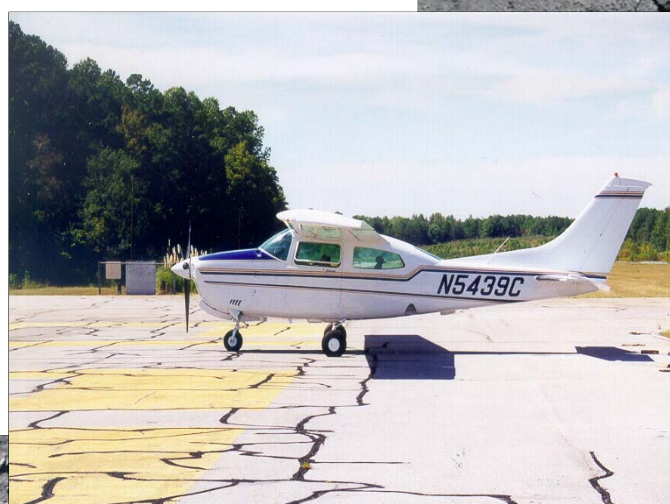
Valdosta Regional Airport

Pavement Evaluation Report

July 2002



The preparation of this document was financed in part through a planning grant from the Federal Aviation Administration, Department of Transportation, under the provisions of the Airport and Airway Improvement Act of 1982, as amended. This financial commitment is not to be construed that the FAA approves of all the recommendations and does not represent a binding financial obligation to provide federal funding. The contents of this publication reflect the views of the author(s), who is responsible for the facts and accuracy of the data presented herein. The opinions, findings and conclusions in this publication are those of the author(s) and not necessarily those of the Department of Transportation, State of Georgia or the Federal Aviation Administration.

VALDOSTA REGIONAL AIRPORT

PAVEMENT EVALUATION REPORT

Prepared By:

Applied Pavement Technology, Inc.
3001 Research Road, Suite C
Champaign, Illinois 61822
217-398-3977
www.pavementsolutions.com

In Association With:

Wilbur Smith & Associates, Inc.
2920 Brandywine Rd, Suite 220
Atlanta, GA 30341
770-936-8650

Prepared For:

Georgia Department of Transportation
Aviation Office
279 Memorial Drive, SW
Atlanta, Georgia 30303
302-571-6309

July 2002

TABLE OF CONTENTS

VALDOSTA REGIONAL AIRPORT

PAVEMENT EVALUATION REPORT

Introduction

In 2001, the Georgia Department of Transportation (GDOT), Aviation Programs, retained Wilbur Smith Associates, assisted by Applied Pavement Technology, Inc. (APTech), to update the Georgia Aviation System Plan (GASP). APTech's portion of the project involved updating the 1998 State Airport Pavement Management System (APMS) by reevaluating the 94 general aviation airports included in the original APMS plus incorporating eight commercial service airports. The ultimate goal of this project was to provide the airports and the State with the pavement information and analytical tools that can help them identify pavement related needs, optimize the selection of projects and treatments over a multi-year period, and evaluate the long-term impacts of their project priorities.

As part of the GASP Update, an evaluation of the pavement conditions at Valdosta Regional Airport was conducted in 2001. The results of this evaluation are presented within this report and can be used by GDOT, the Federal Aviation Administration (FAA), and Valdosta Regional Airport to monitor the condition of pavements and to identify, prioritize, and schedule pavement maintenance and rehabilitation actions at the airport.

Pavement conditions were assessed using the Pavement Condition Index (PCI) procedure – the industry standard in aviation for visually assessing the condition of pavements. During a PCI inspection, inspectors identify signs of deterioration on the surface of the pavement. The types, severities, and amounts of distress present in a pavement are quantified during the pavement survey. This information is then used to develop a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent).

The PCI number provides an overall measure of condition and an indication of the level of maintenance or rehabilitation work that will be required to maintain or repair a pavement. This number also provides an objective means of prioritizing and scheduling pavement rehabilitation work. Further, the individual distress information, such as cracking or rutting, provides insight into what is causing the pavement to deteriorate. These factors can then be used to select the appropriate maintenance or rehabilitation action to correct the problem. PCI data also serve as the basis for a computerized APMS – a tool that is used to track pavement condition, identify pavement repair needs, and develop prioritized maintenance and rehabilitation programs with associated schedules and budgets.

The importance of identifying not only the best repair alternative, but also the optimal time of repair, is illustrated in Figure 1. This figure shows that during the first 75 percent of the life of a pavement, approximately 40 percent of the pavement deterioration takes place. After this point, the pavement deteriorates much faster. The financial impact of delaying repairs until the second drop in condition can mean repair expenses 4 to 5 times higher than repairs triggered over the first 75 percent of the pavements life. By evaluating the condition of pavements, and using an

APMS to project future pavement condition, the most economical time to apply pavement maintenance and rehabilitation can be identified.

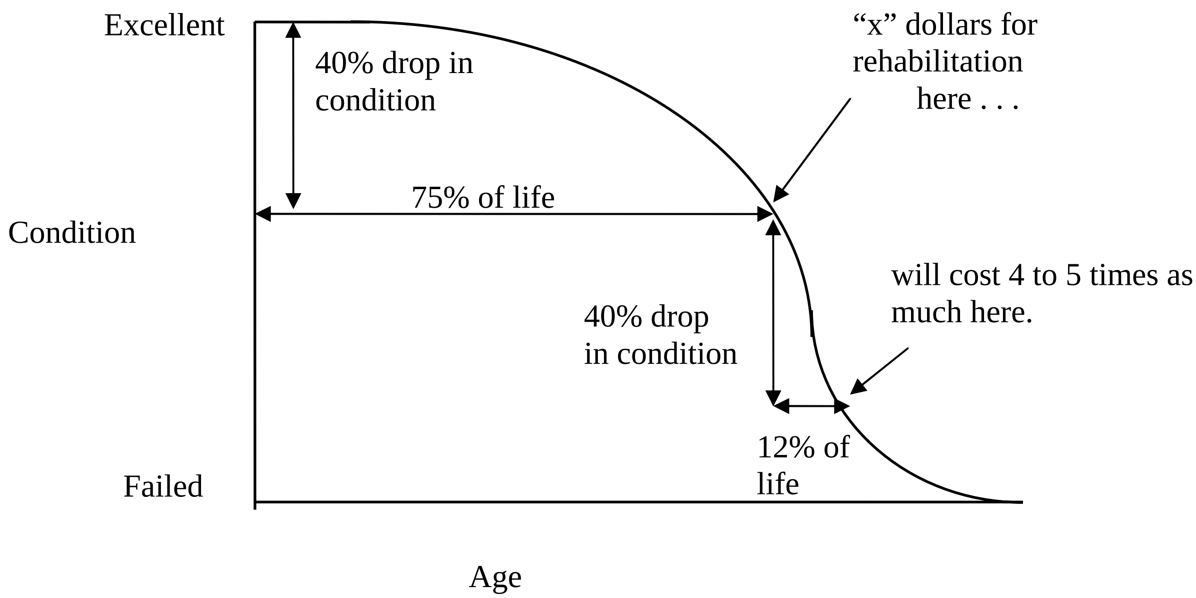


Figure 1. Pavement condition versus cost of repair.

This report contains the results of the 2001 pavement evaluation, as well as a diskette containing the Micro PAVER pavement management software database developed during this project.

Scope of Work

This project included the collection of pavement history information, the development of CAD maps, the evaluation of current pavement condition, and the development of a computerized APMS. The APMS was then used to prepare a 5-year pavement maintenance and rehabilitation program at the state level for the GDOT and the FAA to use as a planning tool.

Individual reports, such as this one, were prepared for each of the project airports to communicate the results of the pavement inspections. A statewide analysis report and an executive summary report were also developed. The statewide analysis report presents the overall results of the study and provides detailed recommendations for future maintenance and rehabilitation actions at the airports. The executive summary presents an overview of the current condition of the State's airports and a summary of the recommended 5-year maintenance and rehabilitation program.

Project Results

Pavement Inventory

Valdosta Regional Airport has over 3,346,218 square feet of pavement. Figure 2 shows the area of the pavement system, broken out by pavement use (runway, taxiway, and apron). This figure also shows the average age of the pavements.

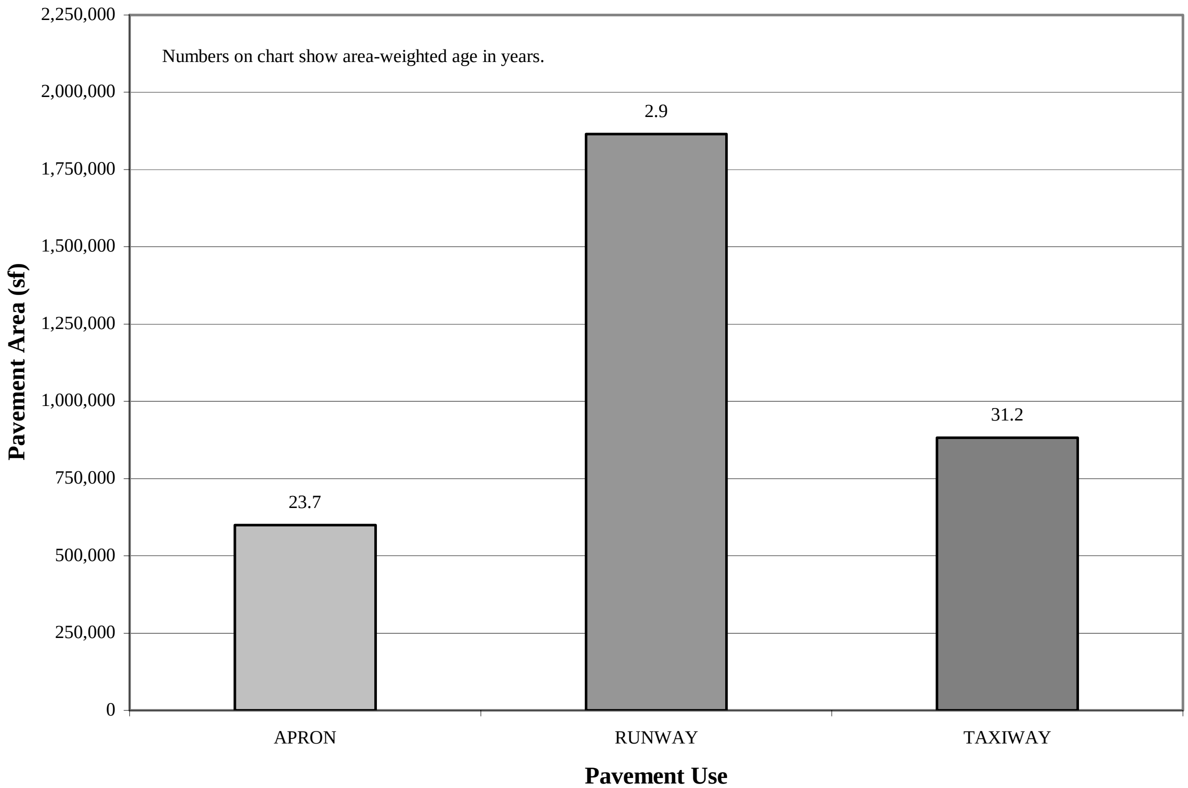


Figure 2. Pavement inventory.

Figure 3 is a network definition map that identifies the pavements at Valdosta Regional Airport evaluated during this project. This map shows how the pavement network was divided into branches, sections, and sample units for pavement management purposes. It also shows the nomenclature used in the Micro PAVER pavement management database to identify the different pavement areas. Finally, the map summarizes the construction history information compiled during the records review and identifies the areas inspected during the visual survey.

Figure 3. Network Definition Map (11 x 17 except for very large airports that need larger map folded into a map sleeve.

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 may be further divided into sections. Traditionally, sections are defined as parts of the branch that share common attributes, such as cross-section, last construction date, traffic level, and performance. Using the traditional approach, if a runway was built in 1968 and then extended in 1984, it would be comprised of two separate sections. A modified approach to defining pavement sections has become increasingly popular with state aviation agencies in recent years and has been adopted by GDOT. The basic premise of this approach is that the section is considered the management unit of the APMS, and that it should represent a pavement area where it is realistic to expect that pavement maintenance or rehabilitation would be undertaken. For example, if a runway was built in 1968 and then extended in 1984, in the database this runway would be represented by a single section, even though there are two distinct construction periods. This is because in the future if repair work is scheduled for that runway it is probable that it will be programmed for the entire runway and not just a portion of it.

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

PCI Procedure

APTech inspected the pavements at Valdosta Regional Airport using the PCI procedure. This procedure is described in FAA AC 150/5380-6 and ASTM Standard D5340. A network-level sampling rate was used during the inspection, and the sample units inspected are identified on the network definition map shown in Figure 3.

The PCI provides a numerical indication of overall pavement condition, as illustrated in Figure 4. 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	PCI
	100
	60
	5

Figure 4. Visual representation of PCI scale.

In general terms, pavements with a PCI of 60 to 100 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 60 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 5 illustrates how the appropriate repair type varies with the PCI of a pavement section.

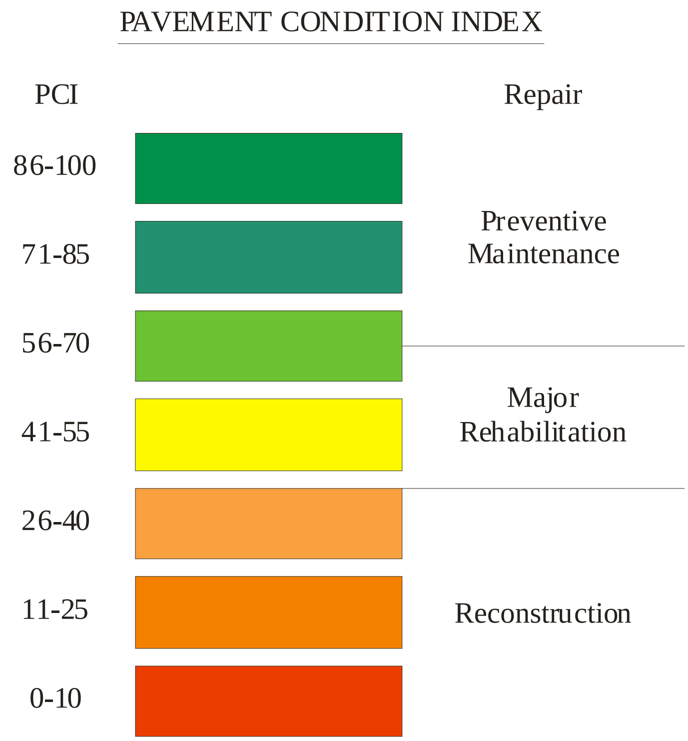


Figure 5. PCI versus repair type.

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 (such as alligator cracking on hot-mix asphalt [HMA] pavements or corner breaks on portland cement concrete [PCC] pavements), climate/durability-related (such as weathering [climate-related on HMA pavements) and D-cracking [durability-related on PCC pavements]), and other (distress types that cannot be attributed solely to load or climate/durability). 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 concrete 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.

Inspection Comments

The inspection of Valdosta Regional Airport was completed on January 17th and 18th of 2002. Nineteen sections were defined for the purpose of this inspection.

Runway 17-35

Runway 17-35, section R1735VL-10, is in excellent condition with no distresses observed on the recently rehabilitated pavement.

Runway 4-22

Runway 4-22, section R422VL-10, is in very good condition with only two distress types identified. Bleeding was noted in several areas along the runway and low-severity depressions were observed near the 4 Approach. The center 100 feet of the runway has been recently rehabilitated. The older pavement outside of the current runway dimension contains nearly 100 percent of medium-severity block cracking.

Runway 13-31

Runway 13-31 is comprised of a PCC section, R1331VL-10, and an AAC section, R1331VL-20. R1331VL-10 is in excellent condition with no noted distress. R1331VL-20 is in very good condition with relatively small quantities of unsealed, low-severity longitudinal and transverse (L&T) cracks identified along the runway. The center 75 feet of this runway was recently rehabilitated. The older pavement outside of the current runway dimension contains nearly 100 percent of medium-severity block cracking.

Taxiways

Taxiway A runs parallel to Runway 17-35 and is composed of one section, TAVL-10. This pavement is in fair condition. The predominant distress on this pavement is unsealed, low-severity L&T cracks. Other distresses noted on the taxiway include medium-severity L&T cracks and areas of unsealed, low-severity block cracking. The block cracking was limited to the northern end of the taxiway near the Runway 17 approach.

Taxiway C is composed of one section, TCVL-10, and connects the Runway 4 approach with the Runway 31 approach. The pavement is in very poor condition with significant areas of medium-severity block cracking and high-severity weathering. The airport restricts the use of jets on the pavement due to the high FOD potential.

The sections for Taxiways D and E were combined into A01VL-40 because of their similar condition and work history. Taxiway F is divided into two sections, TFVL-10 and TFVL-20, and are separated by Runway 17-35. TFVL-10 is in poor condition due the large quantities of unsealed, low and medium-severity block cracking. Other distresses identified on section TFVL-10 are medium-severity swells, low-severity weathering, and low and medium-severity L&T cracking. TFVL-20 was rehabilitated at the same time as Runway 17-35 and is in excellent condition with no noted distresses.

TGVL-10 is a relatively short section connecting Runway 17-35 and Taxiway A. The section was rehabilitated concurrently with Runway 17-35, and it is in excellent condition with no noted distress.

Taxiways H, J, K and L are small taxiways providing access to Taxiway A and are in similar condition to the aprons they are associated with. Taxiways H and J are connected to section A01VL-20, and Taxiway K is connected to A01VL-10. Taxiway L also connects A01Vl-10 to Taxiway A; however, it has its own distinct condition and work history. TLVL-10 is in good condition with the only identified distress being unsealed, low-severity L&T cracks.

Taxiways M and N connect the terminal apron with Runways 22 and 17, respectively. Section TMVL-10 is in excellent condition with a limited amount of unsealed, low-severity L&T cracking. TNVL-10 is in excellent condition with no observed distresses.

Aprons

The terminal apron, ATERMVL-10, is in very good condition, however shrinkage cracking was noted on every inspected slab.

Section A01VL-10 is in good condition with limited amounts of low and medium-severity L&T cracking. The only other distress type observed on this section was an area of bleeding near Taxiway K. A surface treatment was present along the tie-down areas but not in the taxilanes.

Section A01VL-20 is in fair condition with block cracking representing the predominant distress type. Unsealed, low-severity block cracking was present over 100 percent of the area. Also present are areas of low and medium-severity weathering.

Section A01VL-30 is in fair condition with moderate amounts of unsealed, low and medium-severity block cracking. Unsealed, low and medium-severity L&T cracks are also present.

Section A01VL-40 is in fair condition with large quantities of unsealed, low-severity block cracking present in several areas. Other typical distresses for this section include unsealed, low and medium-severity L&T cracks. Several additional sample units were required to account for distresses limited to a few areas. These distresses include medium-severity depressions, medium-severity alligator cracking, and medium-severity patching.

T-Hangers

There are two separate T-Hanger areas located along the eastern border of the facility. THANG01VL-10 is adjacent to A01VL-20, and it is in fair condition. Significant quantities of unsealed, low-severity block and L&T cracking were observed. THANG02VL-10 is located near A01VL-40 and is in very good condition. Relatively low quantities of unsealed, low-severity L&T cracks were identified.

Overall Pavement Condition

The 2001 area-weighted condition of Valdosta Regional Airport is 82, with conditions ranging from 23 to 100 [on a scale of 0 (failed) to 100 (excellent)]. Figures 6 and 7 provide graphs summarizing the overall condition of the pavements at Valdosta Regional Airport. Figure 8 is a map that displays the condition of the pavements evaluated. Table 1 summarizes the results of the pavement evaluation.

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.

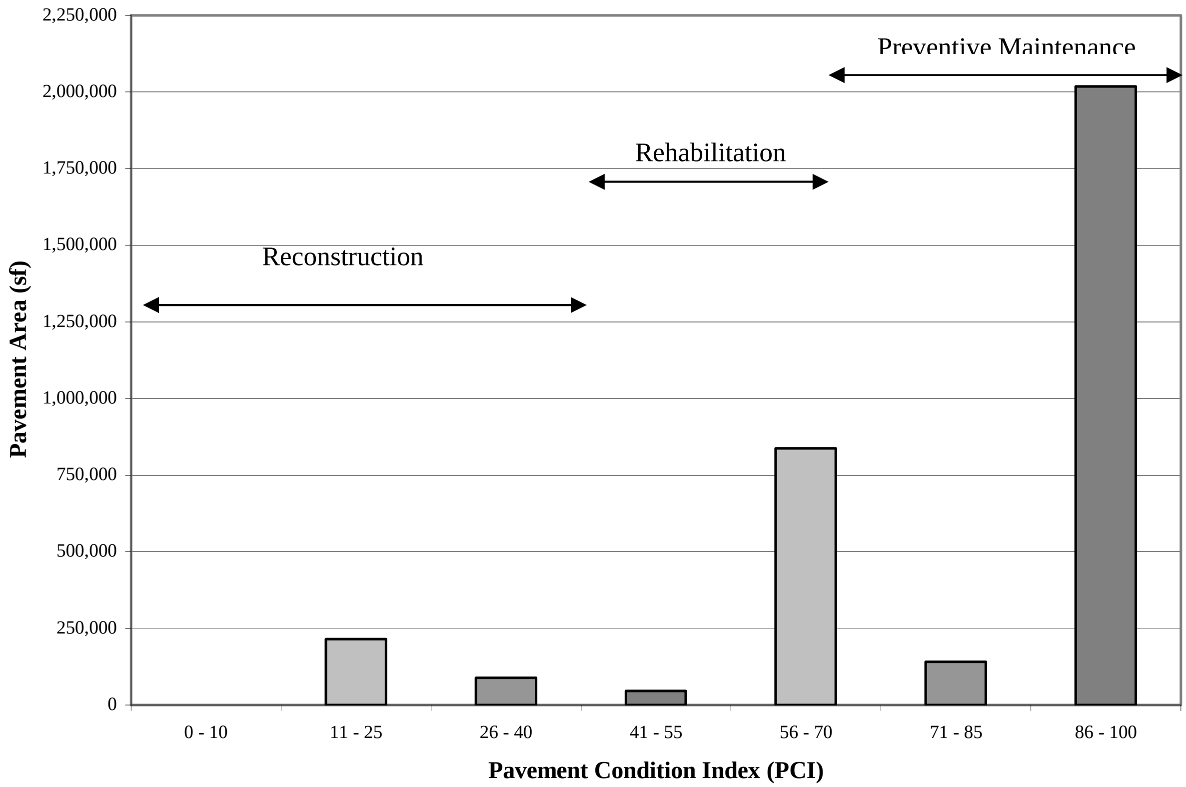


Figure 6. Condition distribution.

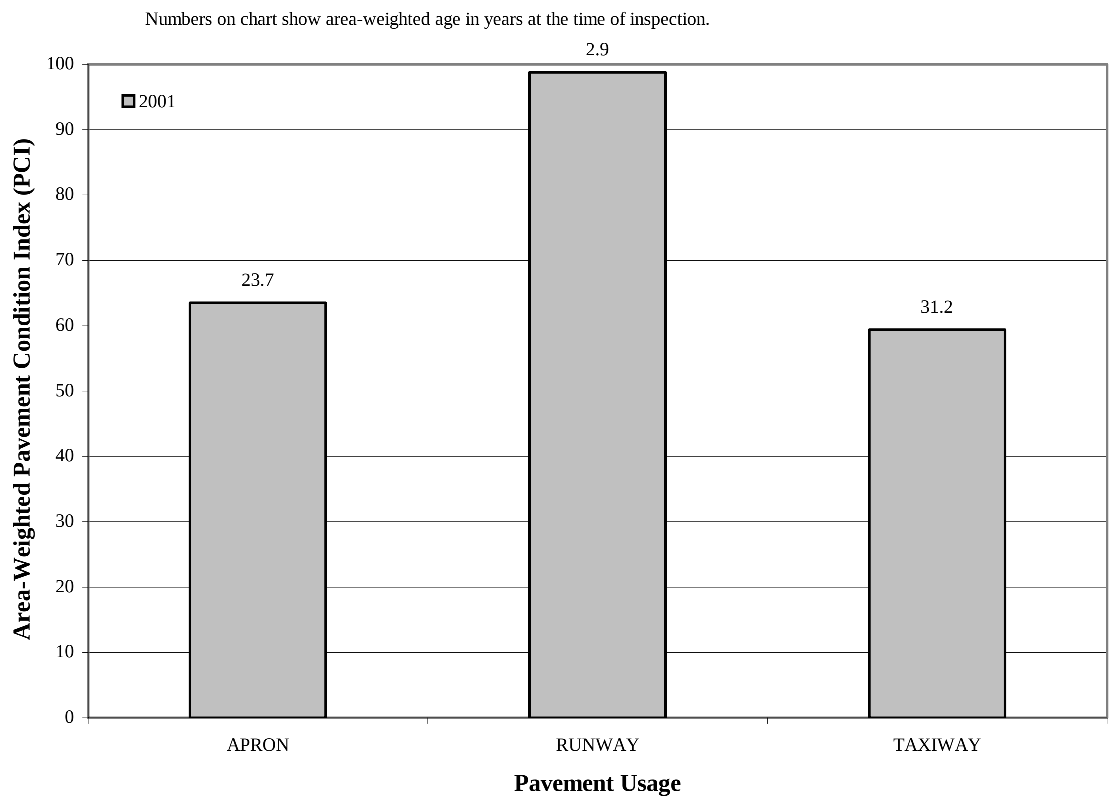
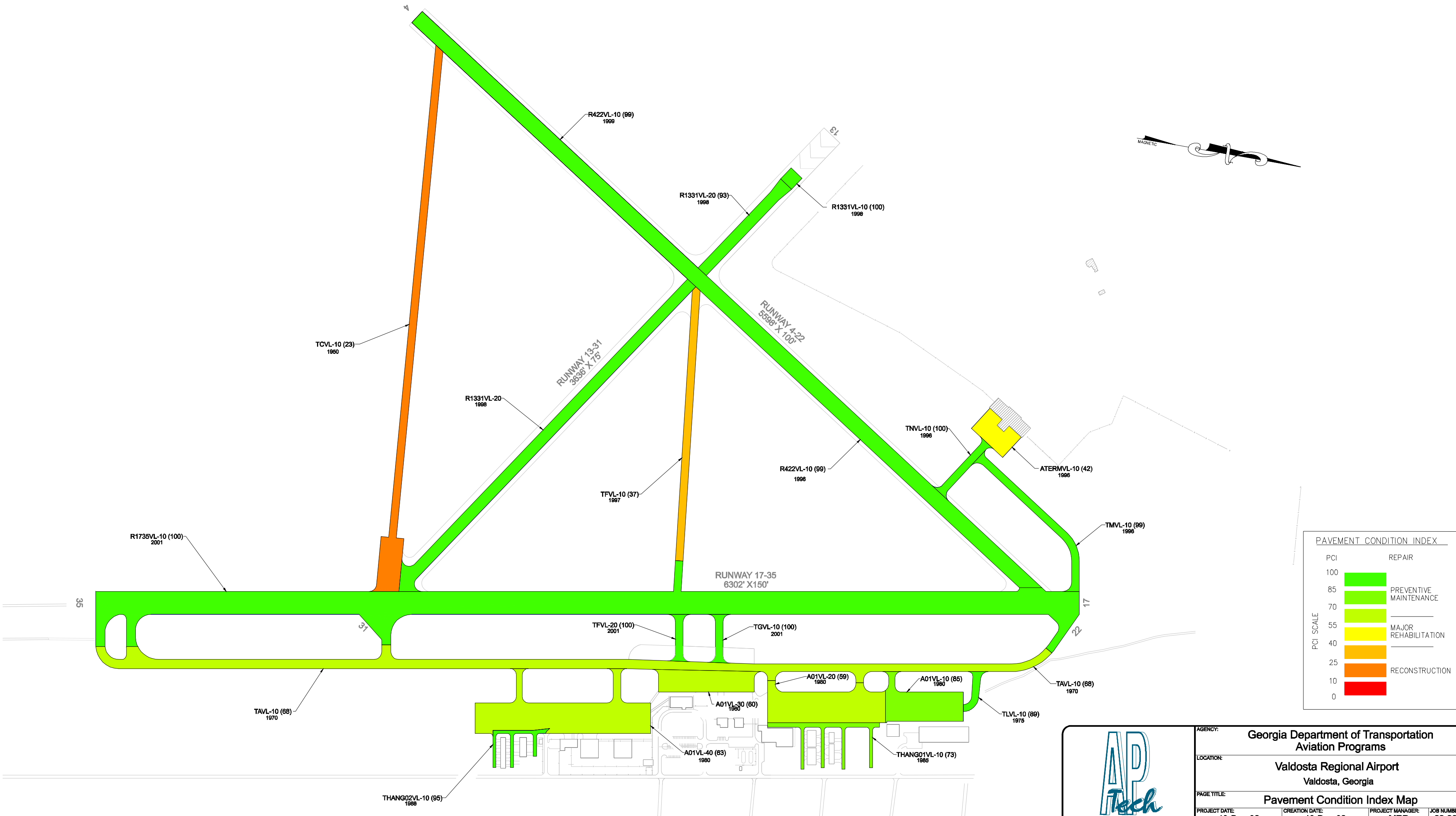


Figure 7. Condition by use.



Applied Pavement Technology, Inc.
3010 Woodcreek Drive, Suite J
Downers Grove, Illinois 60515
Tel: 630.434.9210
Fax: 630.434.9213

AGENCY: Georgia Department of Transportation Aviation Programs			
LOCATION: Valdosta Regional Airport, Valdosta, Georgia			
PAGE TITLE: Pavement Condition Index Map			
PROJECT DATE: 19-Dec-02	CREATION DATE: 19-Dec-02	PROJECT MANAGER: MRB	JOB NUMBER: 00-060-AM1
DRAWING SCALE: 1" = 600'	LAST MODIFIED DATE: 8/5/2002	REVISED BY: JJS	DRAWN BY: KMP
FILENAME: Valdosta.dwg		LAYOUT NAME/NUMBER: 1	PAGE NUMBER: 1

Figure 8. INSERT PCI MAP
(11 x 17)

Table 1. 2001 pavement inspection results.

VALDOSTA REGIONAL AIRPORT								
BRANCH ID	SECTION ID	SURFACE TYPE [1]	SECTION AREA (sf)	LCD [2]	2001 PCI	% Distress due to:		DISTRESS TYPES [5]
						LOAD [3]	CLIMATE OR DURABILITY [4]	
A01VL	10	AC	96,900	1980	85	0	100	L & T CR, BLEEDING
A01VL	20	AC	146,000	1980	59	0	100	BLOCK CR, WEATH/RAVEL, L & T CR
A01VL	30	AC	87,500	1960	60	0	100	BLOCK CR, L & T CR
A01VL	40	AC	223,000	1980	63	13	80	BLOCK CR, ALLIGATOR CR, DEPRESSION, L & T CR, PATCHING
ATERMVL	10	PCC	46,000	1996	42	100	0	SHAT. SLAB
R1331VL	10	PCC	10,000	1998	100	0	0	N/A
R1331VL	20	AAC	243,989	1998	93	0	96	DEPRESSION, L & T CR
R1735VL	10	AAC	1,060,826	2001	100	0	0	N/A
R422VL	10	AAC	550,000	1996	99	0	0	DEPRESSION, BLEEDING
TAVL	10	AC	380,966	1970	68	0	100	BLOCK CR, L & T CR
TCVL	10	AC	214,757	1950	23	0	98	BLEEDING, WEATH/RAVEL, BLOCK CR, L & T CR
TFVL	10	AC	88,500	1977	37	0	70	BLOCK CR, WEATH/RAVEL, L & T CR, SWELLING
TFVL	20	AAC	17,503	2001	100	0	0	N/A
TGVL	10	AAC	17,980	2001	100	0	0	N/A
THANG01VL	10	AC	44,206	1985	73	0	100	BLOCK CR, L & T CR
THANG02VL	10	AC	20,241	1988	95	0	100	L & T CR
TLVL	10	AC	14,484	1975	89	0	100	L & T CR
TMVL	10	AC	59,090	1996	99	0	100	L & T CR

Table 1 (continued). 2001 pavement inspection results.

BRANCH ID	SECTION ID	SURFACE TYPE [1]	SECTION AREA (sf)	LCD [2]	2001 PCI	% Distress due to: LOAD [3]	% Distress due to: CLIMATE OR DURABILITY [4]	DISTRESS TYPES [5]
TNVL	10	AC	24,276	1996	100	0	0	N/A

NOTES:

[1]See Figure 3 for the location of the branch.

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

[5]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 and raveling or block cracking in asphalt pavements) or to a materials-related problem (such as durability cracking in a concrete pavement).

[6] L & T CR = longitudinal and transverse cracking.

5-Year Pavement Maintenance and Rehabilitation Recommendations

As part of the statewide analysis, a 5-year pavement maintenance and rehabilitation program was developed for Valdosta Regional Airport. The initial steps in generating this program were developing maintenance policies and determining unit cost information for maintenance and rehabilitation actions. A copy of this information is provided in Appendix D. Please note that this information was developed in conjunction with the GDOT and is of a general nature for the entire state.

For purposes of this analysis, pavement repair was categorized as follows:

- major rehabilitation (reconstruction, overlay), and
- localized preventive maintenance (a preventive maintenance action that is applied only to a distressed area, such as crack sealing or patching).

Many budget scenarios were investigated during the statewide analysis, and the results of those may be found in the statewide detailed analysis report. For the purposes of this report, however, only the results of the unlimited budget scenario (where all identified projects are funded) are presented. The analysis results identify those pavement areas that are predicted to need major rehabilitation within the next 5 years, as well as those recommended for preventive maintenance actions.

An unlimited budget was used in the analysis with the goal of maintaining the pavement above its critical PCI value. For runway pavements this value is 70. The rest of the pavements on the airport were assigned a value of 65. In general, preventive maintenance is recommended for pavements with a PCI above the critical value while major rehabilitation is recommended for pavements that have a PCI below the critical value. An inflation rate of 3 percent was used during the analysis.

A summary of the 5-year pavement maintenance and rehabilitation program is presented in Table 2. Detailed information on the recommendations for localized maintenance in Year 1 of the analysis is contained in Appendix E and Appendix F. In Year 1, all distresses observed during the inspection are considered in determining viable localized maintenance projects. Preventive maintenance recommendations that are identified in subsequent years only address crack sealing those cracks in asphalt pavements that were rated as low severity at the time of inspection.

Note that these recommendations are based upon a broad network level analysis and are meant to provide the 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.

Major rehabilitation projects may be clustered in the first year of the analysis. Obviously, for economic and operational reasons, this work will often need to be distributed over several years. It is important to remember that regardless of the recommendations presented within this report, the Airport is responsible for repairing pavements where existing conditions pose a hazard to safe operations.

Table 2. 5-year program under an unlimited funding analysis scenario.

Branch[1]	Section	Year	Type of Repair[2]	Estimated Cost[3]
TAVL	10	2002	Preventive	$20,508
TCVL	10	2002	Major M&R	$716,102
TFVL	10	2002	Major M&R	$295,101
A01VL	10	2002	Preventive	$3,325
A01VL	20	2002	Major M&R	$289,439
A01VL	30	2002	Major M&R	$158,678
A01VL	40	2002	Major M&R	$366,714
ATERMVL	10	2002	Major M&R	$153,386
TAVL	10	2005	Major M&R	$684,575
R1331VL	10	2006	Preventive	$20,373
TLVL	10	2006	Preventive	$1,909
A01VL	10	2006	Preventive	$6,226
THANG01VL	10	2006	Preventive	$2,370

[1]See Figure 3 for the location of the branch.
[2]Major Rehabilitation: overlay, mill and overlay, reconstruction, and so on;
Preventive Maintenance: crack sealing, patching, joint resealing, and so on.
[3]Cost estimates based on broad statewide policy and should be adjusted to reflect local costs.

Summary

This report documents the results of the pavement evaluation conducted at Valdosta Regional Airport. During a visual inspection of the pavements in 2001, it was found that the overall condition of the pavement network is a PCI of 82. A 5- year pavement repair program was generated for the Airport, which revealed that approximately $3,196,468 needs to be expended on the pavement system in order to maintain and improve its condition. If this program is followed, over the next 5 years the pavement system will improve from an overall area-weighted PCI value of 82 to approximately a PCI of 88. If money is not expended on pavement maintenance and rehabilitation, it is predicted that the overall area-weighted PCI of the pavement network will drop from 82 to 71.

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	Movement of the concrete slab beneath the asphalt concrete surface because of 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[1] 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 and Weathering	Asphalt binder may have hardened significantly	Patch if isolated. If low-severity, consider surface treatment if extensive. At medium and high 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.

[1]PCC: portland cement concrete

Table A-2. Cause of pavement distress, portland cement concrete pavements.

Distress Type	Probable Cause of Distress	Feasible Maintenance Strategies
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, poor aggregate, and alkali-silica reactivity	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

Overview of section R422VL-10.

Bleeding in section R422VL-10.

Depression and weathering in section R422VL-10.

L&T cracking beginning to form blocks in section R422VL-10.

Overview of underlying pavement in section R422VL-10.

Overview of section R1331VL-10.

Overview of underlying pavement in section R1331VL-10.

L&T cracking in section R1331VL-10.

Overview of section R1735VL-10.

Overview of section TAVL-10.

Block cracking in section TAVL-10.

L&T cracking in section TAVL-10.

Block cracking in section TCVL-10.

Raveling and weathering in section TCVL-10.

Overview of section TFVL-10.

L&T cracking with swelling in section TFVL-10.

Overview of section TLVL-10.

Overview of section TMVL-10.

Overview of section TNVL-10.

Overview of section A01VL-10.

Overview of section A01VL-20.

Overview of section A01VL-30.

Overview of section A01VL-40.

Patching in an additional sample unit in section A01VL-40.

Depression with alligator cracking in sample unit 12 of section A01VL-40.

Overview of section ATERMVL-10.

Shrinkage cracking in section ATERMVL-10.

Overview of section THANG01VL-10.

APPENDIX C

INSPECTION REPORT

APPENDIX D

MAINTENANCE POLICIES AND UNIT COSTS

Table D-1. GDOT's preventive maintenance policy, asphalt-surfaced pavements.

Distress Type	Severity Level	Maintenance Action
Alligator Cracking	Low	Monitor
	Medium	Patch (major rehabilitation if extensive)
	High	Patch (major rehabilitation if extensive)
Bleeding	N/A	Monitor (major rehabilitation required if skid resistance significantly impacted by the distress)
Block Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal (major rehabilitation if extensive)
Corrugation	Low	Monitor
	Medium	Patch (major rehabilitation if extensive)
	High	Patch (major rehabilitation if extensive)
Depression	Low	Monitor
	Medium	Patch
	High	Patch
Jet Blast	N/A	Patch
Joint Reflection Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal (major rehabilitation if extensive)
Longitudinal and Transverse Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal (major rehabilitation if extensive)
Oil Spillage	N/A	AC Patch
Patching	Low	Monitor
	Medium	Monitor
	High	Patch
Polished Aggregate	N/A	Monitor (major rehabilitation required if skid resistance significantly impacted by the distress)
Raveling and Weathering	Low	Monitor (global preventive maintenance action such as surface treatment if extensive)
	Medium	Patch if localized
	High	Patch if localized
Rutting	Low	Monitor
	Medium	Patch (major rehabilitation if extensive)
	High	Patch (major rehabilitation if extensive)
Shoving	Low	Monitor
	Medium	Patch
	High	Patch
Slippage Cracking	N/A	Patch (major rehabilitation if extensive)
Swelling	Low	Monitor
	Medium	Patch
	High	Patch

Table D-2. GDOT's preventive maintenance policy,
portland cement concrete pavements.

Distress Type	Severity Level	Maintenance Action
Blow-Up	Low	Patch
	Medium	Patch
	High	Patch
Corner Break	Low	Crack Seal
	Medium	Crack Seal
	High	Patch
Cracks	Low	Crack Seal
	Medium	Crack Seal
	High	Crack Seal
Durability Cracking	Low	Monitor
	Medium	Patch
	High	Slab Replacement
Joint Seal Damage	Low	Monitor
	Medium	Joint Seal
	High	Joint Seal
Patching	Low	Monitor
	Medium	Patch
	High	Patch
Popouts	N/A	Monitor
Pumping	N/A	Monitor
Scaling	Low	Monitor
	Medium	Slab Replacement
	High	Slab Replacement
Settlement	Low	Monitor
	Medium	Monitor
	High	Grinding
Shattered Slab	Low	Crack Seal
	Medium	Slab Replacement
	High	Slab Replacement
Shrinkage	N/A	Monitor
Spalling (Joint and Corner)	Low	Monitor
	Medium	Patch
	High	Patch

Table D-3. Unit costs for GDOT preventive maintenance actions, commercial service airports.

Maintenance Action	Unit Cost ($/sf)
Patching	2.55
Crack Sealing	3.20
Slab Replacement	5.10
Joint Sealing	4.00
Grinding	50.00

Table D-4. GDOT's unit costs based on PCI ranges, commercial service airports.

	PCI Range							
Work Type	0 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	> 89
Major Rehabilitation: CS	$30.01/sy	$30.01/sy	$30.01/sy	$14.80/sy	$14.80/sy	$14.80/sy	$10.71/sy	$10.71/sy

APPENDIX E

YEAR 2002 MAINTENANCE PLAN
ORGANIZED BY SECTION

Table E-1. 2002 maintenance plan organized by section.

Plan Year	Network	Branch	Section	Distress Description	Severity	Work Description	Work Qty.	Work Unit	Unit Cost	Work Cost
2002	VALDOSTA	A01VL	10	L & T CR	M	Crack Sealing	1,039	LF	$3.20	$3,325
2002	VALDOSTA	TAVL	10	L & T CR	M	Crack Sealing	6,409	LF	$3.20	$20,508

APPENDIX F

YEAR 2002 MAINTENANCE PLAN
ORGANIZED BY REPAIR TYPE

Table F-1. 2002 maintenance plan organized by repair type.

Plan Year	Network	Branch	Section	Distress Description	Severity	Work Description	Work Qty.	Work Unit	Unit Cost	Work Cost
2002	VALDOSTA	A01VL	10	L & T CR	M	Crack Sealing	1,039	LF	$3.20	$3,325
2002	VALDOSTA	TAVL	10	L & T CR	M	Crack Sealing	6,409	LF	$3.20	$20,508