2012 Washington-Wilkes County Airport Pavement Management Plan

Preserving Georgia's Critical Airport Pavement Infrastructure

GEORGIA AIRPORTS
MEAN BUSINESS

Acknowledgement

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WASHINGTON-WILKES COUNTY AIRPORT

PAVEMENT MANAGEMENT REPORT

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INTRODUCTION

In 2012, the Georgia Department of Transportation – Aviation Programs (the Department), selected Applied Pavement Technology, Inc. (APTech), assisted by CDM Smith, to update its statewide airport pavement management system (APMS). This study will provide airports and the State with pavement information and analytical tools to help identify pavement related needs, optimize selection of individual airport projects over a multi-year period, and evaluate the long-term impacts of project priorities.

As part of this study, pavement conditions at Washington-Wilkes County Airport were assessed in 2012 using the pavement condition index (PCI) procedure. The results of that evaluation are presented within this report and can be used by the Department, the Federal Aviation Administration (FAA), and Washington-Wilkes County Airport to monitor the condition of airfield pavements and to identify, prioritize, and schedule pavement maintenance and rehabilitation (M&R) actions at the airport.

During a PCI inspection, the types, severities, and amounts of distress present in a pavement are visually quantified. This information is then used to develop a composite index that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent). The PCI number is a measure of overall condition and is indicative of the level of work that will be required to maintain or repair a pavement. Further, the information provides insight into the cause of pavement deterioration, which is the first step in selecting the appropriate repair action.

Programmed into an APMS, PCI information is used to determine when preventive maintenance actions, such as crack sealing, are advisable and also identifies the most cost-effective time to perform major rehabilitation, such as an overlay. The importance of identifying not only the type of repair but also the optimal time of repair is illustrated in Figure 1. There is a point in a pavement's life cycle where the rate of deterioration increases and the financial impact of delaying repairs beyond this point can be severe.

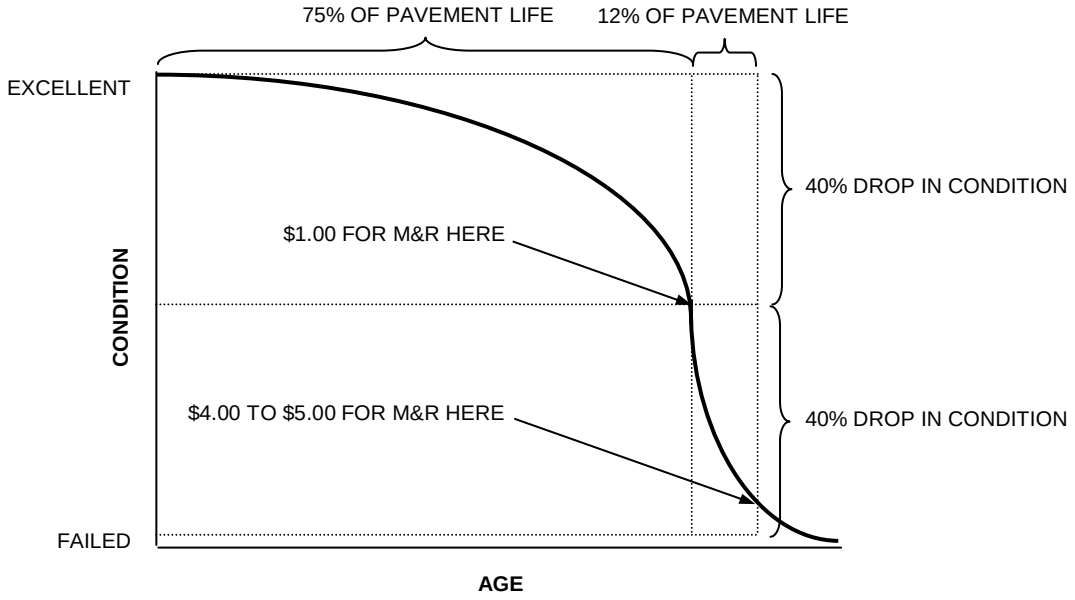


Figure 1. Pavement Condition versus Cost of Repair.

This study collected pavement history information, developed CAD maps, evaluated current pavement condition, and updated the Department's APMS. The APMS was used to prepare a 5-year pavement M&R program. Individual reports, such as this one, have been prepared for each individual airport as well as a statewide analysis report and an executive summary report in order to convey the study results.

METHODOLOGY

The study consists of three major work elements: records review and network definition; pavement condition evaluation; and the development of an M&R plan for the preservation of the pavement infrastructure. Detail of each work element is further described below.

Records Review and Network Definition

The first activities undertaken involved gathering historical airfield pavement data, which includes date of original construction and date of any subsequent rehabilitation; location of completed work; and the type of work undertaken.

The historical data is used to divide the pavement system into management units – branches, sections, and sample units. A branch is a single entity that serves a distinct function. For example, a runway is considered a branch because it serves a single function (allowing aircraft to take off and land). Taxiways and aprons are also separate branches.

A branch is further divided into sections. A section is considered the management unit of the APMS, and represents a pavement area where pavement maintenance or rehabilitation would be undertaken. For example, if a runway was built in 1968 and then extended and overlaid in 1984, this runway might be represented by a single section, even though there are two distinct construction periods. However, if the condition of one part of the runway was significantly different than another the branch would be divided into two sections because in that situation the runway may not be repaired as a whole in the future.

To estimate the overall condition of each pavement section, each section is subdivided into sample units. A percentage of these sample units are then evaluated during pavement inspections, and the condition information is extrapolated to predict the condition of the section as a whole.

Pavement Evaluation Procedure

Pavements were evaluated at Washington-Wilkes County Airport using the PCI procedure. This procedure is described in FAA Advisory Circular (AC) 150/5380-6B, *Guidelines and Procedures for Maintenance of Airport Pavements* and American Society for Testing and Material (ASTM) Standard D5340-11, *Standard Test Method for Airport Pavement Condition Index Surveys*.

The PCI provides a numerical indication of overall pavement condition, as illustrated in Figure 2. The types and amounts of deterioration are used to calculate the PCI value of the section. The PCI ranges from 0 to 100, with 100 representing a pavement in excellent condition. It should be noted that a PCI value is based on visual signs of pavement deterioration and does not provide a measure of structural capacity.

Typical Pavement Surface[1]	PCI
	100
	60
	20

[1]Photographs shown are not specific to Washington-Wilkes County Airport.

Figure 2. Visual Representation of PCI Scale.

In general terms, pavements with a PCI greater than 70 that are not exhibiting significant load-related distress will benefit from preventive maintenance actions, such as crack sealing and surface treatments. Pavements with a PCI of 40 to 70 may require major rehabilitation, such as an overlay. Often, when the PCI is less than 40, reconstruction is the only viable alternative due to the substantial damage to the pavement structure. Figure 3 illustrates how repair type varies with the PCI of a pavement section.

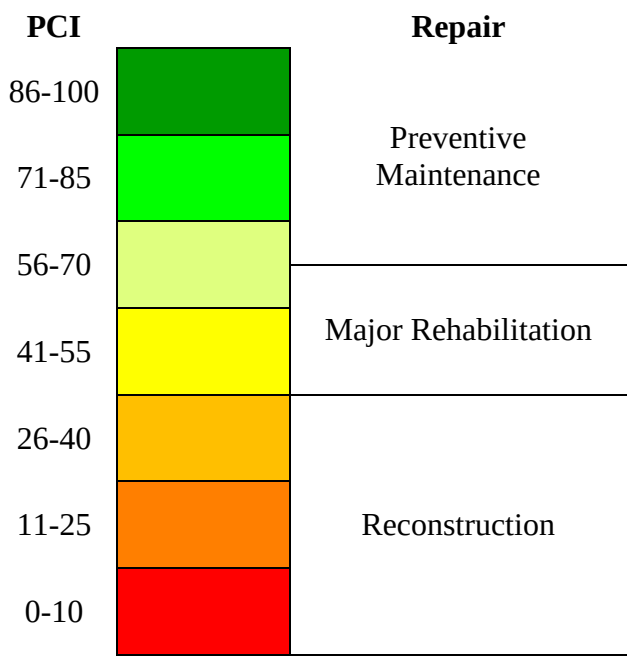


Figure 3. PCI versus Repair Type.

The types of distress identified during the PCI inspection provide insight into the cause of pavement deterioration. PCI distress types are characterized as:

- **Load-related** – These distress types are defined as being caused by aircraft or vehicular traffic and may provide an indication of a structural deficiency. Examples of load-related distresses include alligator cracking on hot-mix asphalt (HMA) pavements and corner breaks on portland cement concrete (PCC) pavements,

- **Climate/durability-related** – These distress types often signify the presence of aged and/or environment-susceptible material and include durability-related issues. Examples of climate/durability-related distresses include weathering, which is climate-related, on HMA pavements and durability cracking, which is durability-related, on PCC pavements, and

- **Other** – Distress types that fall into this category cannot be attributed solely to load or climate/durability. Examples of this type of distress include depressions on HMA pavements and shrinkage cracking on PCC pavements.

Understanding the cause of distress helps in selecting a rehabilitation alternative that corrects the cause and thus eliminates its recurrence.

Appendix A contains tables for asphalt and PCC pavements indicating the typical types of distresses that may be identified during a PCI survey, the likely cause of each distress type, and feasible maintenance strategies for addressing each distress type.

Paint Markings Evaluation Procedure

The condition of the paint markings was evaluated for each section at Washington-Wilkes County Airport. The markings were rated as "satisfactory" or "non-satisfactory" based on whether the markings were visible and the paint and reflectivity appeared intact. Following is a short description of each category:

- Not Applicable (N/A): No paint markings exist to rate.
- Satisfactory (SAT): Markings that are still visible and in good condition, requiring no maintenance or remarking.
- Non-satisfactory: Markings that require maintenance or remarking in the near future and any of the following conditions are present:
  - Paint is faded to the point where markings are not easily visible from a distance (U-FA).
  - Paint is flaking off the surface or has worn to point that portions of the painted surface no longer have paint on them (U-CH).
  - Painted areas have a large amount of superficial cracking within their limits, degrading the integrity of the painted area and reducing its visibility (U-CR).

Development of Maintenance and Rehabilitation Program

Using the information collected during the 2012 pavement inspection, an M&R program for 2013 through 2017 was developed. The MicroPAVER™ pavement management software was used to perform this analysis.

Analysis Parameters

Several parameters were defined prior to running the analysis, and are further explained below.

Critical PCI Values

MicroPAVER™ uses critical PCI values to determine whether preventive maintenance or major rehabilitation is the appropriate repair action. Above the critical PCI, localized (such as crack sealing) and global (such as a slurry seal) preventive maintenance activities are recommended. Below the critical PCI, major rehabilitation (such as an overlay or reconstruction) is recommended. The Department set the critical PCI values shown in Table 1.

Table 1. Critical PCI Values.

Airport Classification	Runway	Taxiway/ T-Hangar	Apron/Helipad
General Aviation	70	60	60
Commercial Service	75	65	65

Budget and Inflation Rate

An unlimited budget and an inflation rate of 3 percent were used during the analysis.

Maintenance Policies

Localized preventive maintenance policies and global preventive maintenance policies were developed for the Department. Localized maintenance policies, shown in Appendix D, identify the localized maintenance actions that the Department consider appropriate to correct different distress types when the PCI of the pavement is above the critical PCI level.

Global maintenance actions were also considered in the analysis. These are treatments that are applied over an entire section, rather than just to distressed areas. Rejuvenators were considered for pavements that are more than 5 years old with a PCI value greater than 80. Rejuvenators were only applied once during the analysis period to eligible sections.

Unit Costs

Unit costs for maintenance treatments and major rehabilitation actions are presented in Appendix D. For general aviation airports, the costs were separated by geographic regions. MicroPAVER™ estimates the cost of major rehabilitation based on the PCI of the pavement. If major rehabilitation is recommended in the program, further engineering investigation will be needed to identify the most appropriate rehabilitation action and to more accurately estimate the cost of such work.

Analysis Approach

The goal of the M&R program is to maintain the pavements above established critical PCI values. Major rehabilitation was recommended for pavements in the year they dropped below their critical PCI value for 2013 through 2017.

For 2013, a localized preventive maintenance plan was developed for those pavement sections that were above their critical PCI value. If major rehabilitation was triggered for a section in 2014 or 2015, then localized maintenance was not recommended for 2013. It was assumed that all low-severity cracking would need to be resealed in 2017 unless major rehabilitation was triggered on the section. No other maintenance activities, other than crack sealing, were considered for year 2017.

RESULTS

Pavement Inventory

Washington-Wilkes County Airport has over 498,560 square feet of pavement, as shown in Figure 4. Figure 5 is a network definition map of the airport showing the pavement system broken down into management units, as described on page 3 of this report. It also shows the nomenclature used in the MicroPAVER™ pavement management database to identify the different pavement areas. Additionally, the map summarizes the construction history information compiled during the records review and identifies the areas inspected during the visual survey.

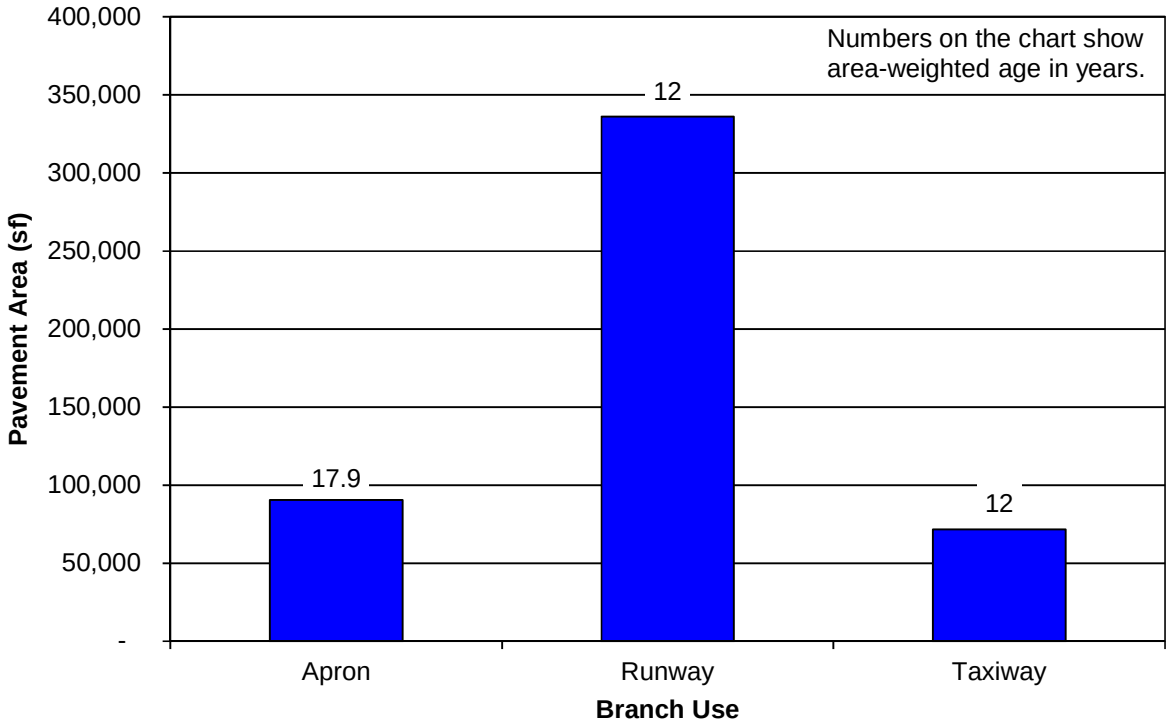
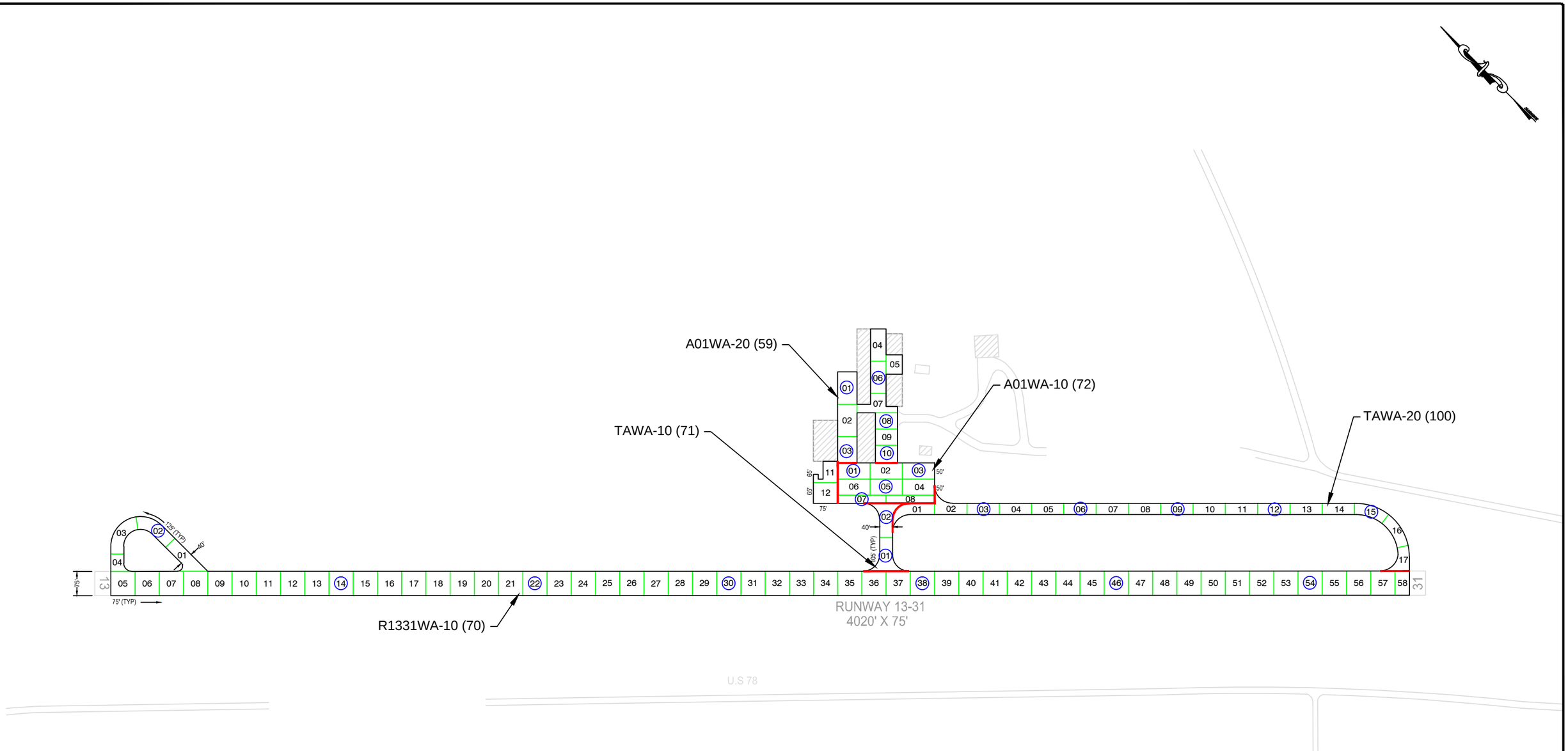


Figure 4. Pavement Inventory.



NETWORK DEFINITION LEGEND

RW1533AL-10 (77)
- BRANCH IDENTIFIER
- SECTION IDENTIFIER
- PCI VALUE

- SECTION BREAK LINE
- SAMPLE UNIT BREAK LINE
- SLAB JOINT
- 03 SAMPLE UNIT NUMBER
- 03 SAMPLE UNIT INSPECTED
- 03 ADDITIONAL SAMPLE UNIT

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AGENCY: Georgia Department of Transportation Aviation Programs			
LOCATION: Washington - Wilkes County Airport, Washington, GA			
PAGE TITLE: NETWORK DEFINITION MAP			
PROJECT DATE: NOV. 2011	CREATION DATE: NOV. 2011	PROJECT MANAGER: MRC	JOB NUMBER: 09-067-AM01
DRAWING SCALE: 1"= 300'	LAST MODIFIED DATE: APR. 2012	REVISED BY: TMM	DRAWN BY: TMM
FILENAME: Washington.dwg		LAYOUT NAME/NUMBER: NET. DEF.	FIGURE: 5

Pavement Evaluation and Paint Assessment

The inspection of Washington-Wilkes County Airport was completed on March 17, 2012 using the PCI procedure described previously. The map presented in Figure 5 identifies the sample units inspected during the pavement evaluation.

Inspection Comments

Five pavement sections were defined during the inspection. A crack sealing project was completed in 2010 on the runway, taxiway, and main part of the apron. The majority of the low-severity cracking was sealed with smaller amounts of unsealed cracking; all medium-severity cracking was due to unsatisfactory crack sealant.

Runway 13-31

Runway 13-31 was comprised of one section with a PCI value of 70. The primary distresses identified in Section 10 were low-severity longitudinal and transverse (L&T) cracking and weathering. In addition, low-severity patching and swelling were observed in smaller quantities.

Taxiway

Taxiway A was defined by two sections. Section 10 had a PCI value of 71. The primary distresses identified in this section were low-severity L&T cracking and weathering. Medium-severity L&T cracking was also recorded in smaller quantities. Section 20 was constructed in 2007 and was in excellent condition with a PCI value of 100. No distresses were observed at the time of inspection.

Apron

The apron area consisted of two sections. Section 10 was comprised of the main apron area and had a PCI value of 72. Moderate amounts of low-severity L&T cracking were recorded throughout this section. Section 20 consisted of T-Hangar areas behind the main apron area and had a PCI value of 59. The primary distresses identified in this section were low-severity L&T cracking and medium-severity weathering. In addition, moderate amounts of medium-severity alligator cracking, low- and medium-severity patching, and medium-severity L&T cracking were observed. No crack sealing was performed in this section; therefore, all low-severity cracking was unsealed, and medium-severity cracking was due to either crack widths exceeding ¼ inch or the development of secondary cracking.

Overall Condition

The 2012 area-weighted condition of Washington-Wilkes County Airport is 73, with conditions ranging from 59 to 100 [on a scale of 0 (failed) to 100 (excellent)]. This compares to a 2007 PCI of 67.

Figures 6 and 7 provide graphs summarizing the overall condition of the pavements at Washington-Wilkes County Airport. Figure 8 is a map that displays the condition of the pavements evaluated. Table 2 summarizes the results of the pavement evaluation and paint assessment and also presents both the 2007 and 2012 PCI values. Please note that modifications have been made to the PCI methodology since the time of the last pavement inspection in 2007, as detailed in ASTM 5340-11. These changes include the separation of the raveling and weathering distress type on asphalt-surfaced pavements into two distress types along with the addition of the alkali silica reaction (ASR) distress type on PCC pavements.

Appendix B presents photographs taken during the PCI inspection, and Appendix C contains a detailed inspection report. The detailed inspection report provides information on the quantity of the different types and severities of distresses observed during the visual survey.

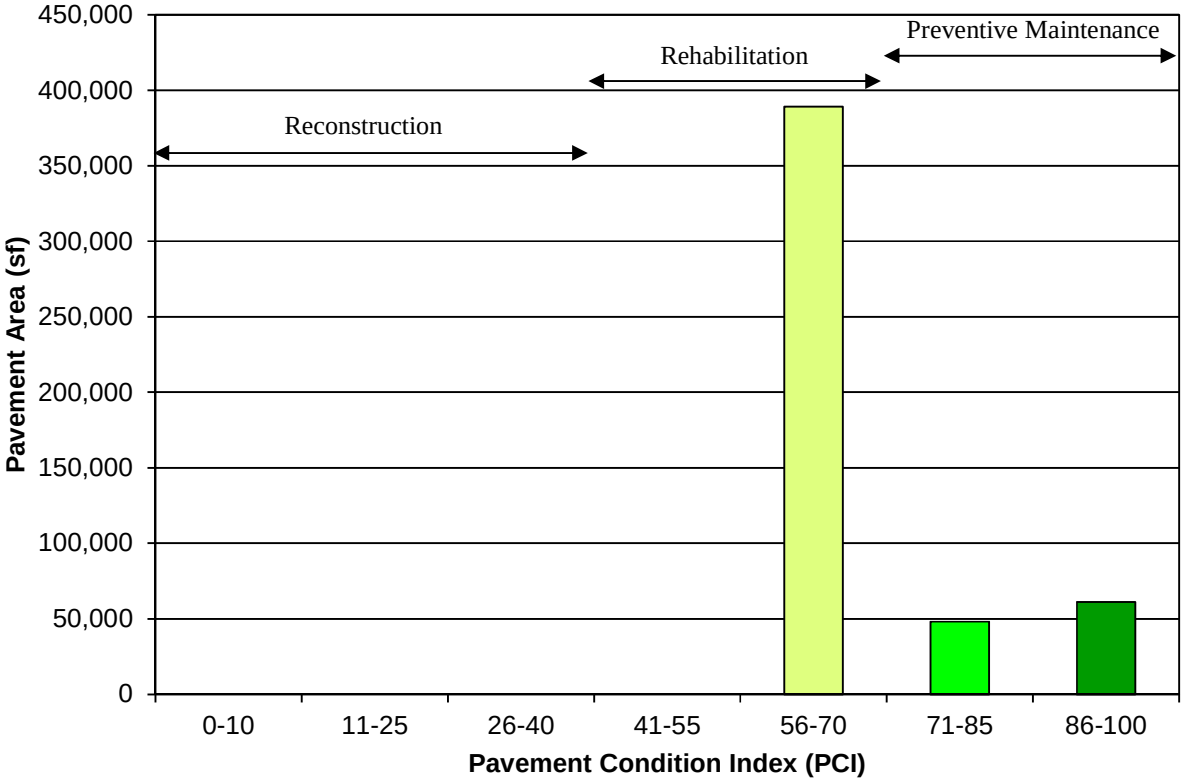


Figure 6. Condition Distribution.

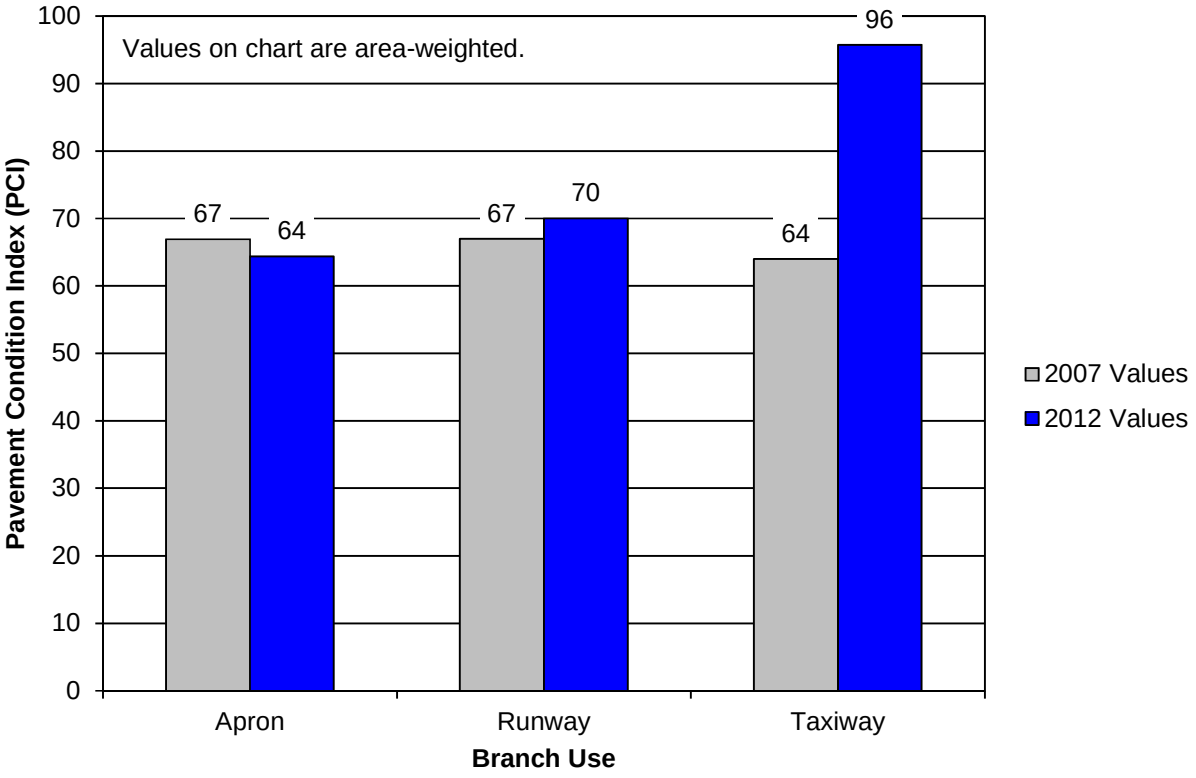
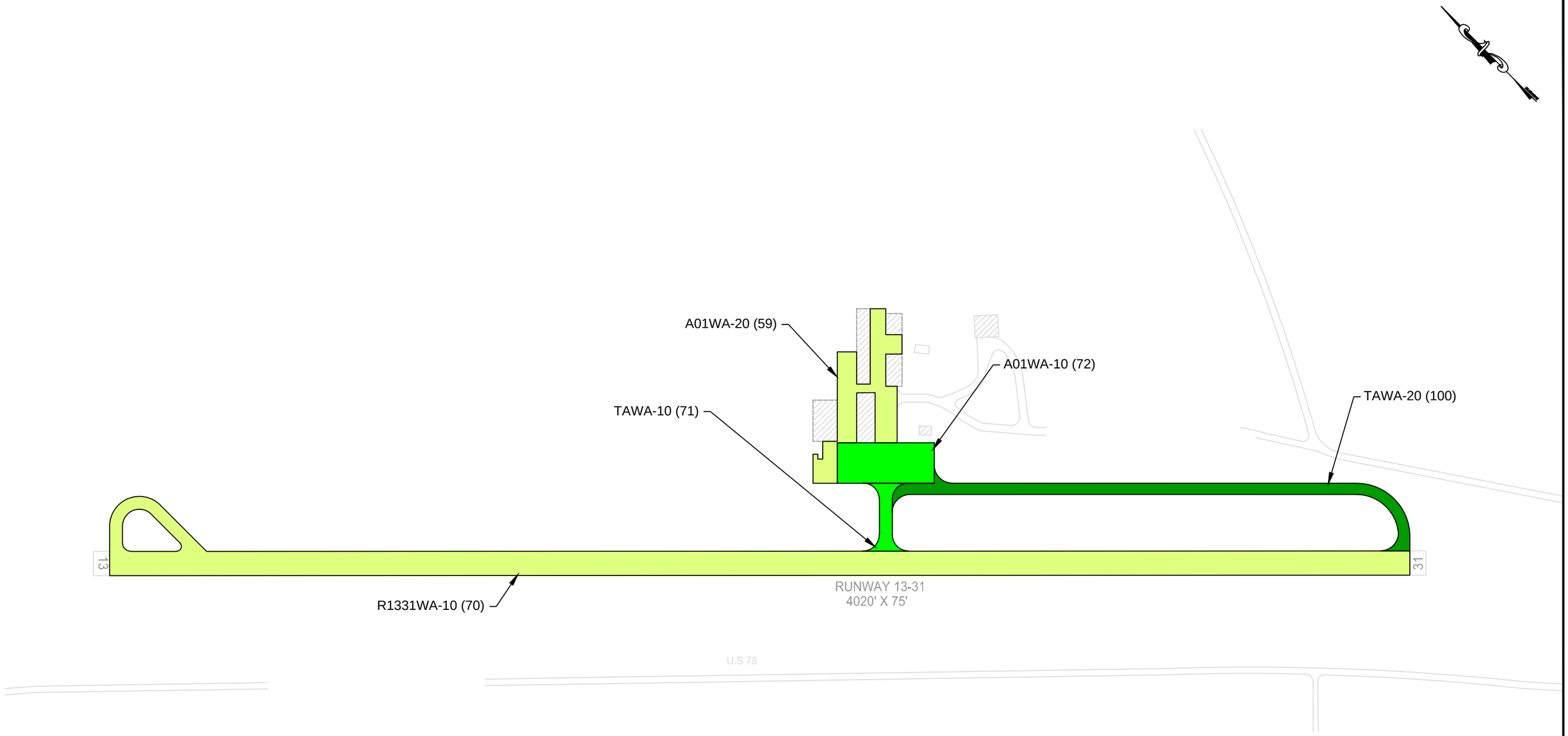


Figure 7. Condition by Use.



LEGEND

BRANCH IDENTIFIER
SECTION IDENTIFIER
PCI VALUE
RW927GL-10 (74)

SECTION BREAK LINE

PAVEMENT CONDITION INDEX

PCI	REPAIR
100	
85	PREVENTIVE MAINTENANCE
70	
55	MAJOR REHABILITATION
40	
25	RECONSTRUCTION
10	
0	

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AGENCY: Georgia Department of Transportation Aviation Programs			
LOCATION: Washington - Wilkes County Airport, Washington, GA			
PAGE TITLE: PAVEMENT CONDITION INDEX MAP			
PROJECT DATE: NOV. 2011	CREATION DATE: NOV. 2011	PROJECT MANAGER: MRC	JOB NUMBER: 09-067-AM01
DRAWING SCALE: 1"= 300'	LAST MODIFIED DATE: MAY 2012	REVISED BY: TMM	DRAWN BY: TMM
FILENAME: Washington.dwg		LAYOUT NAME/NUMBER: PCI	FIGURE: 8

Table 2. Pavement Evaluation Results.

Branch[1]	Section[1]	Surface Type[2]	Section Area (sf)	LCD[3]	Paint Markings[4]	2007 PCI	2012 PCI	% Distress due to:		Distress Types[7]
								Load[5]	Climate or Durability[6]	
A01WA	10	AAC	0	6/1/2000	SAT	64	72	0	100	L&T Cracking
A01WA	20	AAC	0	6/1/1990	SAT	69	59	32	68	Alligator Cracking, L&T Cracking, Patching, Weathering
R1331WA	10	AAC	0	6/2/2000	SAT	67	70	0	88	L&T Cracking, Patching, Swelling, Weathering
TAWA	10	AAC	0	6/1/2000	SAT	64	71	0	100	L&T Cracking, Weathering
TAWA	20	AC	0	6/3/2000	SAT	N/A	100	0	0	No Distresses

NOTES:

[1]See Figure 5 for the location of the branch and section.

[2] AC = asphalt cement concrete; AAC = asphalt overlay on AC; PCC = portland cement concrete; APC = asphalt overlay on PCC.

[3]LCD = last construction date.

[4] Paint markings condition: not applicable (N/A), satisfactory (SAT), unsatisfactory due to faded paint (U-FA), unsatisfactory due to chipping paint (U-CH), or unsatisfactory due to superficial cracking (U-CR).

[5]Distress due to load includes distresses attributed to a structural deficiency in the pavement, such as alligator (fatigue) cracking, rutting, or shattered concrete slabs.

[6]Distress due to climate or durability includes those distresses attributed to either the aging of the pavement and the effects of the environment (such as weathering or block cracking in AC pavements) or to a materials-related problem (such as durability cracking in a PCC pavement).

[7]L&T Cracking = longitudinal and transverse cracking.

Maintenance and Rehabilitation Program

The 5-year M&R program developed for Washington-Wilkes County Airport is described on page 6 of this report.

A summary of the M&R program is presented in Table 3. Detailed information on the localized maintenance plan for 2013 is contained in Appendix E and Appendix F. While localized preventive maintenance should be an annual undertaking at Washington-Wilkes County Airport, it is not possible to accurately predict the propagation of cracking and other distresses. The airport should budget for maintenance every year and can use the 2013 maintenance plan as a baseline for that work. As the pavements age, it can be assumed that the amount of localized maintenance required will increase.

Because an unlimited budget was used in the analysis, it is probable that the pavement repair program will need to be adjusted to take into account economic and/or operational constraints. Further, the identification of the need for a major rehabilitation project does not mean that federal or state funding will be available to complete the work in the year shown. It is important to remember that regardless of the recommendations presented within this report, Washington-Wilkes County Airport is responsible for repairing pavements where existing conditions pose a hazard to safe operations.

Note these recommendations are based on a broad network-level analysis and are meant to provide Washington-Wilkes County Airport with an indication of the type of pavement-related work required during the next 5 years. Further engineering investigation will need to be performed to identify exactly which repair action is most appropriate and to more accurately estimate the cost of such work. In addition, the cost estimates provided were based on a statewide policy and each airport should adjust the maintenance policies and unit costs to match its own approach to pavement maintenance and to reflect local costs.

Table 3. 5-Year Program under an Unlimited Funding Analysis Scenario.

Branch[1]	Section	Year	Type of Repair[2]	Estimated Cost[3]
A01WA	10	2017	Preventive Maintenance	$12,668
	20	2013	Major M&R	$143,236
R1331WA	10	2013	Major M&R	$574,631
TAWA	10	2013	Preventive Maintenance	$87
		2017	Preventive Maintenance	$2,156
	20	2013	Rejuvenator	$13,485

[1]See Figure 5 for the location of the branch and section.

[2]Major Rehabilitation: overlay, mill and overlay, reconstruction, and so on;
Localized Maintenance: crack sealing, patching, joint resealing, and so on;
Global Maintenance: surface treatments, rejuvenators, and so on.

[3]Cost estimates based on broad, statewide policy and should be adjusted to reflect local costs.

GENERAL RECOMMENDATIONS

Maintenance

In addition to the specific maintenance actions presented in Appendix E and Appendix F, the following strategies are recommended to prolong pavement life:

1. Conduct an aggressive campaign against weed growth through timely herbicide applications. Vegetation growing in pavement cracks is very destructive and significantly increases the rate of pavement deterioration.

2. Implement a periodic crack sealing program. Sealing cracks is a proven method for cost-effectively keeping water and debris out of the pavement system and extending its life.

3. Ensure that dirt does not build up along the edges of the pavements. This can create a "bathtub" effect—reducing the ability of water to drain away from the pavement system.

4. Closely monitor heavy equipment movement, such as construction equipment, emergency equipment, and fueling equipment, to make sure that it is only operating on pavement designed to accommodate the heavy loads this type of equipment often applies. Failure to restrict heavy equipment to appropriate areas may result in the premature failure of airport pavements.

5. Other maintenance necessities include keeping all pavement markings well painted, keeping safety signage clear of debris and weeds, ensuring the continuous operation of lighting systems (bulb replacement), and the frequent removal of any debris found in any of the operating areas. In addition, failed pavement areas should be remediated as necessary.

Remaining in Compliance with Public Law 103-305

Public Law 103-305 states that after January 1, 1995, airport sponsors must provide assurances or certifications that an airport has implemented an effective airport pavement maintenance management system (PMMS) before the airport will be considered for funding of pavement replacement or reconstruction projects. To be in full compliance with the Federal law, the PMMS must include the following components at a minimum: pavement inventory, pavement inspections, record keeping, information retrieval, and program funding.

By undertaking this project, the Department has provided Washington-Wilkes County Airport with an excellent basis for meeting the requirements of this law. The airport now has a complete pavement inventory and a detailed inspection. To remain in compliance with the law, the airport will also need to undertake monthly drive-by inspections of pavement conditions and track pavement-related maintenance activities. The next detailed inspection should occur in 2015.

The FAA AC 150/5380-6B provides further information on Public Law 103-305. Specifically, Appendix 1 of this AC outlines what needs to be included in a PMMS to satisfy FAA Grant Assurance 11. A copy of this AC can be found at the following website http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/22556.

SUMMARY

This report documents the results of the pavement evaluation conducted at Washington-Wilkes County Airport. During a visual inspection of the pavements in 2012, it was found that the overall condition of the pavement network is a PCI of 73. A 5- year pavement repair program was generated for Washington-Wilkes County Airport, which revealed that approximately $746,263 needs to be expended on the pavement system to maintain and/or improve its condition.

APPENDIX A

CAUSE OF DISTRESS TABLES

Table A-1. Cause of Pavement Distress, Asphalt-Surfaced Pavements.

Distress Type	Probable Cause of Distress	Feasible Maintenance Strategies
Alligator Cracking	Fatigue failure of the asphalt concrete surface under repeated traffic loading.	If localized, partial- or full-depth asphalt patch. If extensive, major rehabilitation needed.
Bleeding	Excessive amounts of asphalt cement or tars in the mix and/or low air void content.	Spread heated sand, roll, and sweep. Another option is to plane excess asphalt. Or, remove and replace.
Block Cracking	Shrinkage of the asphalt concrete and daily temperature cycling; it is not load associated.	At low severity levels, crack seal and/or surface treatment. At higher severities, consider overlay.
Corrugation	Traffic action combined with an unstable pavement layer.	If localized, mill. If extensive, remove and replace.
Depression	Settlement of the foundation soil or can be “built up” during construction.	Patch.
Jet Blast	Bituminous binder has been burned or carbonized.	Patch.
Joint Reflection Cracking	Movement of the concrete slab beneath the asphalt concrete surface due to thermal and moisture changes.	At low- and medium-severities, crack seal. At higher severities, especially if extensive, consider overlay.
Longitudinal and Transverse Cracking	Cracks may be caused by 1) poorly constructed paving lane joint, 2) shrinkage of the AC surface due to low temperatures or hardening of the asphalt, or 3) reflective crack caused by cracks in an underlying PCC slab.	At low- and medium-severity levels, crack seal. At higher severities, especially if extensive, consider overlay options.
Oil Spillage	Deterioration or softening of the pavement surface caused by the spilling of oil, fuel, or other solvents.	Patch.
Patching	N/A	Replace patch if deteriorated.
Polished Aggregate	Repeated traffic applications.	Aggregate seal coat is one option. Could also groove or mill. Overlay is another option.
Raveling	Asphalt binder may have hardened significantly, causing coarse aggregate pieces to dislodge.	Patch if isolated. At higher severity levels, consider major rehabilitation if extensive.
Rutting	Usually caused by consolidation or lateral movement of the materials due to traffic loads.	Patch medium- and high-severity levels if localized. If extensive, consider major rehabilitation.
Shoving	Where PCC pavements adjoin flexible pavements, PCC “growth” may shove the asphalt pavement.	Mill and patch as needed.
Slippage Cracking	Low strength surface mix or poor bond between the surface and next layer of pavement structure.	Partial- or full-depth patch.
Swelling	Usually caused by frost action or by swelling soil.	Patch if localized. Major rehabilitation if extensive.
Weathering	Asphalt binder and/or fine aggregate may wear away as the pavement ages and hardens.	Patch if isolated. Consider a surface treatment if extensive.

Table A-2. Cause of Pavement Distress, PCC Pavements.

Distress Type	Probable Cause of Distress	Feasible Maintenance Strategies
Alkali Silica Reaction (ASR)	Chemical reaction of alkalis in the portland cement with certain reactive silica minerals. ASR may be accelerated by the use of chemical pavement deicers.	At medium- and high-severity levels, slab replacement is recommended.
Blow-Up	Incompressibles in joints.	Partial- or full-depth patch. Slab replacement.
Corner Break	Load repetition combined with loss of support and curling stresses.	Seal cracks at low-severity. Full-depth patch.
Cracks	Combination of load repetition, curling stresses, and shrinkage stresses.	Seal cracks. At high-severity, may need full-depth patch or slab replacement.
Durability Cracking	Concrete's inability to withstand environmental factors such as freeze-thaw cycles.	Full-depth patch if present on small amount of slab. At higher severity levels, once it has appeared on most of slab, slab replacement.
Joint Seal Damage	Stripping of joint sealant, extrusion of joint sealant, weed growth, hardening of the filler (oxidation), loss of bond to the slab edges, or absence of sealant in joint.	Replace joint seal.
Patching (Small and Large)	N/A	Replace patches if deteriorated.
Popouts	Freeze-thaw action in combination with expansive aggregates.	Monitor.
Pumping	Poor drainage, poor joint sealant.	Seal cracks and joints. Underseal is an option if voids have developed. Establish good drainage.
Scaling	Overfinishing of concrete, deicing salts, improper construction, freeze-thaw cycles, and poor aggregate.	At low-severity levels, do nothing. At medium- and high-severity levels, partial-depth patches or slab replacement.
Settlement	Upheaval or consolidation.	At higher severity levels, leveling patch or grind to restore smooth ride.
Shattered Slab	Load repetition.	Replace slab.
Shrinkage	Setting and curing of the concrete.	Monitor.
Spalling (Joint and Corner)	Excessive stresses at the joint caused by infiltration of incompressible materials or traffic loads; weak concrete at joint combined with traffic loads.	Partial-depth patch.

APPENDIX B

PHOTOGRAPHS

A01WA-10. Overview.

A01WA-10. Longitudinal and Transverse Cracking (Sample Unit #05).

A01WA-10. Satisfactory Paint.

A01WA-20. Overview.

A01WA-20. Alligator Cracking (Sample Unit #10).

A01WA-20. Longitudinal and Transverse Cracking (Sample Unit #08).

A01WA-20. Satisfactory Paint.

R1331WA-10. Overview.

R1331WA-10. Longitudinal and Transverse Cracking (Sample Unit #14).

R1331WA-10. Patching (Sample Unit #02).

R1331WA-10. Satisfactory Paint.

TAWA-10. Overview.

TAWA-10. Longitudinal and Transverse Cracking (Sample Unit #01).

TAWA-10. Satisfactory Paint.

TAWA-20. Overview.

TAWA-20. Satisfactory Paint.

APPENDIX C

INSPECTION REPORT

Re-inspection Report

GA 2012 FINAL
Report Generated Date: November 20, 2012

Network: WASHINGTON Name: WASHINGTON-WILKES COUNTY AIRPORT

Branch: A01WA Name: APRON 01 Use: APRON Area: 90,677.00SqFt

Section: 10 of 2 From: HANGAR AREA To: TAXIWAY A Last Const.: 06/01/2000
Surface: AAC Family: GAAACAPGA2NORTH Zone: SAT Category: Rank: P
Area: 37,500.00SqFt Length: 125.00Ft Width: 300.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 03/17/2012 Total Samples: 8 Surveyed: 4
Conditions: PCI : 72
Inspection Comments:

Sample Number: 01 Type: R Area: 5,000.00SqFt PCI = 70
Sample Comments:

```
48 LONGITUDINAL/TRANSVERSE CRACKING        L      780.00 Ft       Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING        L       15.00 Ft       Comments:u
```

Sample Number: 03 Type: R Area: 5,000.00SqFt PCI = 69
Sample Comments:

```
48 LONGITUDINAL/TRANSVERSE CRACKING        L      826.00 Ft       Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING        L       25.00 Ft       Comments:u
```

Sample Number: 05 Type: R Area: 5,000.00SqFt PCI = 70
Sample Comments:

```
48 LONGITUDINAL/TRANSVERSE CRACKING        L      792.00 Ft       Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING        L       20.00 Ft       Comments:u
```

Sample Number: 07 Type: R Area: 3,730.00SqFt PCI = 79
Sample Comments:

```
48 LONGITUDINAL/TRANSVERSE CRACKING        L      315.00 Ft       Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING        L       10.00 Ft       Comments:u
```

Re-inspection Report

GA 2012 FINAL
Report Generated Date: November 20, 2012

Network: WASHINGTON Name: WASHINGTON-WILKES COUNTY AIRPORT

Branch: A01WA Name: APRON 01 Use: APRON Area: 90,677.00SqFt

Section: 20 of 2 From: ENTRANCE ROAD To: HANGAR Last Const.: 06/01/1990
Surface: AAC Family: GAAACAPGA2NORTH Zone: SAT Category: Rank: P
Area: 53,177.00SqFt Length: 400.00Ft Width: 75.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 03/17/2012 Total Samples: 12 Surveyed: 5
Conditions: PCI : 59
Inspection Comments: unsealed

Sample Number: 01 Type: R Area: 6,000.00SqFt PCI = 75
Sample Comments:

57	WEATHERING	M	6,000.00 SqFt	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	L	410.00 Ft	Comments:

Sample Number: 03 Type: R Area: 4,890.00SqFt PCI = 75
Sample Comments:

57	WEATHERING	M	4,890.00 SqFt	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	L	180.00 Ft	Comments:

Sample Number: 06 Type: R Area: 4,810.00SqFt PCI = 38
Sample Comments:

57	WEATHERING	M	4,310.00 SqFt	Comments:
41	ALLIGATOR CRACKING	M	160.00 SqFt	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	L	279.00 Ft	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	M	40.00 Ft	Comments:
50	PATCHING	M	500.00 SqFt	Comments:

Sample Number: 08 Type: R Area: 3,400.00SqFt PCI = 64
Sample Comments:

57	WEATHERING	M	2,900.00 SqFt	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	L	217.00 Ft	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	M	24.00 Ft	Comments:
50	PATCHING	L	500.00 SqFt	Comments:

Sample Number: 10 Type: R Area: 3,757.00SqFt PCI = 36
Sample Comments:

57	WEATHERING	M	2,857.00 SqFt	Comments:
41	ALLIGATOR CRACKING	M	120.00 SqFt	Comments:
48	LONGITUDINAL/TRANSVERSE CRACKING	L	176.00 Ft	Comments:
50	PATCHING	M	700.00 SqFt	Comments:

Re-inspection Report

GA 2012 FINAL
Report Generated Date: November 20, 2012

Network: WASHINGTON Name: WASHINGTON-WILKES COUNTY AIRPORT

Branch: R1331WA Name: RUNWAY 13/31 Use: RUNWAY Area: 336,041.00SqFt

Section: 10 of 1 From: 13 APPROACH To: 31 APPROACH Last Const.: 06/02/2000
Surface: AAC Family: GAAACRWYGA2NORTH Zone: SAT Category: Rank: P
Area: 336,041.00SqFt Length: 4,020.00Ft Width: 75.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments: 600ft EXT (90 AC) + 280 (AAC? 90) AT 31 END. BOTH TURNAROUNDS 90 AC.

Last Insp. Date: 03/17/2012 Total Samples: 58 Surveyed: 7
Conditions: PCI : 70
Inspection Comments:

Sample Number: 02 Type: R Area: 5,000.00SqFt PCI = 84
Sample Comments:

50 PATCHING	L	72.00	SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	88.00	Ft	Comments:u
57 WEATHERING	L	5,000.00	SqFt	Comments:

Sample Number: 14 Type: R Area: 5,625.00SqFt PCI = 61
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	15.00	Ft	Comments:u
57 WEATHERING	L	5,625.00	SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	830.00	Ft	Comments:s
56 SWELLING	L	200.00	SqFt	Comments:@ crks

Sample Number: 22 Type: R Area: 5,625.00SqFt PCI = 65
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	64.00	Ft	Comments:u
57 WEATHERING	L	5,625.00	SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	580.00	Ft	Comments:s
56 SWELLING	L	150.00	SqFt	Comments:

Sample Number: 30 Type: R Area: 5,625.00SqFt PCI = 63
Sample Comments:

56 SWELLING	L	150.00	SqFt	Comments:
57 WEATHERING	L	5,625.00	SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	730.00	Ft	Comments:s

Sample Number: 38 Type: R Area: 5,625.00SqFt PCI = 66
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	620.00	Ft	Comments:s
57 WEATHERING	L	5,625.00	SqFt	Comments:
56 SWELLING	L	100.00	SqFt	Comments:

Sample Number: 46 Type: R Area: 5,625.00SqFt PCI = 70
Sample Comments:

57 WEATHERING	L	5,625.00	SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	655.00	Ft	Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING	L	4.00	Ft	Comments:u

Sample Number: 54 Type: R Area: 5,625.00SqFt PCI = 83
Sample Comments:

57 WEATHERING	L	5,625.00	SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	205.00	Ft	Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING	L	12.00	Ft	Comments:u

Re-inspection Report

GA 2012 FINAL
Report Generated Date: November 20, 2012

Network: WASHINGTON Name: WASHINGTON-WILKES COUNTY AIRPORT

Branch: TAWA Name: TAXIWAY A Use: TAXIWAY Area: 71,842.00SqFt

Section: 10 of 2 From: APRON 01 To: RUNWAY 13/31 Last Const.: 06/01/2000
Surface: AAC Family: GAAACTWYGA2 Zone: SAT Category: Rank: P
Area: 10,546.00SqFt Length: 210.00Ft Width: 40.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 03/17/2012 Total Samples: 2 Surveyed: 2
Conditions: PCI : 71
Inspection Comments:

Sample Number: 01 Type: R Area: 4,915.00SqFt PCI = 66
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	40.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	18.00	Ft	Comments:u
48 LONGITUDINAL/TRANSVERSE CRACKING	L	490.00	Ft	Comments:s
57 WEATHERING	L	4,915.00	SqFt	Comments:

Sample Number: 02 Type: R Area: 4,840.00SqFt PCI = 75
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	335.00	Ft	Comments:s
48 LONGITUDINAL/TRANSVERSE CRACKING	L	34.00	Ft	Comments:u
57 WEATHERING	L	4,840.00	SqFt	Comments:

Re-inspection Report

GA 2012 FINAL
Report Generated Date: November 20, 2012

Network: WASHINGTON Name: WASHINGTON-WILKES COUNTY AIRPORT

Branch: TAWA Name: TAXIWAY A Use: TAXIWAY Area: 71,842.00SqFt

Section: 20 of 2 From: APRON 01 To: RUNWAY 31 APPROACH Last Const.: 06/03/2000
Surface: AC Family: GAACTWYGA2NORTH Zone: SAT Category: Rank: P
Area: 61,296.00SqFt Length: 1,750.00Ft Width: 35.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 03/17/2012 Total Samples: 17 Surveyed: 5
Conditions: PCI : 100
Inspection Comments:

Sample Number: 03 Type: R Area: 3,500.00SqFt PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 06 Type: R Area: 3,500.00SqFt PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 09 Type: R Area: 3,500.00SqFt PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 12 Type: R Area: 3,500.00SqFt PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 15 Type: R Area: 3,500.00SqFt PCI = 100
Sample Comments:
<NO DISTRESSES>

APPENDIX D

MAINTENANCE POLICIES AND UNIT COSTS

Table D-1. Localized Maintenance Policy, Asphalt-Surfaced Pavements.

Distress Type	Severity Level	Maintenance Action
Alligator Cracking	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Bleeding	N/A	Monitor
Block Cracking	Low	Monitor
	Medium	Crack Sealing – AC
	High	Crack Sealing – AC
Corrugation	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Depression	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Jet Blast	N/A	AC Patching
Joint Reflection Cracking	Low	Monitor
	Medium	Crack Sealing – AC
	High	Crack Sealing – AC
Longitudinal and Transverse Cracking	Low	Monitor
	Medium	Crack Sealing – AC
	High	Crack Sealing – AC
Oil/Fuel Damage	N/A	AC Patching
Patching	Low	Monitor
	Medium	Monitor
	High	AC Patching
Polished Aggregate	N/A	Monitor
Raveling	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Rutting	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Shoving	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Slippage Cracking	N/A	AC Patching
Swelling	Low	Monitor
	Medium	AC Patching
	High	AC Patching
Weathering	Low	Monitor
	Medium	Monitor
	High	AC Patching

Table D-2. Localized Maintenance Policy, PCC Pavements.

Distress Type	Severity Level	Maintenance Action
Alkali Silica Reaction (ASR)	Low	Monitor
	Medium	Slab Replacement
	High	Slab Replacement
Blow-Up	Low	Slab Replacement
	Medium	Slab Replacement
	High	Slab Replacement
Corner Break	Low	Crack Sealing – PCC
	Medium	PCC Full Depth Patch
	High	PCC Full Depth Patch
LTD Cracking	Low	Crack Sealing – PCC
	Medium	Crack Sealing – PCC
	High	Crack Sealing – PCC
Durability Cracking	Low	Monitor
	Medium	Slab Replacement
	High	Slab Replacement
Joint Seal Damage	Low	Monitor
	Medium	Joint Sealing – PCC
	High	Joint Sealing – PCC
Patching (Large and Small)	Low	Monitor
	Medium	PCC Full Depth Patch
	High	PCC Full Depth Patch
Popouts	N/A	Monitor
Pumping	N/A	Monitor
Scaling	Low	Monitor
	Medium	Slab Replacement
	High	Slab Replacement
Faulting	Low	Monitor
	Medium	Monitor
	High	PCC Partial Depth Patch
Shattered Slab	Low	Crack Sealing – PCC
	Medium	Slab Replacement
	High	Slab Replacement
Shrinkage	N/A	Monitor
Spalling (Joint and Corner)	Low	Monitor
	Medium	PCC Partial Depth Patch
	High	PCC Partial Depth Patch

Table D-3. 2012 Unit Costs for Localized Maintenance Actions, General Aviation Airports.

Maintenance Action	Unit Cost		
	Metro	North	South
AC Patching	$3.19/sf	$3.18/sf	$3.28/sf
Crack Sealing – AC	$2.02/lf	$2.02/lf	$1.95/lf
Crack Sealing – PCC	$2.71/lf	$2.71/lf	$2.71/lf
Joint Sealing – PCC	$2.71/lf	$2.71/lf	$2.71/lf
PCC Partial Depth Patch	$12.84/sf	$12.84/sf	$12.84/sf
PCC Full Depth Patch	$43.32/sf	$43.32/sf	$43.32/sf
Slab Replacement	$43.32/sf	$43.32/sf	$43.32/sf

Table D-4. 2012 Unit Costs for Localized Maintenance Actions, Air Carrier Airports.

Maintenance Action	Unit Cost
AC Patching	$3.47/sf
Crack Sealing – AC	$6.25/lf
Crack Sealing – PCC	$2.71/lf
Joint Sealing – PCC	$2.71/lf
PCC Partial Depth Patch	$12.84/sf
PCC Full Depth Patch	$43.32/sf
Slab Replacement	$43.32/sf

Table D-5. 2012 Unit Costs for Global Maintenance Actions, General Aviation Airports.

Maintenance Action	Unit Cost		
	Metro	North	South
Single Surface Treatment	$0.26/sf	$0.12/sf	$0.19/sf
Pavement Rejuvenator	$0.22/sf	$0.22/sf	$0.22/sf

Table D-6. 2012 Unit Costs for Global Maintenance Actions, Air Carrier Airports.

Maintenance Action	Unit Cost
Single Surface Treatment	$0.43/sf
Pavement Rejuvenator	$0.22/sf

Table D-7. 2012 Major Rehabilitation Unit Costs Based on PCI Ranges for Asphalt-Surfaced Pavements.

Type of Airport[1]	PCI Range							
	0 – 29	**30 – 39**	**40 – 49**	**50 – 59**	**60 – 69**	**70 – 79**	**80 – 89**	**> 89**
G.A., Metro	$6.09/sf	$6.09/sf	$6.85/sf	$1.96/sf	$1.96/sf	$1.96/sf	$1.96/sf	$1.96/sf
G.A., North	$5.14/sf	$5.14/sf	$5.38/sf	$1.71/sf	$1.71/sf	$1.71/sf	$1.71/sf	$1.71/sf
G.A., South	$5.00/sf	$5.00/sf	$5.42/sf	$1.87/sf	$1.87/sf	$1.87/sf	$1.87/sf	$1.87/sf
Air Carrier	$6.52/sf	$6.52/sf	$2.62/sf	$2.62/sf	$2.62/sf	$2.62/sf	$2.62/sf	$2.62/sf

[1]G.A. = General Aviation

Table D-8. 2012 Major Rehabilitation Unit Costs Based on PCI Ranges for PCC-Surfaced Pavements.

Type of Airport[1]	PCI Range							
	0 – 29	**30 – 39**	**40 – 49**	**50 – 59**	**60 – 69**	**70 – 79**	**80 – 89**	**> 89**
G.A., Metro	$9.50/sf	$9.50/sf	$1.96/sf	$1.96/sf	$1.96/sf	$1.96/sf	$1.96/sf	$1.96/sf
G.A., North	$9.87/sf	$9.87/sf	$1.71/sf	$1.71/sf	$1.71/sf	$1.71/sf	$1.71/sf	$1.71/sf
G.A., South	$9.71/sf	$9.71/sf	$1.87/sf	$1.87/sf	$1.87/sf	$1.87/sf	$1.87/sf	$1.87/sf
Air Carrier	$9.68/sf	$9.68/sf	$2.62/sf	$2.62/sf	$2.62/sf	$2.62/sf	$2.62/sf	$2.62/sf

[1]G.A. = General Aviation

APPENDIX E

YEAR 2013 MAINTENANCE PLAN ORGANIZED BY SECTION

Table E-1. 2013 Maintenance Plan Organized by Section.

Branch[1]	Section[1]	Distress Type[2]	Severity	Maintenance Action	Maintenance Quantity	Maintenance Unit	Unit Cost	Estimated Cost
TAWA	10	L&T Cracking	Medium	Crack Sealing - AC	43	Ft	$2.02	$87

[1]See Figure 5 for the location of the branch and section.
[2]L&T Cracking = longitudinal and transverse cracking.

APPENDIX F

YEAR 2013 MAINTENANCE PLAN ORGANIZED BY REPAIR TYPE

Table F-1. 2013 Maintenance Plan Organized by Repair Type.

Branch[1]	Section[1]	Distress Type[2]	Severity	Maintenance Action	Maintenance Quantity	Maintenance Unit	Unit Cost	Estimated Cost
TAWA	10	L&T Cracking	Medium	Crack Sealing - AC	43	Ft	$2.02	$87

[1]See Figure 5 for the location of the branch and section.
[2]L&T Cracking = longitudinal and transverse cracking.

Georgia Department of Transportation

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