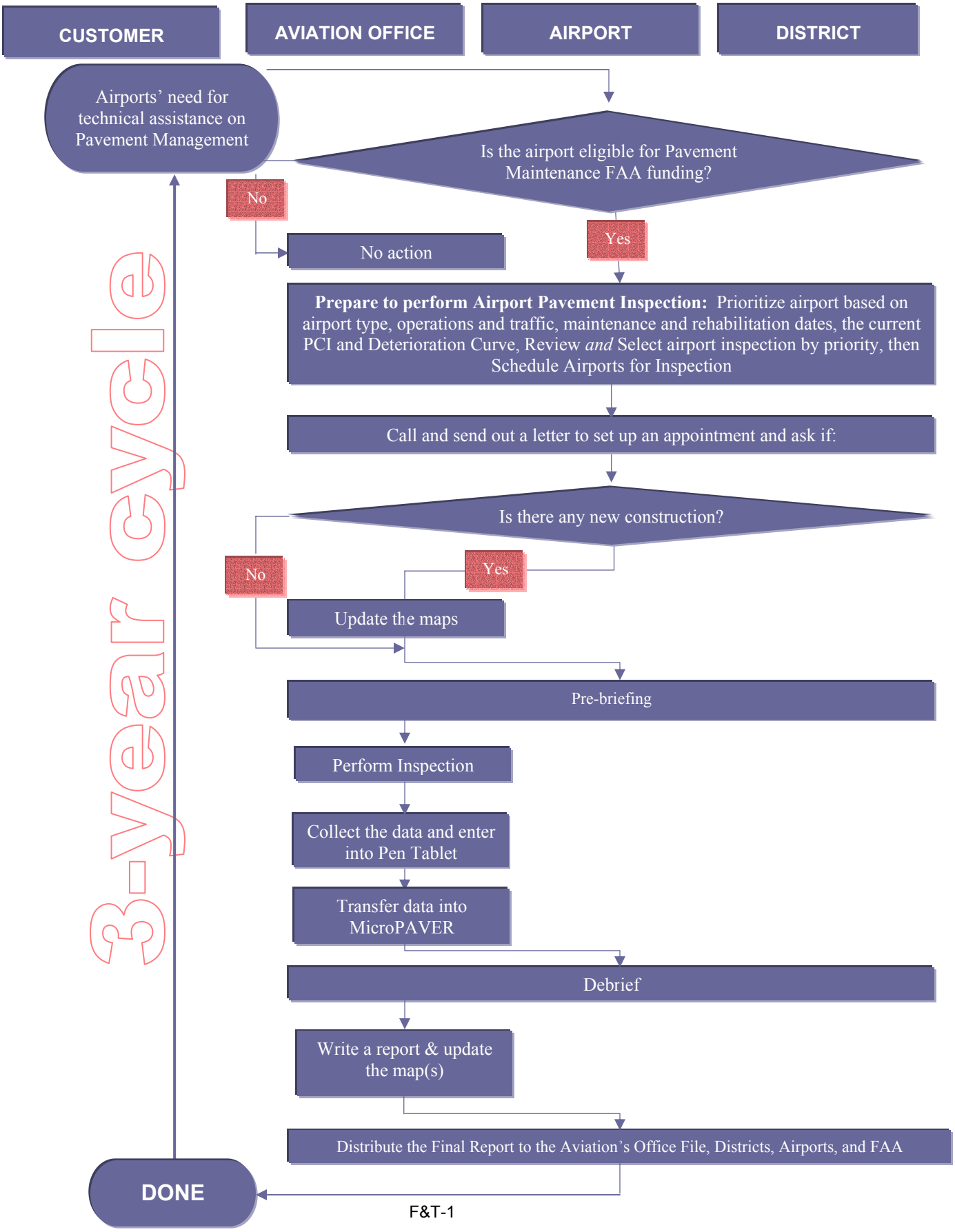


Figure 2: Florida Statewide Pavement Management Program

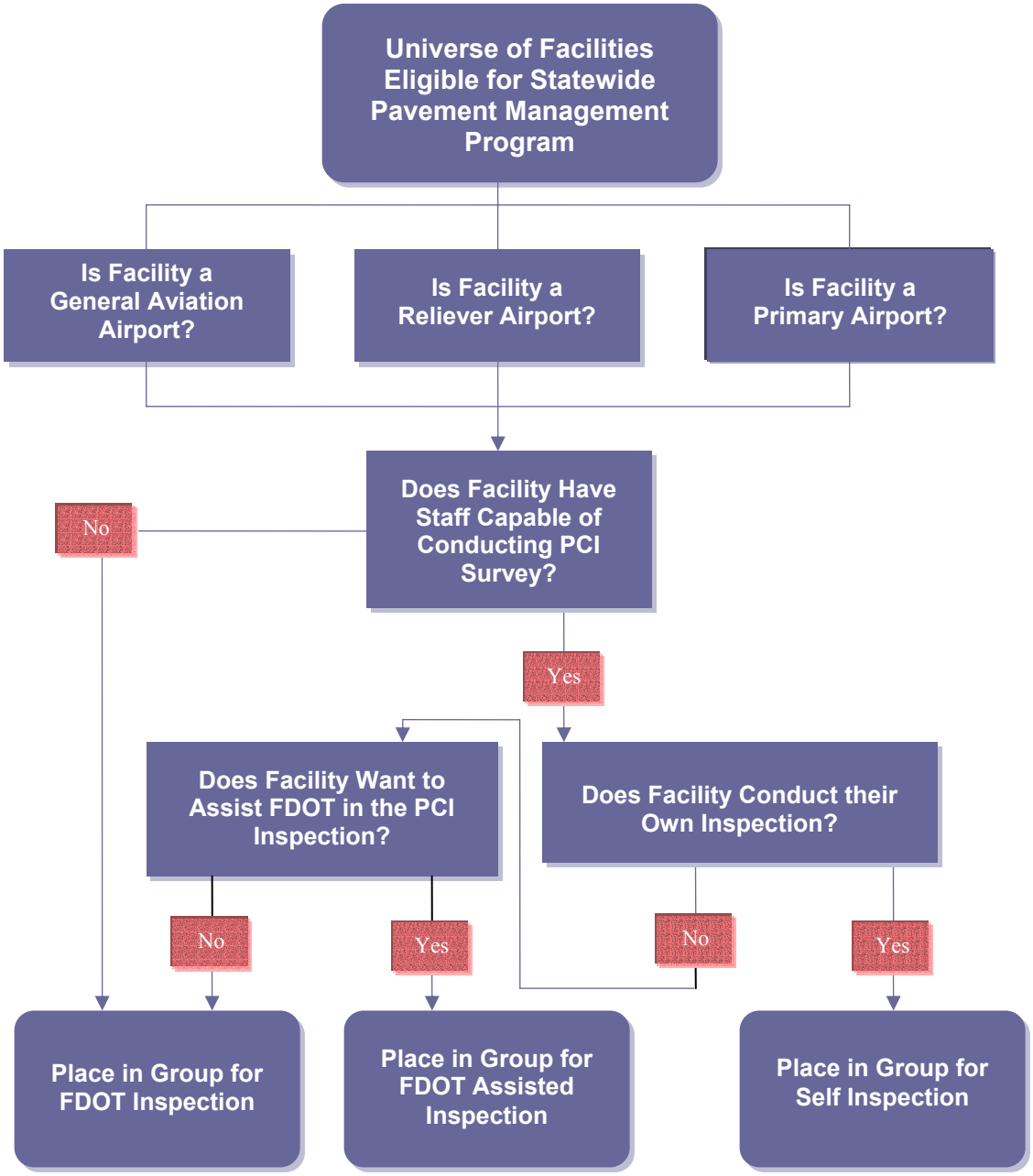


Table 1: FDOT Statewide Pavement Management System Responsibility Assignment Matrix

Phase I		FDOT	URS	MACTEC	PTI
Project Development		**Lead**	Support	Support	Support
3.1.1	Inspection Schedule – draft	Review	Support	**Lead**	Support
	Inspection Schedule – final	**Approval**	Support	**Lead**	Support
3.1.2	Refine Inspection Schedule – draft	Review	Support	**Lead**	Support
	Refine Inspection Schedule – final	**Approval**	Support	**Lead**	Support
3.1.3	Development of Software Design Concept				
	Review AIRPAV vs MicroPAVER	Review	Support	**Lead**	Support
	Pavement Management Software	**Approval**	Support	**Lead**	Support
3.1.4	QA Manual – draft	Review	Support	**Lead**	Support
	QA Manual – final	**Approval**	Support	**Lead**	Support
3.1.5	QC and Procedures Manual – draft	Review	Support	**Lead**	Support
	QC and Procedures Manual – final	**Approval**	Support	**Lead**	Support
3.2	System Inventory				
	Preliminary Drawing	Review	**Lead**	Support	Support
	Final Drawing (FDOT & Airport)	**Approval**	**Lead**	Support	Support
3.3	Network Definition				
	Preliminary Drawing	Review	Support	**Lead**	Support
	Final Drawing (FDOT & Airport)	**Approval**	Support	**Lead**	Support
3.4	PMS Customization				
	Customization – MicroPAVER	**Approval**	Support	**Lead**	Support
	FAD Interface	**Approval**	Support	Support	**Lead**
	Data Conversion	**Approval**	Support	Support	**Lead**
	Software Quality Assurance/ Beta Testing	**Approval**	Support	Support	**Lead**
3.5	Pavement Inspection Training				
	Proposal for Training – Concept	Review	Support	**Lead**	Support
	Proposal for Training – Final	**Approval**	Support	**Lead**	Support
	Development of Training Course	**Approval**	Support	**Lead**	Support
	Conduct Training Course	**Approval**	Support	**Lead**	Support
3.6	Collection of Pavement Condition Data				
	Field Inspection	Support	Support	**Lead**	Support
	Quality Control	Support	Support	**Lead**	Support
3.7	Data Analysis	Support	Support	**Lead**	Support
	Quality Control	Support	Support	**Lead**	Support
3.8	Final Drawing Preparation				
	Preliminary Drawing	Review	Support	**Lead**	Support
	Final Drawing	**Approval**	Support	**Lead**	Support
3.9	Data Submittals and Report Preparation				
	Draft Report	Review	Support	**Lead**	Support
	Final Report (FDOT & Airport)	**Approval**	Support	**Lead**	Support
3.10	Administration	Support	Support	Support	Support

Table 2: FDOT Inspected Group

District	Airport Name	1992-1999 AIRPAV Class	NPIAS	Flexible Response
1	Airglades Airport	U	GA	FDOT
1	Arcadia Municipal	U	GA	FDOT
1	Avon Park Municipal	U	GA	FDOT
1	Bartow Municipal	NU	GA	FDOT
1	Charlotte County	NU	GA	FDOT
1	Everglades Airpark	U	GA	FDOT
1	Immokalee Regional Airport	U	GA	FDOT
1	La Belle Municipal	U	GA	FDOT
1	Lake Wales Municipal	U	GA	FDOT
1	Marco Island	U	GA	FDOT
1	Okeechobee County	U	GA	FDOT
1	Wauchula Municipal	U	GA	FDOT
1	Winter Havens Gilbert	U	GA	FDOT
2	Cross City	U	GA	FDOT
2	George T. Lewis	U	GA	FDOT
2	Kay Larkin	U	GA	FDOT
2	Keystone Airpark	U	GA	FDOT
2	Lake City Municipal	NU	GA	FDOT
2	Perry-Foley	U	GA	FDOT
2	Suwannee County Airport	U	GA	FDOT
2	Williston Municipal	NU	GA	FDOT
3	Apalachicola Municipal	U	GA	FDOT
3	Bob Sikes	NU	GA	FDOT
3	Carrabelle-Thompson	U	GA	FDOT
3	DeFuniak Springs	U	GA	FDOT
3	Destin-Ft Walton Beach	U	GA	FDOT
3	Marianna Municipal	U	GA	FDOT
3	Quincy-Gadsden Airport	U	GA	FDOT
3	Tri-County Airport	U	GA	FDOT
4	Belle Glade State Municipal	U	GA	FDOT
5	Dunnellon/Marion County	U	GA	FDOT
5	Ocala International - Jim Taylor Field	NU	GA	FDOT
5	Umatilla Municipal	U	GA	FDOT
5	Valkaria	U	GA	FDOT
7	Crystal River	U	GA	FDOT
7	Inverness	U	GA	FDOT

Abbreviations
U = utility
NU = non-utility
C = commercial
NPIAS = National Plan of Integrated Airport Systems
GA = general aviation
RL = regional reliever
PR = primary

Table 3: FDOT Assisted Inspection Group

District	Airport Name	1992-1999 AIRPAV Class	NPIAS	Flexible Response
1	Lakeland Linder Regional	NU	RL	FDOT Assisted
1	Sebring Regional	NU	GA	FDOT Assisted
2	Fernandina Beach Municipal	NU	RL	FDOT Assisted
2	Gainesville Regional	NU	PR	FDOT Assisted
2	St. Augustine	NU	RL	FDOT Assisted
3	Pensacola Regional	C	PR	FDOT Assisted
4	North Palm Beach County General Aviation	U	RL	FDOT Assisted
4	North Perry	U	RL	FDOT Assisted
4	Palm Beach County Glades		GA	FDOT Assisted
4	Palm Beach County Park	U	RL	FDOT Assisted
4	Pompano Beach Airpark	NU	GA	FDOT Assisted
4	Sebastian Municipal	U	GA	FDOT Assisted
4	St. Lucie County International	NU	GA	FDOT Assisted
4	Witham Field	NU	GA	FDOT Assisted
5	Arthur Dunn Airpark	U	GA	FDOT Assisted
5	Flagler County	U	GA	FDOT Assisted
5	Kissimmee Gateway	NU	RL	FDOT Assisted
5	Leesburg Regional	U	GA	FDOT Assisted
5	Merritt Island	U	GA	FDOT Assisted
5	New Smyrna Beach Municipal	U	RL	FDOT Assisted
5	Space Coast Regional	NU	GA	FDOT Assisted
6	The Florida Keys Marathon	NU	RL	FDOT Assisted
7	Albert Whitted Municipal Airport	U	RL	FDOT Assisted
7	Clearwater Airpark	U	RL	FDOT Assisted
7	Hernando County	U	GA	FDOT Assisted
7	Zephyrhills Municipal	U	GA	FDOT Assisted

Abbreviations
U = utility
NU = non-utility
C = commercial
NPIAS = National Plan of Integrated Airport Systems
GA= general aviation
RL = regional reliever
PR = primary

Table 4: Self Inspection Group

District	Airport Name	1992-1999 AIRPAV Class	NPIAS	Flexible Response
1	Naples Municipal	NU	PR	Self
1	Page Field	NU	GA	Self
1	Sarasota/Bradenton International	C	PR	Self
1	Southwest Florida International	NU	PR	Self
1	Venice Municipal	NU	GA	Self
2	Cecil Field	C	RL	Self
2	Craig Municipal	NU	RL	Self
2	Herlong	U	RL	Self
2	Jacksonville International	C	PR	Self
3	Panama City-Bay County International	C	PR	Self
3	Peter Prince Field	U	GA	Self
3	Tallahassee Regional	C	PR	Self
4	Boca Raton	NU	RL	Self
4	Fort Lauderdale Executive	NU	RL	Self
4	Fort Lauderdale-Hollywood International	C	PR	Self
4	Palm Beach International	C	PR	Self
4	Vero Beach Municipal	NU	RL	Self
5	Daytona Beach International	C	PR	Self
5	DeLand Municipal Airport - Sidney H. Taylor Field	NU	RL	Self
5	Executive Airport	NU	RL	Self
5	Melbourne International	C	PR	Self
5	Orlando International		PR	Self
5	Orlando Sanford International	NU	PR	Self
5	Ormond Beach Municipal	U	RL	Self
5	St. Petersburg-Clearwater International	C	PR	Self
6	Dade-Collier Training and Transition	NU	GA	Self
6	Homestead General Aviation	U	GA	Self
6	Kendall-Tamiami Executive	U	RL	Self
6	Key West International	NU	PR	Self
6	Miami International		PR	Self
6	Opa Locka	NU	RL	Self
6	Opa Locka West	U	GA	Self
7	Peter O Knight	U	RL	Self
7	Plant City Municipal	U	GA	Self
7	Tampa International	C	PR	Self
7	Vandenberg Airport	U	RL	Self

Abbreviations
U = utility,
NU = non-utility,
C = commercial
NPIAS = National Plan of Integrated Airport Systems
GA= general aviation
RL = regional reliever
PR = primary

Table 5: NETWORK LEVEL ANALYSIS FOR FDOT PAVEMENT MANAGEMENT PROGRAM

AC

TOTAL NUMBER OF SAMPLE UNITS	NUMBER OF SAMPLE UNITS TO BE INSPECTED	
	Runway	Others
BETWEEN 1-4	1	1
BETWEEN 5-10	2	1
BETWEEN 11-15	3	2
BETWEEN 16-30	5	3
BETWEEN 31-40	7	4
BETWEEN 41-50	8	5
≥ 51	20% but ≤ 20	10% but ≤ 10

PCC

TOTAL NUMBER OF SAMPLE UNITS	NUMBER OF SAMPLE UNITS TO BE INSPECTED	
	Runway	Others
BETWEEN 1-3	1	1
BETWEEN 4-6	2	1
BETWEEN 7-10	3	2
BETWEEN 11-15	4	2
BETWEEN 16-20	5	3
BETWEEN 21-30	7	3
BETWEEN 31-40	8	4
BETWEEN 41-50	10	5
≥ 51	20% but ≤ 20	10% but ≤ 10

Table 6: Example M&R Recommendations for Airport A

Airport	Branch Use	Branch Name	Section ID	Surface Type	Plan Year	PCI before Maint	Maint. Type*	PCI after Maint.	Cost ($)
A	RUNWAY	17-35	276	AC	2004	63	Major	100	29965
A	RUNWAY	17-35	275	AC	2004	75	Local	81	2960
A	RUNWAY	17-35	275	AC	2005	81	Local	86	2400
A	RUNWAY	17-35	275	AC	2006	86	Local	90	2400
A	RUNWAY	17-35	276	AC	2006	96	Local	99	13600
A	RUNWAY	17-35	275	AC	2007	90	Local	94	2400
A	RUNWAY	17-35	276	AC	2007	99	Local	100	13600
A	TAXIWAY	TW1	277	AC	2004	72	Prev	72	608
A	TAXIWAY	TW1	277	AC	2005	72	Prev	72	608
A	TAXIWAY	TW1	277	AC	2006	72	Prev	72	608
A	TAXIWAY	TW1	277	AC	2007	72	Prev	72	608
A	APRON	1	278	AC	2004	68	Local	77	6314
A	APRON	1	278	AC	2005	77	Local	82	4614
A	APRON	1	278	AC	2006	82	Local	85	4048
A	APRON	1	278	AC	2007	85	Local	87	4048

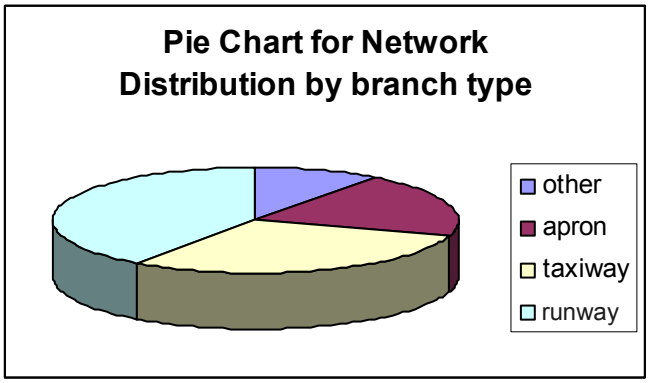
*maint type: major = major construction/replacement/overlay
local = localized repairs such as crack sealing and localized patches
prev = preventative minor maintenance such as periodic replacement of PCC joint sealants, surface sealcoats for asphalt pavements etc.

Note* general maintenance type must be defined in specification format

Table 7: Example PCI Summary Table by Airport

Airport Name	Airport ID	Branch Name	Total Area(sq.yds.)	Insp. Area(sq.yds.)	Insp. Coverage(%)	2005	2006	2007	2008	2009
A			80000	80000	100	15	3	0	0	0
B			120000	120000	100	40	39	39	38	37
C			12000	12000	100	43	41	39	37	35
D			19444	19444	100	45	44	42	41	39
E			26667	26667	100	46	45	43	42	41
F			17222	17222	100	60	60	60	59	59
G			103328	103328	100	68	67	66	66	65
H			71333	71333	100	69	65	60	54	47
I			35000	35000	100	70	68	66	64	64
J			24133	24133	100	70	68	67	65	64
K			45833	45833	100	71	67	63	57	51
L			66667	66667	100	77	75	73	72	70
M			35833	35833	100	84	80	76	73	70
N			41667	41667	100	85	81	78	74	71
O			34167	34167	100	88	87	87	85	84
P			2778	556	20	100	95	91	86	82

Table 8: Sample Statewide Summary Report



- **General Information organized for Branch Types (Aprons)**

Number of Apron Branches:	104
Number of Inspected Apron:	65
Total Apron Area (sq.yds.):	1609426
Total Area of Inspected Apron Sections (sq.yds.):	345084
Inspection Coverage:	21%

	2005	2006	2007	2008	2009
Area Weighted PCI branch type Apron	100	95	90	85	80

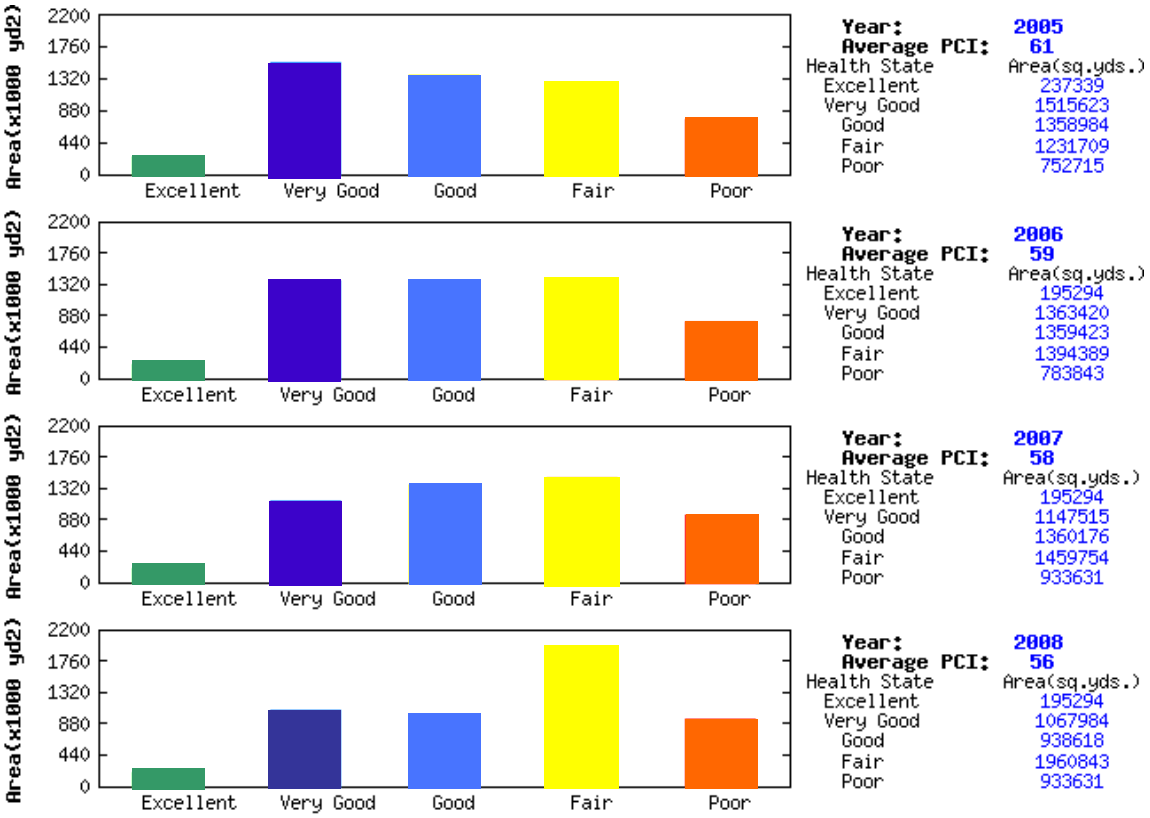
- **General Information organized for Branch Types (Runways)**

Similar to apron

- **General Information organized for Branch Types (Taxiways)**

Similar to apron

Table 9: PCI Distribution 5-Year Area-Weighted Network Entire System



5-Year Area-Weighted Network PCI Forecasts Entire System

Year	Average PCI	Health State
2004	63	Good
2005	61	Good
2006	59	Fair
2007	58	Fair
2008	56	Fair

PCI Legend

	86 – 100	Excellent
	71 – 85	Very Good
	56 – 70	Good
	41 – 55	Fair
	26 – 40	Poor
	11 – 25	Very Poor
	0 – 10	Failed

APPENDIX A

WEBSITE AND FAD INTERFACE IMPLEMENTATION DETAILS

Website and FAD Interface Implementation Details

Program Design Requirements

The purpose of the Design Requirements task is to determine the user needs and application specifications. These enable the development team to verify that the application will fulfill the needs of the users and that all needs identified are complete and correct. A FDOT Aviation Pavement Management Team workgroup will be formed to evaluate the design requirements for completeness. The Information Technology Consultant for Aviation will identify areas of overlap with other applications. For areas of overlap, an integration analysis will be conducted during the development planning.

User Requirements

The users' needs will be determined and it is at this stage that information needs and functions will be identified. Interviews, workshops and online open-issue forums may be used to assist in identifying the users' requirements. The results of this task will include the identification of the functional requirements, input requirements, output requirements and procedures that define how the information must flow through the functions of the developed application.

An application-specific FDOT Aviation Pavement Management Team workgroup will be defined and organized by the Information Technology Consultant and FDOT. This Workgroup is responsible for assisting in the design and functionality of the application as well as for testing and evaluating the functionality of the system before it is released to the general user population. The Workgroup is responsible for testing the technical efficiency and integrity of the application and verifying that it meets the users' functional requirements. The FDOT Aviation Office Program Manager is responsible for approving the application after testing and verification.

Data Requirements

This task involves the identification of the available data to meet the users' application-specific data needs. Data availability and format for existing data will be extracted from the Florida Aviation Database Information Standards. New data required specifically by the application will be identified and the Information Standards will be updated to reflect the new data with the Aviation Office's MetaFAD and Data Dictionary.

Infrastructure Requirements

The system specifications and limitations for the designated application platform will be selected from the Aviation Information Standards. The results of this task will include the identification of infrastructure needs, the transition needs from the existing systems, and constraints of the Aviation Information Standards upon this specific application. This will require meeting with OIS personnel from the Central and each District office to determine the intra-agency connection requirements and meeting with the Central Office OIS personnel to identify the interagency and public access connection and infrastructure requirements.

Security Requirements

Based upon the user, data, and infrastructure requirements identified, the security requirements will be identified and discussed with Department security. A user access schema will be developed identifying the access rights and privilege levels of various user levels. Security risks to data integrity will also be evaluated and documented.

Development Plan

The purpose of the development plan is to convert all of the logical requirements gathered in the Design Requirements task into physical specifications. The development plan will include all the information necessary to develop a working system during the application development. If data exist in electronic format, which will need to be converted for use by the application, then data conversion will be included in the plan.

Interface Prototypes

Graphical user interface prototypes will be prepared which meet the design and functional requirements identified. These prototypes will be presented to the FDOT Aviation Pavement Management Team workgroup for review. These prototypes will be reviewed and approved by the FDOT Aviation Office Program Manager. The prototypes will illustrate the interface design and proposed functionality. Examples of interface prototypes include screens, forms, dialogs, and input mechanisms.

Output Prototypes

Output prototypes will be prepared which meet the design and functional requirements identified. These prototypes will be presented to the FDOT Aviation Pavement Management Team workgroup for review. These prototypes will be reviewed and approved by the FDOT Aviation Office Program Manager. The output prototypes may include reports, graphs, maps, queries, file structures or web pages as examples.

Development plan

The application Development Plan will be developed to include the design requirements, the approved interface and output prototypes, development schedule and an implementation strategy. The development plan will be presented as a power point presentation, or Web site mockup to the Aviation Pavement Management Team at a Project Team Meeting. The review groups should ensure that the design is within the scope and time frame of the project and may decide to modify the scope and time frame if necessary. Upon approval by the FDOT Aviation Office, the project will move to the development process.

Data Development and Population

The Information Technology Consultant team will transform the development plan into a system representing the physical tables, which will be accessed by the application. This is the physical schema design. The physical data structures required will be created. All data development shall be reviewed, identified and included/updated into the Aviation Office's MetaFAD and Data Dictionary program or Aviation Pavement Management Web site based on the audience of the application.

Existing data will be transitioned from existing systems, if available. Any new data necessary will be entered. The data will be verified and tested by the Information Technology Consultant and/or selected project team members users using data verification routines developed by the FDOT Aviation Pavement Management Team workgroup. Data will be selected by the Information Technology Consultant for the application test cases.

Application Development

Software architecture and integration

The variables and system architecture required for application integration will be identified by the Aviation Pavement Management Team during the Design Requirements task will be created and used as a base for the alpha design. The FDOT Aviation Office Program Manager is responsible for reviewing and approving the variables and system architecture required for application integration.

Alpha Design

The actual coding and application development will occur. During the development, close coordination with the FDOT Aviation Pavement Management Team workgroup will be maintained. The application will be reviewed on a regular basis to ensure that the product meets the Workgroup's expectations. Modifications to the application will take place during this phase to modify and correct any problems identified. The application will be reviewed and tested by the development team to eliminate programming errors if possible.

Beta Design

Coding modifications required by the alpha level testing will be made. In order to accurately ascertain how the application will perform in production, the beta application will resemble the actions of production as close as possible. The beta testing plan will be finalized. The plan defines who will participate, where and when the beta testing will occur, how test results will be recorded and transmitted back to the development team and what will be the length of the testing period.

The beta users, selected from the Users' Workgroup, will be provided an application training session. Training will ensure that the application testing will examine and experiment with all aspects of the application. Each process will be evaluated with the expected and unexpected data entered. The application will be tested for efficiency, functionality, security and integration across the designated operating systems and platforms. The beta design software will be delivered to the beta testers for review and comment at the training session.

Final Release

Application and coding modifications resulting from the beta testing will be made. Upon final approval from the FDOT Aviation Office Program Manager, the final release of the software will be released with access to the appropriate data to be provided following application training.

Deliverables

Beta Release Software
Final Release Software

User Training

An application user training program will be developed including all appropriate software, training facility hardware specifications, and training materials in reproducible format. The instruction team will be selected from the Aviation Pavement Management Team, and any outside source as deemed necessary. An application user training course will be conducted and all necessary instruction, facilities, and materials will be provided. Reproducible copies of the training materials and the course curriculum will be provided to the Aviation Office Training Staff Person for use in future courses.

Deliverables

User Training
Training Materials, as required

Documentation

Complete documentation for the application and the process will be delivered to the FDOT Aviation Office. Documentation includes such items as program items, data structures/ relationships, variable listings, and procedure/method calls.

Deliverables

Application Documentation

Maintenance

Identification of procedures for ongoing maintenance of the application will be provided to the FDOT Aviation Office. This will identify such issues as the need for support for corrective changes contained within a warranty period, support for corrective changes outside of a warranty period, and enhancements to the application. The procedure will include the steps required to identify and report desired changes; approve work on change requests; implement the change; approve the completed change; and put the changed application into production. In addition, any documentation requiring modification will also be updated.

APPENDIX B

JOB SAFETY ANALYSIS DEVELOPMENT GUIDELINES

INSTRUCTIONS FOR COMPLETING JOB SAFETY ANALYSIS FORM

SEQUENCE OF BASIC JOB STEPS

Break the job down into steps. Each of the steps of a job should accomplish some major task. The task will consist of a set of movements. Look at the first set of movements used to perform a task, and then determine the next logical set of movements. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. How does that break down into job steps? Picking up the box from the conveyor and putting it on a hand truck is one logical set of movements, so it is one job step.

The next logical set of movements might be pushing the loaded hand truck to the storeroom. Removing the boxes from the truck and placing them on the shelf is another logical set of movements. And finally, returning the hand truck to the receiving area might be the final step in this type of job.

Be sure to list all the steps in a job. Some steps might not be done each time-checking the casters on a hand truck, for example. However, the task is a part of the job as a whole, and should be listed and analyzed.

POTENTIAL HAZARDOUS

Identify the hazards associated with each step. Examine each step to find and identify hazards-actions, conditions and possibilities that could lead to an accident.

It's not enough to look at the obvious hazards. It's also important to look at the entire environment and discover every conceivable hazard that might exist.

Be sure to list health hazards as well, even through the harmful effect may not be immediate. A good example is the harmful effect of inhaling a solvent or chemical dust over a long period of time.

It's important to list all hazards. Hazards contribute to accidents, injuries and occupational illnesses.

In order to do part three of a JSA effectively, you must identify potential and existing hazards. That's why it's important to distinguish between a hazard, an accident and an injury. Each of theses terms has a specific meaning:

HAZARD—A potential danger. Oil on the floor is a hazard.

ACCIDENT—An unintended happening that may result in injury, loss or damage. Slipping on the oil is an accident.

INJURY—The result of an accident. A sprained wrist from the fall would be an injury.

Some people find it easier to identify possible accidents and illnesses and work back from them to the hazards. If you do that, you can list the accident and illness types in parentheses following the hazard. But be sure you focus on the hazard for developing recommended actions and safe work procedures.

RECOMMENDED ACTION OR PROCEDURE

Using the first two columns as a guide, decide which actions are necessary to eliminate or minimize the hazards that could lead to an accident, injury, or occupational illness.

Among the actions that can be taken are:

1) engineering the hazard out 2) providing personnel protective equipment; 3) job instruction training; 4) good housekeeping; and 5) good ergonomics (positioning the person in relation to the machine or other elements in the environment in such a way as to eliminate stresses and strains).

List recommended safe operating procedures on the form, and also list required or recommended personal protective equipment for each step of the job.

Be specific. Say exactly what needs to be done to correct the hazard, such as "lift, using your leg muscles." Avoid general statements like, "be careful."

Give a recommended action or procedure for every hazard.

If the hazard is a serious one, it should be corrected immediately. The JSA should when be changed to reflect the new conditions.

JOB SAFETY ANALYSIS	Name of Job:	JSA No:	Page of	Date:	☐ New ☐ Revised
	Title of Person who does job:	Supervisor:		Prepared by:	
Company/Organization:	Location:	Department:		Reviewed by:	
Required and/or recommended Personal Protective Equipment:					

Sequence and Description of Basic Job Steps	Potential Hazards	Recommended Action or Procedure
Date of field verification:	Names of personnel performing activities:	