

# FOREST CITY MUNICIPAL AIRPORT PAVEMENT MANAGEMENT REPORT



**Prepared For:**  
Iowa Department of Transportation  
Office of Aviation

**Prepared By:**  
Applied Pavement Technology, Inc.

# **FOREST CITY MUNICIPAL AIRPORT PAVEMENT MANAGEMENT REPORT**

*PREPARED FOR:*

**IOWA DEPARTMENT OF TRANSPORTATION  
OFFICE OF AVIATION**

*PREPARED BY:*

**APPLIED PAVEMENT TECHNOLOGY, INC.**

*IN ASSOCIATION WITH:*

**ROBINSON ENGINEERING COMPANY**

April 2016

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## TABLE OF CONTENTS

INTRODUCTION.....	1
PAVEMENT INVENTORY.....	2
PAVEMENT EVALUATION.....	4
Pavement Evaluation Procedure.....	4
Pavement Evaluation Results.....	5
Inspection Comments.....	10
Runways.....	10
Taxiways.....	10
Apron.....	10
PAVEMENT MAINTENANCE AND REHABILITATION PROGRAM.....	11
Analysis Parameters.....	11
Localized Preventive Maintenance Policies and Unit Costs.....	11
Major Rehabilitation Unit Costs.....	11
Budget and Inflation Rate.....	11
Analysis Approach.....	11
Analysis Results.....	12
General Maintenance Recommendations.....	13
FAA Requirements (Public Law 103-305).....	13
SUMMARY.....	19

## LIST OF FIGURES

Figure 1. Pavement condition versus cost of repair.....	1
Figure 2. Pavement inventory.....	2
Figure 3. Forest City Municipal Airport network definition map.....	3
Figure 4. Visual representation of PCI scale.....	4
Figure 5. PCI versus repair type.....	5
Figure 6. Overall condition at Forest City Municipal Airport.....	6
Figure 7. Condition by branch use at Forest City Municipal Airport.....	7
Figure 8. Forest City Municipal Airport PCI map.....	8

## LIST OF TABLES

Table 1. Pavement evaluation results.....	9
Table 2. 5-year M&R program under an unlimited funding analysis scenario.....	12
Table 3. Pavement inspection report.....	16

## APPENDIXES

Appendix A. Cause of Distress Tables.....	A-1
Appendix B. Inspection Photographs.....	B-1
Appendix C. Inspection Report.....	C-1
Appendix D. Work History Report.....	D-1
Appendix E. Localized Preventative Maintenance Policies and Unit Cost Tables.....	E-1
Appendix F. Year 2016 Localized Preventive Maintenance Details.....	F-1

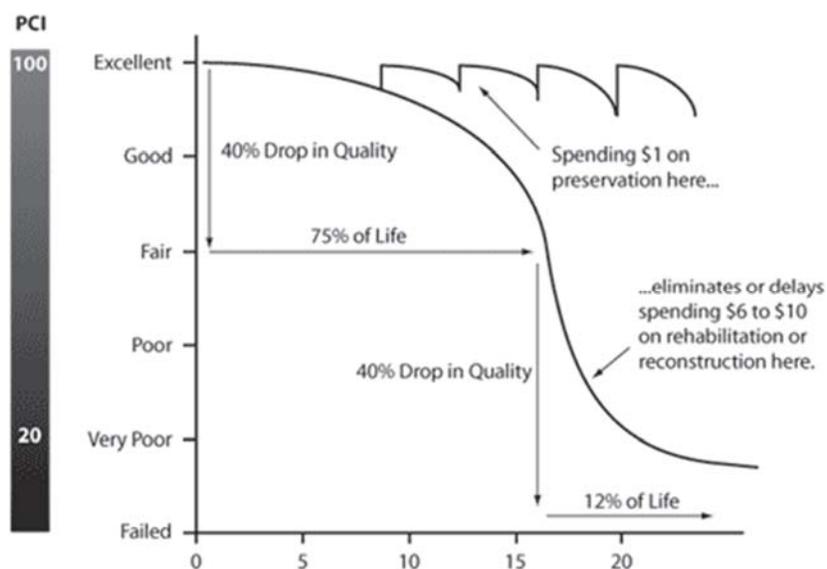
## INTRODUCTION

Applied Pavement Technology, Inc. (APTech), with assistance from Robinson Engineering Company, updated the airport pavement management system (APMS) for the Iowa Department of Transportation, Office of Aviation (Iowa DOT). During this project, pavement conditions at Forest City Municipal Airport were assessed in November 2015 using the Pavement Condition Index (PCI) procedure.

During a PCI inspection, the types, severities, and amounts of distress present in a pavement are 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 provides an overall measure of condition and an indication of the level of work that will be required to maintain or repair a pavement. The distress information also provides insight into what is causing the pavement to deteriorate, which is the first step in selecting the appropriate repair action to correct the problem.

Programmed into an APMS, PCI information is used to determine when preventive maintenance actions (such as crack or joint sealing) are advisable, and also to identify the most cost-effective time to perform major rehabilitation (such as an overlay or whitetopping). The importance of identifying not only the type of repair, but also the optimal time of repair is illustrated in Figure 1 (taken from <http://www.fhwa.dot.gov/pavement/preservation/ppc0621.cfm>). This figure shows that there is a point in a pavement's life cycle where the rate of deterioration increases. The financial impact of delaying repairs beyond this point can be severe.

Figure 1. Pavement condition versus cost of repair.

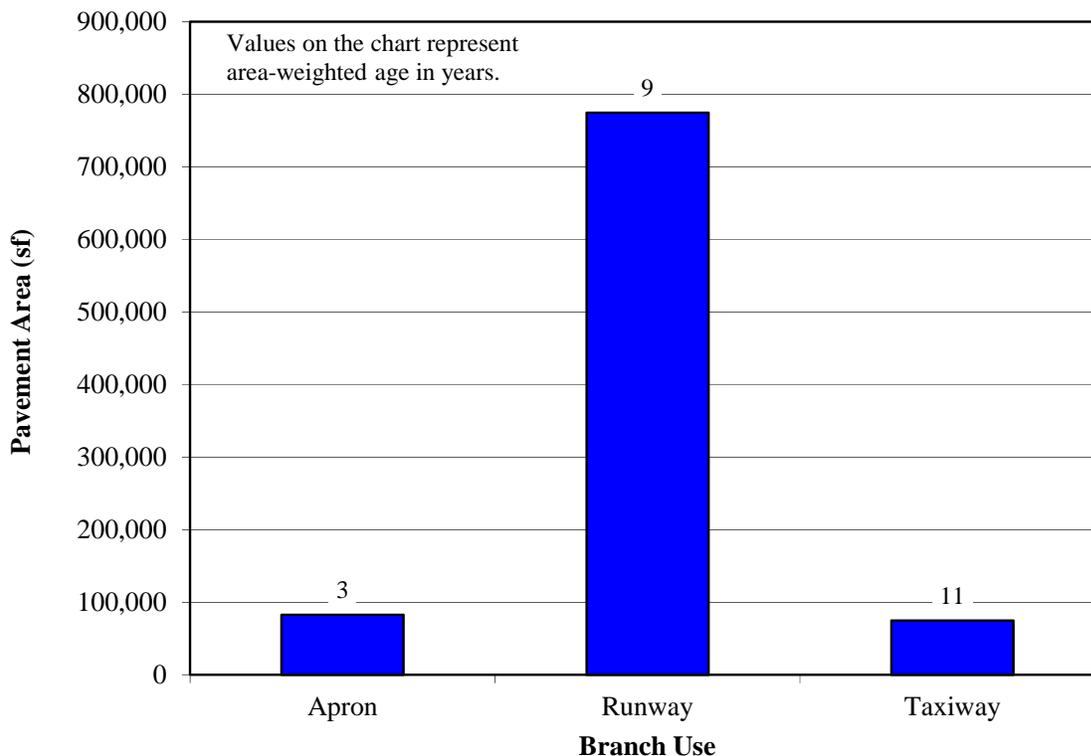


The pavement evaluation results for Forest City Municipal Airport are presented within this report and can be used by the Iowa DOT, the Federal Aviation Administration (FAA), and Forest City Municipal Airport to prioritize and schedule pavement maintenance and rehabilitation (M&R) actions at the airport. In addition to this report, the web-based Interactive Data Exchange Application (IDEA) containing the pavement management information collected during this project was updated, and may be accessed from Iowa DOT's website.

## PAVEMENT INVENTORY

Approximately 932,011 square feet of runway, taxiway, and apron pavements were evaluated at Forest City Municipal Airport, as illustrated in Figure 2. This figure also shows the area-weighted age in years of the pavements.

Figure 2. Pavement inventory.

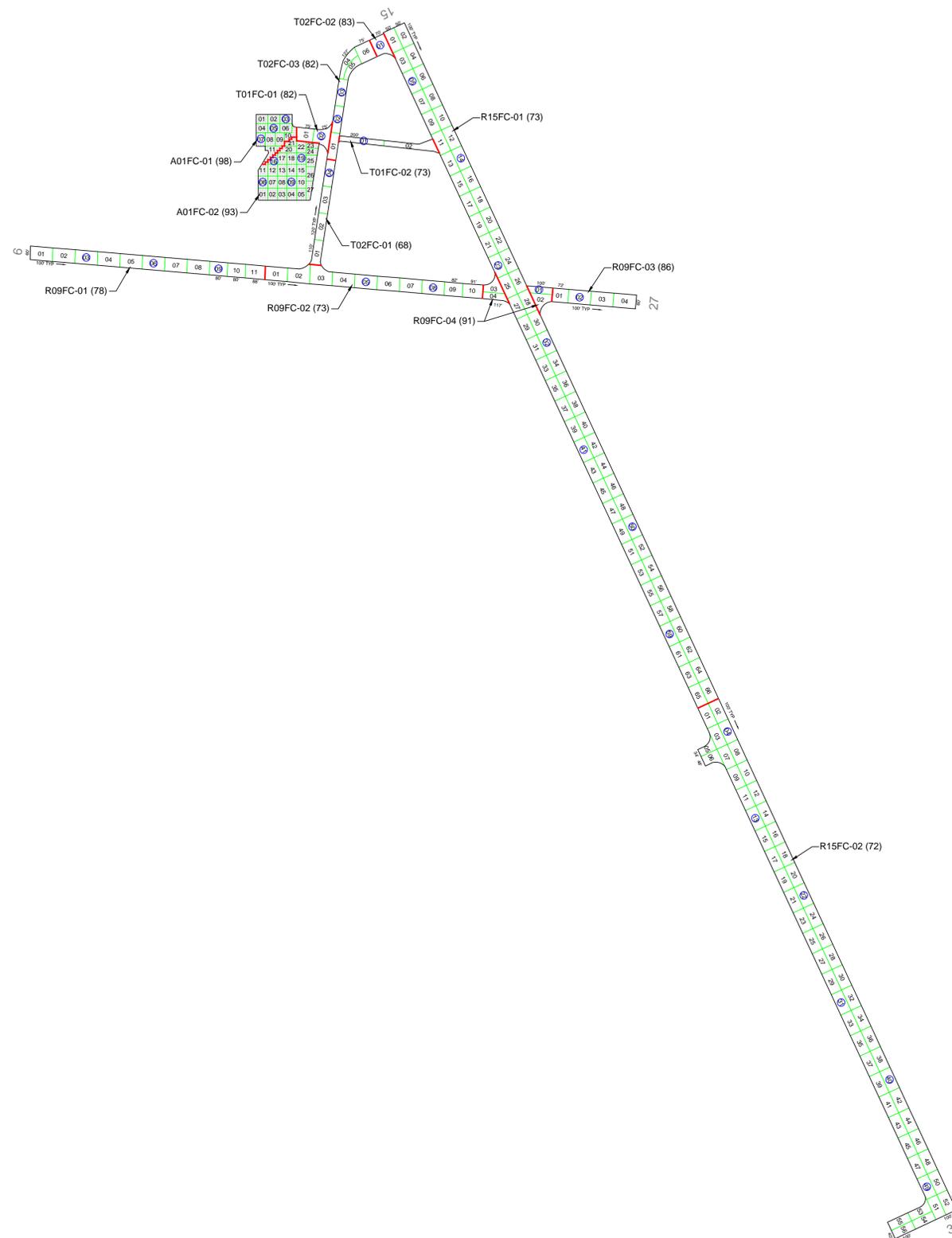


The pavement network at Forest City Municipal Airport was divided into branches, sections, and sample units for pavement management purposes. A branch is a single entity that serves a distinct function. For example, a runway is considered a branch because it serves a single function (allowing aircraft to take off and land). Taxiways and aprons are also separate branches.

Each branch was further divided into sections. Sections are defined as parts of the branch that share common attributes, such as cross-section, last construction date, traffic level, and performance. Using this traditional approach, if a runway was built in 1968 and then extended in 1984, it would be comprised of two separate sections.

To estimate the overall condition of a pavement section, each section was subdivided into sample units. Portions of these sample units were evaluated during pavement inspections, and the collected information was extrapolated to predict the condition of the section as a whole. Figure 3 provides a map that details how the pavement network was divided into management units and identifies the sample units that were evaluated during the pavement inspection at Forest City Municipal Airport.

# FIGURE 3. NETWORK DEFINITION MAP.



**NETWORK DEFINITION LEGEND**

- BRANCH IDENTIFIER
- SECTION IDENTIFIER
- PCI VALUE
- SECTION BREAK LINE
- SAMPLE UNIT BREAK LINE
- SLAB JOINT
- SAMPLE UNIT NUMBER
- SAMPLE UNIT INSPECTED
- ADDITIONAL SAMPLE UNIT

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AGENCY: Iowa Department of Transportation  
 Office of Aviation

LOCATION: Forest City Municipal Airport  
 Forest City, Iowa

PAGE TITLE: Network Definition Map

PROJECT DATE: OCT. 2015	CREATION DATE: OCT. 2015	PROJECT MANAGER: LJR	JOB NUMBER: 2012-001-AM04
DRAWING SCALE: 1"=300'	LAST MODIFIED DATE: DEC. 2015	REVISED BY: ABF	DRAWN BY: KEW
FILENAME: Forest City.dwg		LAYOUT NAME/NUMBER: NET. DEF.	PAGE NUMBER: 3

## PAVEMENT EVALUATION

### Pavement Evaluation Procedure

APTech inspected the pavements at Forest City Municipal Airport using the PCI procedure described in:

- FAA Advisory Circular (AC) 150/5380-6C, *Guidelines and Procedures for Maintenance of Airport Pavements* ([http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/150-5380-6C.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5380-6C.pdf))
- FAA AC 150/5380-7B, *Airport Pavement Management Program (PMP)* ([http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/150-5380-7B.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5380-7B.pdf))
- ASTM D5340-12, *Standard Test Method for Airport Pavement Condition Index Surveys*

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 of the section. The PCI scale ranges from a value of 0 (representing a pavement in a failed condition) to a value of 100 (representing a pavement in excellent condition).

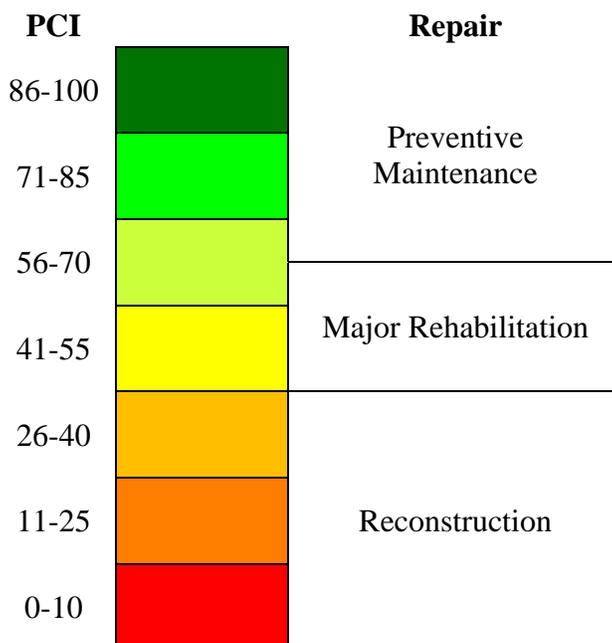
Figure 4. Visual representation of PCI scale.

Typical Pavement Surface <sup>1</sup>	PCI
	100
	60
	15

<sup>1</sup>Photographs shown are not specific to Forest City Municipal Airport.

In general terms, pavements with relatively high PCIs that are not exhibiting significant load-related distress will benefit from preventive maintenance actions, such as crack sealing or joint resealing. As the PCI drops, the pavements may require major rehabilitation, such as an overlay or whitetopping. In some situations where the PCI has dropped low enough, reconstruction may be 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 asphalt-surfaced pavements or shattered slabs on portland cement concrete [PCC] pavements), climate/durability-related (such as weathering [a climate-related distress type on asphalt-surfaced pavements] and durability cracking [a durability-related distress type 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 identifies the distress types considered during a PCI inspection and describes the likely cause of each distress type. It should be noted that a PCI is based on visual signs of pavement deterioration and does not provide a measure of structural capacity.

### Pavement Evaluation Results

The pavements at Forest City Municipal Airport were inspected on November 10, 2015. The 2015 area-weighted condition of Forest City Municipal Airport is 76, with conditions ranging from 68 to 98 (on a scale of 0 [failed] to 100 [excellent]). During the previous pavement inspection in 2012, the area-weighted PCI of the airport was 85.

Figure 6 summarizes the overall condition of the pavements at Forest City Municipal Airport and Figure 7 presents area-weighted condition (average PCI adjusted to account for the relative size of the pavement sections) by branch use. Figure 8 is a map that displays the condition of the evaluated pavements. Table 1 summarizes the results of the pavement evaluation. Appendix B presents photographs taken during the PCI inspection, and Appendix C contains detailed information on the distresses observed during the visual survey. Appendix D includes detailed work history information that was collected during the record review process.

Figure 6. Overall condition at Forest City Municipal Airport.

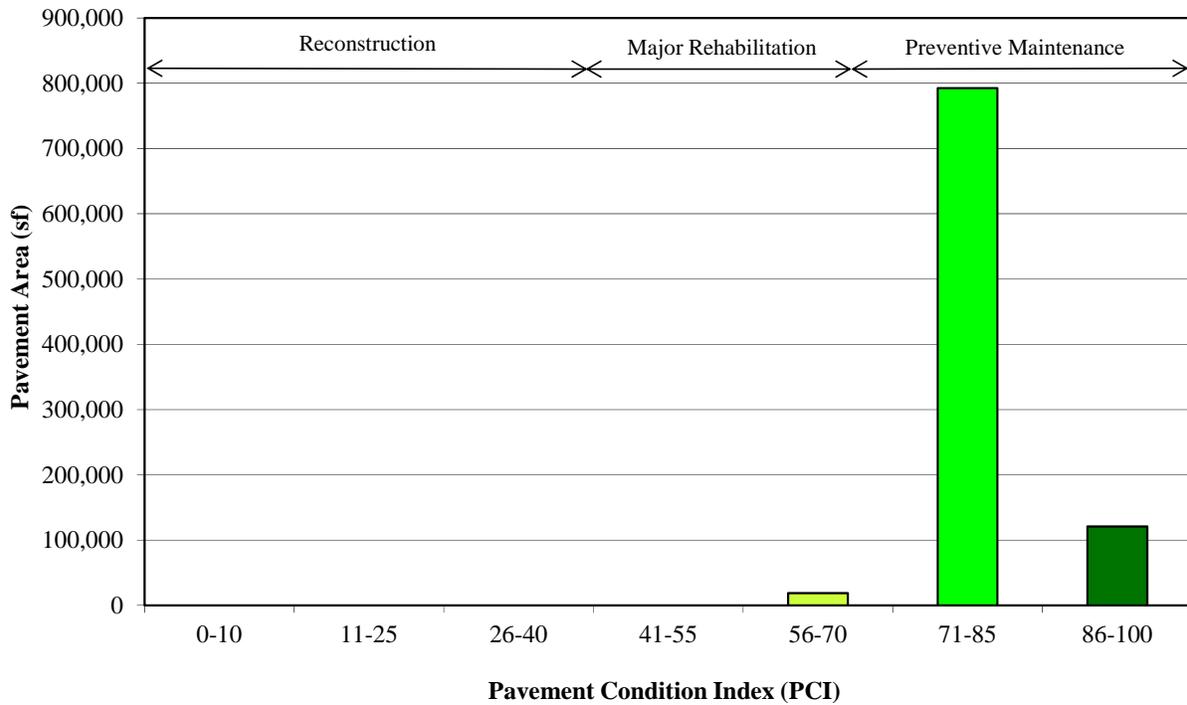


Figure 7. Condition by branch use at Forest City Municipal Airport.

(Values on chart are area-weighted)

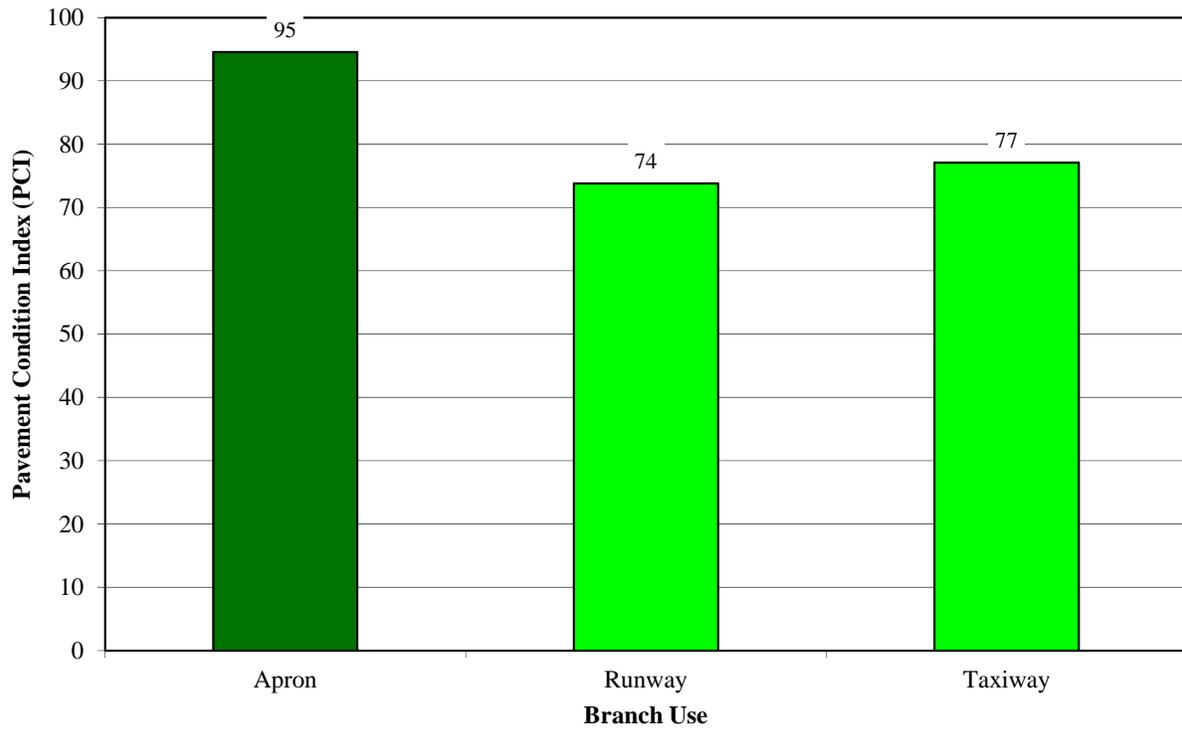
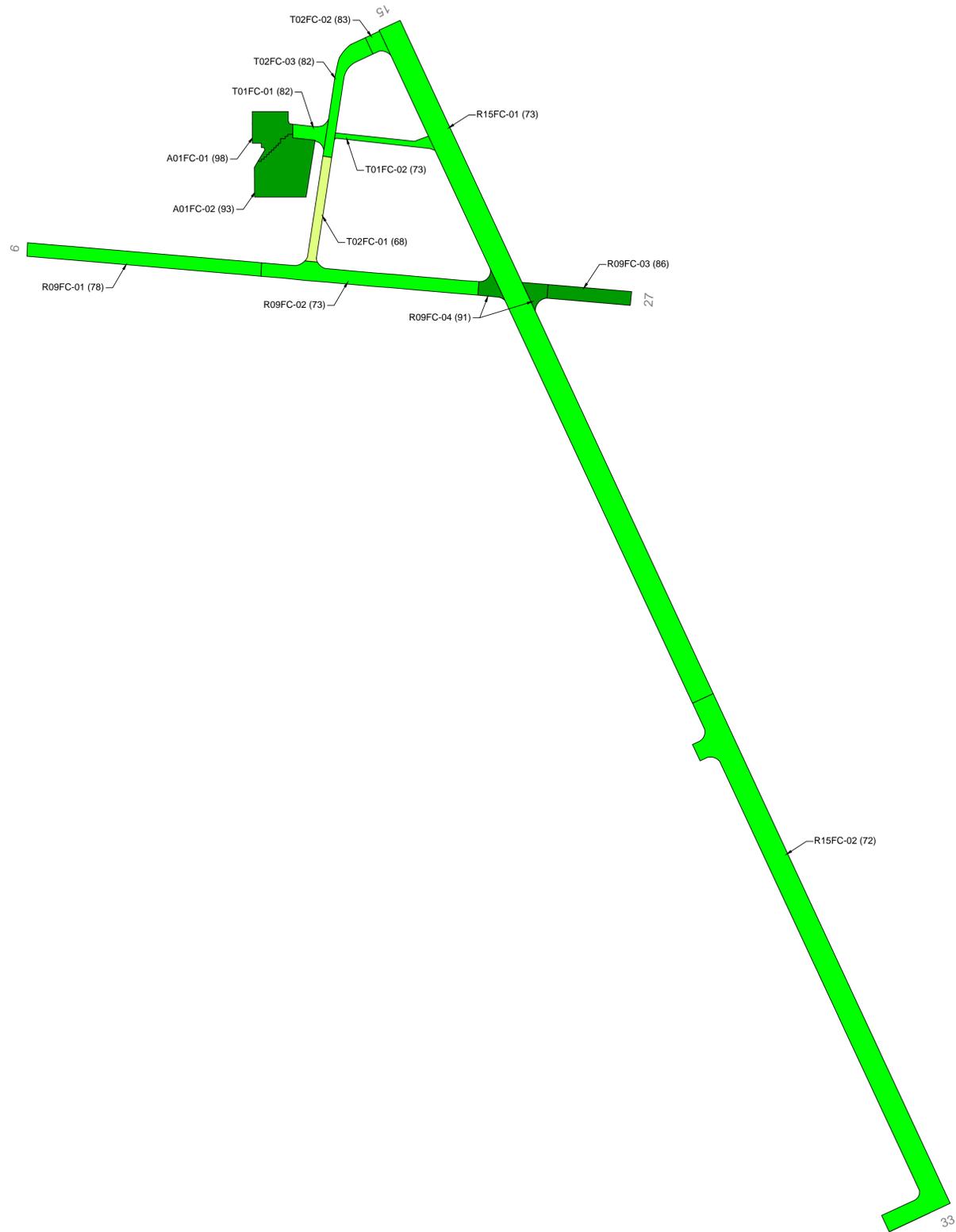


FIGURE 8. PCI MAP.



**LEGEND**

	BRANCH IDENTIFIER
	SECTION IDENTIFIER
	PCI VALUE
	SECTION BREAK LINE

**PAVEMENT CONDITION INDEX REPAIR**

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

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AGENCY: Iowa Department of Transportation Office of Aviation			
LOCATION: Forest City Municipal Airport Forest City, Iowa			
PAGE TITLE: 2015 Pavement Condition Index Map			
PROJECT DATE: OCT. 2015	CREATION DATE: OCT. 2015	PROJECT MANAGER: LJR	JOB NUMBER: 2012-001-AM04
DRAWING SCALE: 1"=300'	LAST MODIFIED DATE: DEC. 2015	REVISED BY: KEW	DRAWN BY: KEW
FILENAME: Forest City.dwg		LAYOUT NAME/NUMBER: PCI	PAGE NUMBER: 8

Table 1. Pavement evaluation results.

Forest City Municipal Airport								
Branch <sup>1</sup>	Section <sup>1</sup>	Surface Type <sup>2</sup>	Section Area (sf)	LCD <sup>3</sup>	2015 PCI	% Distress Due to:		Distress Types <sup>6</sup>
						Load <sup>4</sup>	Climate or Durability <sup>5</sup>	
A01FC	01	PCC	25,521	6/1/2007	98	0	100	Joint Seal Damage
	02	PCC	57,263	6/3/2014	93	85	0	Joint Spalling, LTD Cracking, Shrinkage Cracking
R09FC	01	AAC	62,810	6/1/2004	78	0	100	L&T Cracking, Weathering
	02	AAC	60,476	6/1/2004	73	0	100	L&T Cracking, Weathering
	03	AAC	22,711	6/1/2004	86	0	100	L&T Cracking, Weathering
	04	AAC	15,232	6/1/2007	91	0	100	L&T Cracking, Weathering
R15FC	01	AAC	337,937	8/1/2007	73	0	100	L&T Cracking, Weathering
	02	AAC	275,391	8/1/2007	72	0	100	L&T Cracking, Patching, Weathering
T01FC	01	AAC	10,165	6/1/2012	82	0	100	L&T Cracking, Weathering
	02	AC	11,833	11/1/2004	73	0	100	L&T Cracking, Weathering
T02FC	01	AC	18,938	7/1/1985	68	23	77	Alligator Cracking, L&T Cracking, Raveling, Weathering
	02	AAC	6,118	6/1/2012	83	0	100	L&T Cracking, Weathering
	03	AAC	27,616	6/1/2012	82	0	100	L&T Cracking, Weathering

<sup>1</sup>See Figure 3 for the location of the branch and section.

<sup>2</sup>AC = asphalt cement concrete; AAC = asphalt overlay on AC; PCC = portland cement concrete; APC = asphalt overlay on PCC.

<sup>3</sup>LCD = last construction date.

<sup>4</sup>Distress due to load includes those distresses attributed to a structural deficiency in the pavement, such as alligator cracking or rutting on asphalt-surfaced pavements or shattered slabs on PCC pavements.

<sup>5</sup>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, raveling, or block cracking in asphalt-surfaced pavements) or to a materials-related problem (such as durability cracking or alkali-silica reaction [ASR] in a PCC pavement). If materials-related distresses were recorded during the inspection, further laboratory testing is required to definitively determine the type present.

<sup>6</sup>L&T Cracking = Longitudinal and Transverse Cracking; LTD Cracking = Longitudinal, Transverse, and Diagonal Cracking; ASR = Alkali-Silica Reaction.

## Inspection Comments

Forest City Municipal Airport was inspected on November 10, 2015. There were thirteen pavement sections defined during the inspection.

### Runways

Runway 15-33 consisted of two sections in similar condition. Moderate amounts of low- and medium-severity longitudinal and transverse (L&T) cracking were observed in both sections. In addition, low- and medium-severity weathering in Section 01, and low-severity weathering and patching in Section 02 were identified. The majority of the low-severity cracking was sealed with the crack sealant in good condition, while the medium-severity cracking was recorded in areas where the crack sealant had failed.

Runway 9-27 was defined by four sections. Sections 01 and 02 were in similar condition with moderate amounts of low- and medium-severity L&T cracking and low-severity weathering identified. Sections 03 and 04 had smaller quantities of low-severity L&T cracking and weathering observed. The low-severity cracking was mostly sealed with the crack sealant in good condition. The medium-severity cracking was recorded where the crack sealant had failed.

### Taxiways

Taxiway 01 contained two sections. Section 01, which connected the apron area to Taxiway 02, had small amounts of low- and medium-severity L&T cracking and low-severity weathering observed at the time of inspection. Section 02 connected Runway 15-33 with Taxiway 02 and had moderate quantities of medium-severity L&T cracking and low- and medium-severity weathering identified throughout. The low-severity cracking was unsealed and the medium-severity cracking was recorded where unsealed crack widths were greater than ¼ in.

Taxiway 02 connected the Runway 15 approach with Runway 9-27 midfield and was defined by three sections. Section 01 had small amounts of low- and medium-severity L&T cracking, low-severity weathering, and low-severity raveling along with isolated quantities of medium-severity alligator cracking noted. Sections 02 and 03 were in similar condition with small amounts of low- and medium-severity L&T cracking and low-severity weathering observed. The low-severity cracking was unsealed and the medium-severity cracking was recorded where unsealed crack widths exceeded ¼ in.

### Apron

The apron area consisted of two sections. Section 01 was in excellent condition with only low-severity joint seal damage observed. Section 02 was recently reconstructed with areas of low-severity longitudinal, transverse, and diagonal (LTD) cracking; low-severity joint spalling; and shrinkage cracking identified.

## PAVEMENT MAINTENANCE AND REHABILITATION PROGRAM

Using the information collected during the pavement inspection, a 5-year M&R program was developed for Forest City Municipal Airport. In addition, a 1-year plan for localized preventive maintenance (such as crack sealing and patching) was prepared. The PAVER™ pavement management software was used to perform this analysis.

### Analysis Parameters

#### Localized Preventive Maintenance Policies and Unit Costs

Localized preventive maintenance policies were developed for asphalt-surfaced and PCC pavements. These policies, shown in Appendix E, identify the localized preventive maintenance actions that the Iowa DOT considered appropriate to correct different distress types and severities. The Iowa DOT provided unit costs for each of the localized preventive maintenance actions included in these policies, and these costs are detailed in Appendix E. Please note that this information is of a general nature for the entire state. The maintenance policies and unit costs may require adjustment to reflect specific conditions at Forest City Municipal Airport.

#### Major Rehabilitation Unit Costs

PAVER™ estimates the cost of major rehabilitation based on the predicted PCI of the pavement section. The Iowa DOT provided these costs, and they are presented in Appendix E. If major rehabilitation is recommended in the 5-year program, further engineering investigation will be needed to identify the most appropriate rehabilitation action and to more accurately estimate the cost of such work.

#### Budget and Inflation Rate

An unlimited budget with a start date of July 1, 2016 and an inflation rate of 2.5 percent was used during the analysis.

### Analysis Approach

The 5-year M&R program was prepared with the goal of maintaining the pavements above established critical PCIs. The Iowa DOT set the critical PCI at 65 for runways, 60 for taxiways, and 55 for aprons. During this analysis, major rehabilitation was recommended for pavements in the year they dropped below their critical PCI.

For the first year (2016) of the analysis only, a localized preventive maintenance plan was developed for those pavement sections that were above their critical PCI. If major rehabilitation was triggered for a section in 2017 or 2018, then localized maintenance was not recommended for 2016. While localized preventive maintenance should be an annual undertaking at Forest City Municipal Airport, it is not possible to accurately predict the propagation of cracking and other distress types. Therefore, the airport should budget for maintenance every year and can use the 2016 localized preventive 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.

## Analysis Results

A summary of the M&R program for Forest City Municipal Airport is presented in Table 2. Detailed information on the recommended localized preventive maintenance plan for 2016 is contained in Appendix F.

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

Year	Branch <sup>1</sup>	Section <sup>1</sup>	Surface Type <sup>2</sup>	Type of Repair <sup>3</sup>	Estimated Cost <sup>4</sup>
2016	R09FC	01	AAC	Localized Maintenance	\$188
		02	AAC	Localized Maintenance	\$612
	R15FC	01	AAC	Localized Maintenance	\$13,266
		02	AAC	Localized Maintenance	\$7,421
	T01FC	01	AAC	Localized Maintenance	\$247
		02	AC	Localized Maintenance	\$624
	T02FC	01	AC	Localized Maintenance	\$840
		02	AAC	Localized Maintenance	\$92
		03	AAC	Localized Maintenance	\$580
2019	R09FC	02	AAC	Major Rehabilitation	\$293,067
	R15FC	01	AAC	Major Rehabilitation	\$1,637,645
		02	AAC	Major Rehabilitation	\$1,334,547
2020	T02FC	01	AC	Major Rehabilitation	\$94,068
<b>Total:</b>					<b>\$3,383,197</b>

<sup>1</sup>See Figure 3 for the location of the branch and section.

<sup>2</sup>AC = asphalt cement concrete; AAC = asphalt overlay on AC; PCC = portland cement concrete; APC = asphalt overlay on PCC.

<sup>3</sup>Major Rehabilitation: such as pavement reconstruction or an overlay. Localized Maintenance: such as crack sealing or patching.

<sup>4</sup>Cost estimates are based on broad statewide numbers and should be adjusted to reflect local costs.

The recommendations made in this report are based on a broad network level analysis and are meant to provide Forest City Municipal Airport with an indication of the type of pavement-related work required during the next 5 years. Further engineering investigation may be necessary to identify which repair action is most appropriate. In addition, the cost estimates provided are based on overall unit costs for the entire state, and Forest City Municipal Airport should adjust the plan to reflect local costs.

Because an unlimited budget was used in the analysis, the pavement repair program may need to be adjusted to take into account economic and/or operational constraints. Identifying a project need does not necessarily mean that state or federal funding will be available in the year it is indicated. It is important to remember that, regardless of the recommendations presented within this report, Forest City Municipal Airport is responsible for repairing pavements where existing conditions pose a hazard to safe operations.

## General Maintenance Recommendations

In addition to the specific maintenance actions presented in Appendix F, it is recommended that the following strategies are considered for prolonging pavement life:

1. Regularly inspect all safety areas of the airport, and document all inspection activity. A sample form that can be used to perform these inspections is provided in Table 3 of this report.
2. Provide a method of tracking all maintenance activities that occur as a result of inspections. These need to be reported to the FAA and Iowa DOT. This is important because this information is used to update the APMS records and is required to remain in compliance with Public Law 103-305 (see the next section of this report for further information on this law).
3. Conduct an aggressive campaign against weed growth through timely herbicide applications and/or mowing programs for the safety areas. Vegetation growth in pavement cracks is very destructive and significantly increases the rate of pavement deterioration.
4. Implement a periodic crack and joint sealing program. Keeping water and debris out of the pavement system by sealing cracks and joints is a proven and cost-effective method of extending the life of the pavement system.
5. 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.
6. Closely monitor the movement of heavy equipment (particularly farming, construction, and fueling equipment) to make sure it is only operating on pavements that are designed to accommodate heavy loads. Failure to restrict heavy equipment to appropriate areas may result in the premature failure of airport pavements.

## FAA Requirements (Public Law 103-305)

Since Forest City Municipal Airport is in the National Plan of Integrated Airport Systems (NPIAS), the airport sponsor is required to keep the airport in a viable operating condition. This includes maintaining airport pavements in accordance with Public Law 103-305. Public Law 103-305 states that after January 1, 1995, NPIAS 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 federal funding of pavement replacement or reconstruction projects. To be in full compliance with the federal law, the PMMS must include the following components, at minimum: pavement inventory, pavement inspections, record keeping, information retrieval, and program funding.

This report serves as a complete pavement inventory and 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.

FAA AC 150/5380-6C and FAA AC 150/5380-7B provide detailed guidance pertaining to the requirements for an acceptable pavement management program. Appendix A of FAA AC 150/5380-7B outlines what needs to be included in a pavement management program (PMP) to remain in compliance with this law and Grant Assurance #11. Following is a copy of this

Appendix, along with instructions for supplementing this report so that all requirements are met. **Note that the italicized words are direct quotations from the FAA AC.**

### FAA AC 150/5830-7B, Appendix A. Pavement Management Program (PMP)

*A-1.0 An effective PMP specifies the procedures to follow to assure that proper preventative and remedial pavement maintenance is performed. The program should identify funding or anticipated funding and other resources available to provide remedial and preventive maintenance activities. An airport sponsor may use any format deemed appropriate, but the program needs to, as a minimum, include the following:*

*A-1.1. Pavement Inventory. The following must be depicted:*

- a. *Identification of all runways, taxiways, and aprons with pavement broken down into sections each having similar properties.*

The network definition map provided in Figure 3 of this report shows the location of all runways, taxiways, and aprons at Forest City Municipal Airport. If any new pavements are constructed or any pavement areas are permanently closed, this map must be updated. Maps can be updated by submitting the project plans to the Iowa DOT after project completion.

- b. *Dimensions of pavement sections.*

The dimensions of all runways, taxiways, and aprons are stored in the PAVER™ database. Appendix C provides information on length, width, and area. In addition, the network definition map (Figure 3) is drawn to scale. Any changes to pavement dimensions must be recorded.

- c. *Type of pavement surface.*

The type of pavement for each section at the airport is listed in Table 1 of this report and is also stored in the PAVER™ database. Any changes to pavement type (through an overlay or reconstruction) must be recorded.

- d. *Year of construction and/or most recent major rehabilitation.*

Dates for pavement construction, rehabilitation, or reconstruction must be recorded.

- e. *Whether AIP [Airport Improvement Program] or PFC [Passenger Facility Charge] funds were used to construct, reconstruct, or repair the pavement.*

Funding sources for all pavement projects should be recorded.

**A-1.2. PMP Pavement Inspection Schedule.** Airports must perform a detailed inspection of airfield pavements at least once a year for the PMP. If a pavement condition index (PCI) survey is performed, as set forth in ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys, the frequency of the detailed inspection by PCI surveys may be extended to three years. Less comprehensive routine daily, weekly, and monthly maintenance inspections required for operations should be addressed.

This report consists of a detailed inspection that will extend the inspection period to 3 years. It is the airport sponsor's responsibility to perform a monthly drive-by inspection. A sample pavement inspection report form is provided in Table 3 of this report.

**A-1.3. Record Keeping.** The airport must record and keep on file complete information about all detailed inspections and maintenance performed until the pavement system is replaced. The types of distress, their locations, and remedial action, scheduled or performed, must be documented. The minimum information recorded includes:

- a. Inspection date
- b. Location
- c. Distress types
- d. Maintenance scheduled or performed

Items a through c are satisfied by this inspection report. Item d is the responsibility of the airport, as is record keeping of the monthly drive-by inspections.

**A-1.4. Information Retrieval.** An airport sponsor may use any form of record keeping it deems appropriate so long as the information and records from the pavement survey can generate required reports, as necessary.

Keep this report, monthly drive-by inspection reports, construction updates, and all records of maintenance activities in a readily accessible location so that they can be easily retrieved as requested by the FAA.

Table 3. Pavement inspection report.

Inspected By: \_\_\_\_\_  
 Date Inspected: \_\_\_\_\_

Inspection Record			Maintenance Action			
Location <sup>1</sup>		Distress Description/Dimensions/Severity/ Recommended Action	Description of Repair	Date Performed	Cost	Funding Source
Branch	Section					
A01FC	01					
	02					
R09FC	01					
	02					
	03					
	04					

Table 3. Pavement inspection report (continued).

Inspected By: \_\_\_\_\_  
 Date Inspected: \_\_\_\_\_

Inspection Record			Maintenance Action			
Location <sup>1</sup>		Distress Description/Dimensions/Severity/ Recommended Action	Description of Repair	Date Performed	Cost	Funding Source
Branch	Section					
R15FC	01					
	02					
T01FC	01					
	02					
T02FC	01					
	02					

Table 3. Pavement inspection report (continued).

Inspected By: \_\_\_\_\_  
 Date Inspected: \_\_\_\_\_

Inspection Record			Maintenance Action			
Location <sup>1</sup>		Distress Description/Dimensions/Severity/ Recommended Action	Description of Repair	Date Performed	Cost	Funding Source
Branch	Section					
T02FC	03					

<sup>1</sup>See Figure 3 for the location of the branch and section.

## **SUMMARY**

This report documents the results of the pavement evaluation conducted at Forest City Municipal Airport. During a visual inspection of the pavements in 2015, it was found that the overall condition of the pavement network is a PCI of 76. A 5-year pavement repair program, shown in Table 2, was generated for Forest City Municipal Airport, which revealed that approximately \$3,384,000 needs to be expended on M&R. Forest City Municipal Airport should utilize these study results to assist in planning for future maintenance needs as part of the airport CIP planning process.

**APPENDIX A**

**CAUSE OF DISTRESS TABLES**

Table A-1. Cause of pavement distress, asphalt-surfaced pavements.

<b>Distress Type</b>	<b>Probable Cause of Distress</b>
Alligator Cracking	Fatigue failure of the asphalt concrete surface under repeated traffic loading.
Bleeding	Excessive amounts of asphalt cement or tars in the mix and/or low air void content.
Block Cracking	Shrinkage of the asphalt concrete and daily temperature cycling; it is not load associated.
Corrugation	Traffic action combined with an unstable pavement layer.
Depression	Settlement of the foundation soil or can be “built up” during construction.
Jet Blast Erosion	Bituminous binder has been burned or carbonized.
Joint Reflection Cracking	Movement of the concrete slab beneath the asphalt concrete surface due to thermal and moisture changes.
L&T Cracking	Cracks may be caused by 1) a poorly constructed paving lane joint, 2) shrinkage of the asphalt surface due to low temperatures or hardening of the asphalt, or 3) reflective cracking caused by cracks in an underlying PCC slab.
Oil Spill Damage	Deterioration or softening of the pavement surface caused by the spilling of oil, fuel, or other solvents.
Patching	N/A
Polished Aggregate	Repeated traffic applications.
Raveling	Asphalt binder may have hardened significantly, causing coarse aggregate pieces to dislodge.
Rutting	Usually caused by consolidation or lateral movement of the materials due to traffic loads.
Shoving	Where PCC pavements adjoin flexible pavements, PCC “growth” may shove the asphalt pavement.
Slippage Cracking	Low strength surface mix or poor bond between the surface and the next layer of the pavement structure.
Swelling	Usually caused by frost action or by swelling soil.
Weathering	Asphalt binder and/or fine aggregate may wear away as the pavement ages and hardens.

Table A-2. Cause of pavement distress, PCC pavements.

<b>Distress Type</b>	<b>Probable Cause of Distress</b>
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.
Blow-Up	Incompressible materials in the joints.
Corner Break	Load repetition combined with loss of support and curling stresses.
Durability Cracking	Concrete's inability to withstand environmental factors such as freeze-thaw cycles.
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 the joint.
LTD Cracking	Combination of load repetition, curling stresses, and shrinkage stresses.
Patching (Small and Large)	N/A
Popouts	Freeze-thaw action in combination with expansive aggregates.
Pumping	Poor drainage, poor joint sealant.
Scaling	Over finishing of concrete, deicing salts, improper construction, freeze-thaw cycles, and poor aggregate.
Settlement	Upheaval or consolidation.
Shattered Slab	Load repetition.
Shrinkage Cracking	Setting and curing of the concrete.
Spalling (Joint and Corner)	Excessive stresses at the joint caused by infiltration of incompressible materials or traffic loads; weak concrete at the joint combined with traffic loads.

**APPENDIX B**

**INSPECTION PHOTOGRAPHS**



A01FC-01. Overview.



A01FC-02. LTD Cracking (Sample Unit No. 16).



A01FC-02. Overview.



R09FC-01. Overview.



R09FC-01. L&T Cracking (Sample Unit No. 03).



R09FC-02. Overview.



R09FC-02. L&T Cracking (Sample Unit No. 05).



R09FC-03. Overview.



R09FC-03. L&T Cracking (Sample Unit No. 02).



R09FC-04. Overview.



R09FC-04. L&T Cracking (Sample Unit No. 01).



R15FC-01. Overview.



R15FC-01. L&T Cracking (Sample Unit No. 59).



R15FC-02. Overview.



R15FC-02. L&T Cracking (Sample Unit No. 41).



T01FC-01. Overview.



T01FC-01. L&T Cracking (Sample Unit No. 01).



T01FC-02. Overview.



T01FC-02. L&T Cracking (Sample Unit No. 02).



T02FC-01. Overview.



T02FC-01. L&T Cracking (Sample Unit No. 04).



T02FC-02. Overview.



T02FC-02. L&T Cracking (Sample Unit No. 01).



T02FC-03. Overview.



T02FC-03. L&T Cracking (Sample Unit No. 02).

**APPENDIX C**  
**INSPECTION REPORT**

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: A01FC Name: APRON AT FOREST CITY Use: APRON Area: 82,784.00SqFt

Section: 01 of 2 From: HANGERS To: TAXIWAY 01 Last Const.: 06/01/2007  
Surface: PCC Family: IowaPCCAPNCE Zone: Category: Rank: P  
Area: 25,521.00SqFt Length: 140.00Ft Width: 160.00Ft  
Slabs: 241 Slab Width: 10.00Ft Slab Length: 10.00Ft Joint Length: 4,180.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 11 Surveyed: 3

Conditions: PCI : 98

Inspection Comments:

Sample Number: 03 Type: R Area: 20.00Slabs PCI = 98

Sample Comments:

65 JOINT SEAL DAMAGE L 20.00 Slabs Comments :

Sample Number: 05 Type: R Area: 20.00Slabs PCI = 98

Sample Comments:

65 JOINT SEAL DAMAGE L 20.00 Slabs Comments :

Sample Number: 07 Type: R Area: 24.00Slabs PCI = 98

Sample Comments:

65 JOINT SEAL DAMAGE L 24.00 Slabs Comments :

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: A01FC Name: APRON AT FOREST CITY Use: APRON Area: 82,784.00SqFt

Section: 02 of 2 From: To: TAXIWAY 01 Last Const.: 06/03/2014  
Surface: PCC Family: IowaPCCAPNCE Zone: Category: Rank: P  
Area: 57,263.00SqFt Length: 230.00Ft Width: 220.00Ft  
Slabs: 520 Slab Width: 10.00Ft Slab Length: 10.00Ft Joint Length: 9,670.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 27 Surveyed: 4

Conditions: PCI : 93

Inspection Comments:

Sample Number: 06 Type: R Area: 20.00Slabs PCI = 84

Sample Comments:

73 SHRINKAGE CRACKING N 1.00 Slabs Comments:

63 LINEAR CRACKING L 4.00 Slabs Comments:

74 JOINT SPALLING L 1.00 Slabs Comments:

Sample Number: 09 Type: R Area: 20.00Slabs PCI = 100

Sample Comments:

<NO DISTRESSES>

Sample Number: 16 Type: R Area: 14.00Slabs PCI = 87

Sample Comments:

63 LINEAR CRACKING L 2.00 Slabs Comments:

74 JOINT SPALLING L 1.00 Slabs Comments:

Sample Number: 19 Type: R Area: 20.00Slabs PCI = 100

Sample Comments:

<NO DISTRESSES>

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: R09FC Name: RUNWAY 09/27 FOREST CITY Use: RUNWAY Area: 161,229.00SqFt

Section: 01 of 4 From: RUNWAY END 09 To: RUNWAY SECT 02 Last Const.: 06/01/2004  
Surface: AAC Family: IowaAACRWNorthern Zone: Category: Rank: S  
Area: 62,810.00SqFt Length: 1,048.00Ft Width: 60.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 11 Surveyed: 3

Conditions: PCI : 78

Inspection Comments:

Sample Number: 003 Type: R Area: 6,000.00SqFt PCI = 79

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 190.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 166.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 4.00 Ft Comments:unsealed  
57 WEATHERING L 2,000.00 SqFt Comments:

Sample Number: 006 Type: R Area: 6,000.00SqFt PCI = 77

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 275.00 Ft Comments:sealed  
57 WEATHERING L 2,500.00 SqFt Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING L 120.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 14.00 Ft Comments:unsealed

Sample Number: 009 Type: R Area: 4,800.00SqFt PCI = 77

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 210.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 22.00 Ft Comments:failed sealant; seco  
57 WEATHERING L 2,000.00 SqFt Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: R09FC Name: RUNWAY 09/27 FOREST CITY Use: RUNWAY Area: 161,229.00SqFt

Section: 02 of 4 From: RUNWAY SECT 01 To: RUNWAY 15/33 Last Const.: 06/01/2004  
Surface: AAC Family: IowaAACRWNorthern Zone: Category: Rank: S  
Area: 60,476.00SqFt Length: 964.00Ft Width: 60.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 10 Surveyed: 2

Conditions: PCI : 73

Inspection Comments:

Sample Number: 005 Type: R Area: 6,000.00SqFt PCI = 73

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 370.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 27.00 Ft Comments:unsealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 28.00 Ft Comments:failed sealant; seco  
57 WEATHERING L 2,000.00 SqFt Comments:

Sample Number: 008 Type: R Area: 6,000.00SqFt PCI = 73

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 370.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 25.00 Ft Comments:failed sealant; seco  
48 LONGITUDINAL/TRANSVERSE CRACKING L 41.00 Ft Comments:unsealed  
57 WEATHERING L 2,000.00 SqFt Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

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Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

---

Branch: R09FC Name: RUNWAY 09/27 FOREST CITY Use: RUNWAY Area: 161,229.00SqFt

---

Section: 03 of 4 From: RUNWAY 15/33 To: RUNWAY END 27 Last Const.: 06/01/2004  
Surface: AAC Family: IowaAACRWNorthern Zone: Category: Rank: S  
Area: 22,711.00SqFt Length: 373.00Ft Width: 60.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

---

Last Insp. Date: 11/10/2015 Total Samples: 4 Surveyed: 1

Conditions: PCI : 86

Inspection Comments:

---

Sample Number: 002 Type: R Area: 6,000.00SqFt PCI = 86

Sample Comments:

48	LONGITUDINAL/TRANSVERSE CRACKING	L	179.00 Ft	Comments:sealed
57	WEATHERING	L	2,000.00 SqFt	Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

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Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

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Branch: R09FC Name: RUNWAY 09/27 FOREST CITY Use: RUNWAY Area: 161,229.00SqFt

---

Section: 04 of 4 From: . To: . Last Const.: 06/01/2007  
Surface: AAC Family: IowaAACRWNorthern Zone: Category: Rank: S  
Area: 15,232.00SqFt Length: 190.00Ft Width: 60.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

---

Last Insp. Date: 11/10/2015 Total Samples: 4 Surveyed: 1

Conditions: PCI : 91

Inspection Comments:

---

Sample Number: 01 Type: R Area: 3,244.00SqFt PCI = 91

Sample Comments:

57 WEATHERING	L	1,000.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	30.00 Ft	Comments:sealed
48 LONGITUDINAL/TRANSVERSE CRACKING	L	5.00 Ft	Comments:unsealed

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: R15FC Name: RUNWAY 15/33 FOREST CITY Use: RUNWAY Area: 613,328.00SqFt

Section: 01 of 2 From: RUNWAY END 15 To: RUNWAY SECT 02 Last Const.: 08/01/2007  
Surface: AAC Family: IowaAACRWNorthern Zone: Category: Rank: P  
Area: 337,937.00SqFt Length: 3,300.00Ft Width: 100.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 66 Surveyed: 7

Conditions: PCI: 73

Inspection Comments:

Sample Number: 005 Type: R Area: 5,000.00SqFt PCI = 73

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING M 50.00 Ft Comments:failed sealant  
48 LONGITUDINAL/TRANSVERSE CRACKING L 122.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:  
57 WEATHERING M 500.00 SqFt Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING L 65.00 Ft Comments:sealed

Sample Number: 014 Type: R Area: 5,000.00SqFt PCI = 71

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING M 100.00 Ft Comments:failed sealant  
48 LONGITUDINAL/TRANSVERSE CRACKING L 66.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 32.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:  
57 WEATHERING M 300.00 SqFt Comments:

Sample Number: 023 Type: R Area: 5,000.00SqFt PCI = 74

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 110.00 Ft Comments:sealed  
57 WEATHERING M 500.00 SqFt Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING M 50.00 Ft Comments:failed sealant; seco  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 032 Type: R Area: 5,000.00SqFt PCI = 74

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING M 100.00 Ft Comments:failed sealant; seco  
48 LONGITUDINAL/TRANSVERSE CRACKING L 150.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 85.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 041 Type: R Area: 5,000.00SqFt PCI = 71

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 125.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 96.00 Ft Comments:unsealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 150.00 Ft Comments:failed sealant; seco  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 050 Type: R Area: 5,000.00SqFt PCI = 79

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 150.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 50.00 Ft Comments:failed sealant  
48 LONGITUDINAL/TRANSVERSE CRACKING L 32.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

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Sample Number:	059	Type:	R	Area:	5,000.00SqFt	PCI =	72
Sample Comments:							
48	LONGITUDINAL/TRANSVERSE	CRACKING	L	130.00	Ft	Comments:	sealed
48	LONGITUDINAL/TRANSVERSE	CRACKING	L	208.00	Ft	Comments:	unsealed
48	LONGITUDINAL/TRANSVERSE	CRACKING	M	100.00	Ft	Comments:	failed sealant
57	WEATHERING		L	2,500.00	SqFt	Comments:	

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: R15FC Name: RUNWAY 15/33 FOREST CITY Use: RUNWAY Area: 613,328.00SqFt

Section: 02 of 2 From: RUNWAY SECT 01 To: RUNWAY END 33 Last Const.: 08/01/2007  
Surface: AAC Family: IowaAACRWNorthern Zone: Category: Rank: P  
Area: 275,391.00SqFt Length: 2,498.00Ft Width: 100.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 56 Surveyed: 6

Conditions: PCI : 72

Inspection Comments:

Sample Number: 004 Type: R Area: 5,000.00SqFt PCI = 71  
Sample Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING M 150.00 Ft Comments:failed sealant; widt  
48 LONGITUDINAL/TRANSVERSE CRACKING L 148.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 76.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 013 Type: R Area: 5,000.00SqFt PCI = 73  
Sample Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING L 220.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 94.00 Ft Comments:unsealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 50.00 Ft Comments:failed sealant  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 022 Type: R Area: 5,000.00SqFt PCI = 74  
Sample Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING M 50.00 Ft Comments:failed sealant  
48 LONGITUDINAL/TRANSVERSE CRACKING L 124.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 120.00 Ft Comments:unsealed  
50 PATCHING L 2.00 SqFt Comments:  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 031 Type: R Area: 5,000.00SqFt PCI = 68  
Sample Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING L 320.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 146.00 Ft Comments:unsealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 53.00 Ft Comments:failed sealant  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 040 Type: R Area: 5,000.00SqFt PCI = 72  
Sample Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING L 150.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 50.00 Ft Comments:failed sealant  
48 LONGITUDINAL/TRANSVERSE CRACKING L 179.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:

Sample Number: 049 Type: R Area: 5,000.00SqFt PCI = 77  
Sample Comments:  
48 LONGITUDINAL/TRANSVERSE CRACKING L 208.00 Ft Comments:sealed  
48 LONGITUDINAL/TRANSVERSE CRACKING L 122.00 Ft Comments:unsealed  
57 WEATHERING L 2,500.00 SqFt Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: T01FC Name: TAXIWAY 01 AT FOREST CITY Use: TAXIWAY Area: 21,998.00SqFt

Section: 01 of 2 From: APRON 01 SECTS 01, 02, 03 To: TAXIWAY 02 SECT 01 Last Const.: 06/01/2012  
Surface: AAC Family: IowaAACTWNCE Zone: Category: Rank: P  
Area: 10,165.00SqFt Length: 150.00Ft Width: 60.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 2 Surveyed: 1

Conditions: PCI : 82

Inspection Comments:

Sample Number: 02 Type: R Area: 5,661.00SqFt PCI = 82

Sample Comments:

48	LONGITUDINAL/TRANSVERSE CRACKING	L	60.00 Ft	Comments:unsealed
48	LONGITUDINAL/TRANSVERSE CRACKING	M	60.00 Ft	Comments:width
57	WEATHERING	L	500.00 SqFt	Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

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Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

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Branch: T01FC Name: TAXIWAY 01 AT FOREST CITY Use: TAXIWAY Area: 21,998.00SqFt

---

Section: 02 of 2 From: . To: . Last Const.: 11/01/2004  
Surface: AC Family: IowaACTWNCE Zone: Category: Rank: P  
Area: 11,833.00SqFt Length: 430.00Ft Width: 25.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

---

Last Insp. Date: 11/10/2015 Total Samples: 2 Surveyed: 1

Conditions: PCI: 73

Inspection Comments:

---

Sample Number: 01 Type: R Area: 4,775.00SqFt PCI = 73

Sample Comments:

48	LONGITUDINAL/TRANSVERSE CRACKING	M	110.00 Ft	Comments:width
57	WEATHERING	M	500.00 SqFt	Comments:
57	WEATHERING	L	4,270.00 SqFt	Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: T02FC Name: TAXIWAY 02 AT FOREST CITY Use: TAXIWAY Area: 52,672.00SqFt

Section: 01 of 3 From: T02FC-03 To: RUNWAY 09/27 Last Const.: 07/01/1985  
Surface: AC Family: IowaACTWNCE Zone: Category: Rank: P  
Area: 18,938.00SqFt Length: 470.00Ft Width: 40.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 4 Surveyed: 1

Conditions: PCI : 68

Inspection Comments:

Sample Number: 04 Type: R Area: 4,800.00SqFt PCI = 68

Sample Comments:

48	LONGITUDINAL/TRANSVERSE CRACKING	L	41.00 Ft	Comments:unsealed
48	LONGITUDINAL/TRANSVERSE CRACKING	M	40.00 Ft	Comments:width
41	ALLIGATOR CRACKING	M	4.00 SqFt	Comments:
57	WEATHERING	L	1,500.00 SqFt	Comments:
52	RAVELING	L	1,000.00 SqFt	Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: T02FC Name: TAXIWAY 02 AT FOREST CITY Use: TAXIWAY Area: 52,672.00SqFt

Section: 02 of 3 From: T02FC-03 To: RW15 Last Const.: 06/01/2012  
Surface: AAC Family: IowaAACTWNCE Zone: Category: Rank: P  
Area: 6,118.00SqFt Length: 70.00Ft Width: 80.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 1 Surveyed: 1

Conditions: PCI : 83

Inspection Comments:

Sample Number: 01 Type: R Area: 6,118.00SqFt PCI = 83

Sample Comments:

48	LONGITUDINAL/TRANSVERSE CRACKING	M	40.00 Ft	Comments:width
48	LONGITUDINAL/TRANSVERSE CRACKING	L	67.00 Ft	Comments:unsealed
57	WEATHERING	L	1,000.00 SqFt	Comments:

# Re-inspection Report

IA2015

Report Generated Date: March 31, 2016

Network: FXY Name: FOREST CITY MUNICIPAL AIRPORT

Branch: T02FC Name: TAXIWAY 02 AT FOREST CITY Use: TAXIWAY Area: 52,672.00SqFt

Section: 03 of 3 From: T02FC-02 To: T02FC-01 Last Const.: 06/01/2012  
Surface: AAC Family: IowaAACTWNCE Zone: Category: Rank: P  
Area: 27,616.00SqFt Length: 570.00Ft Width: 40.00Ft  
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 11/10/2015 Total Samples: 6 Surveyed: 2

Conditions: PCI : 82

Inspection Comments:

Sample Number: 02 Type: R Area: 4,800.00SqFt PCI = 81

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING M 60.00 Ft Comments:width  
48 LONGITUDINAL/TRANSVERSE CRACKING L 20.00 Ft Comments:unsealed  
57 WEATHERING L 1,000.00 SqFt Comments:

Sample Number: 03 Type: R Area: 4,800.00SqFt PCI = 84

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING L 28.00 Ft Comments:unsealed  
48 LONGITUDINAL/TRANSVERSE CRACKING M 28.00 Ft Comments:width  
57 WEATHERING L 1,000.00 SqFt Comments:

**APPENDIX D**

**WORK HISTORY REPORT**

Date:03/02/2016

**Work History Report**

1 of 3

Pavement Database:IA2015

**Network:** FXY **Branch:** A01FC (APRON AT FOREST CITY) **Section:** 01 **Surface:** PCC  
**L.C.D.:** 06/01/2007 **Use:** APRON **Rank P Length:** 140.00 Ft **Width:** 160.00 Ft **True Area:** 25,521.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2007	CR-PC	Complete Reconstruction - PC	\$0	0.00	True	
06/01/1974	NC-PC	New Construction - PCC			True	

**Network:** FXY **Branch:** A01FC (APRON AT FOREST CITY) **Section:** 02 **Surface:** PCC  
**L.C.D.:** 06/03/2014 **Use:** APRON **Rank P Length:** 230.00 Ft **Width:** 220.00 Ft **True Area:** 57,263.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/03/2014	CR-PC	Complete Reconstruction - PC	\$0	6.00	True	6" P501
06/02/2014	BA-AG	Base Course - Aggregate	\$0	6.00	False	6" AGG BASE
06/01/2014	SG-CO	Subgrade - Compacted	\$0	0.00	False	SUBGRADE
08/01/1981	NC-PC	New Construction - PCC	\$0	0.00	True	

**Network:** FXY **Branch:** R09FC (RUNWAY 09/27 FOREST CITY) **Section:** 01 **Surface:** AAC  
**L.C.D.:** 06/01/2004 **Use:** RUNWAY **Rank S Length:** 1,048.00 Ft **Width:** 60.00 Ft **True Area:** 62,810.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	CS-AC	Crack Sealing - AC	\$0	0.00	False	
06/01/2004	OL-AS	Overlay - AC Structural (Major		1.50	True	PRE OVERLAY REPAIRS
06/01/1973	NC-AC	New Construction - AC			True	

**Network:** FXY **Branch:** R09FC (RUNWAY 09/27 FOREST CITY) **Section:** 02 **Surface:** AAC  
**L.C.D.:** 06/01/2004 **Use:** RUNWAY **Rank S Length:** 964.00 Ft **Width:** 60.00 Ft **True Area:** 60,476.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	CS-AC	Crack Sealing - AC	\$0	0.00	False	
06/01/2004	OL-AS	Overlay - AC Structural (Major		1.50	True	PRE OVERLAY REPAIRS
06/01/1973	NC-AC	New Construction - AC			True	

**Network:** FXY **Branch:** R09FC (RUNWAY 09/27 FOREST CITY) **Section:** 03 **Surface:** AAC  
**L.C.D.:** 06/01/2004 **Use:** RUNWAY **Rank S Length:** 373.00 Ft **Width:** 60.00 Ft **True Area:** 22,711.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	CS-AC	Crack Sealing - AC	\$0	0.00	False	
06/01/2004	OL-AS	Overlay - AC Structural (Major		1.50	True	PRE OVERLAY REPAIRS
06/01/1973	NC-AC	New Construction - AC			True	

**Network:** FXY **Branch:** R09FC (RUNWAY 09/27 FOREST CITY) **Section:** 04 **Surface:** AAC  
**L.C.D.:** 06/01/2007 **Use:** RUNWAY **Rank S Length:** 190.00 Ft **Width:** 60.00 Ft **True Area:** 15,232.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	CS-AC	Crack Sealing - AC	\$0	0.00	False	
06/01/2007	OL-AS	Overlay - AC Structural	\$0	0.00	True	
06/01/2004	OL-AS	Overlay - AC Structural	\$0	1.50	True	
06/01/1973	NC-AC	New Construction - AC	\$0	0.00	True	

**Network:** FXY **Branch:** R15FC (RUNWAY 15/33 FOREST CITY) **Section:** 01 **Surface:** AAC  
**L.C.D.:** 08/01/2007 **Use:** RUNWAY **Rank P Length:** 3,300.00 Ft **Width:** 100.00 Ft **True Area:**337,937.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	CS-AC	Crack Sealing - AC	\$0	0.00	False	
08/01/2007	OL-AS	Overlay - AC Structural	\$0	0.00	True	
06/01/1973	NC-AC	New Construction - AC			True	

Date:03/02/2016

**Work History Report**

2 of 3

Pavement Database:IA2015

**Network:** FXY **Branch:** R15FC (RUNWAY 15/33 FOREST CITY) **Section:** 02 **Surface:** AAC  
**L.C.D.:** 08/01/2007 **Use:** RUNWAY **Rank P Length:** 2,498.00 Ft **Width:** 100.00 Ft **True Area:**275,391.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	CS-AC	Crack Sealing - AC	\$0	0.00	False	
08/01/2007	OL-AS	Overlay - AC Structural	\$0	0.00	True	
06/01/1973	NC-AC	New Construction - AC			True	

**Network:** FXY **Branch:** T01FC (TAXIWAY 01 AT FOREST CITY) **Section:** 01 **Surface:** AAC  
**L.C.D.:** 06/01/2012 **Use:** TAXIWAY **Rank P Length:** 150.00 Ft **Width:** 60.00 Ft **True Area:** 10.165.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	OL-AS	Overlay - AC Structural	\$0	2.00	True	1" MILL; 2" AC OVERLAY W/0.5" LEVELING COURSE
10/01/1996	OL-AS	Overlay - AC Structural		2.00	True	
08/01/1985	NC-AC	New Construction - AC			True	

**Network:** FXY **Branch:** T01FC (TAXIWAY 01 AT FOREST CITY) **Section:** 02 **Surface:** AC  
**L.C.D.:** 11/01/2004 **Use:** TAXIWAY **Rank P Length:** 430.00 Ft **Width:** 25.00 Ft **True Area:** 11.833.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
11/01/2004	NC-AC	New Construction - AC	\$0	0.00	True	DATE PROVIDED BY AIRPORT

**Network:** FXY **Branch:** T02FC (TAXIWAY 02 AT FOREST CITY) **Section:** 01 **Surface:** AC  
**L.C.D.:** 07/01/1985 **Use:** TAXIWAY **Rank P Length:** 470.00 Ft **Width:** 40.00 Ft **True Area:** 18,938.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1985	NC-AC	New Construction - AC	\$0	0.00	True	

**Network:** FXY **Branch:** T02FC (TAXIWAY 02 AT FOREST CITY) **Section:** 02 **Surface:** AAC  
**L.C.D.:** 06/01/2012 **Use:** TAXIWAY **Rank P Length:** 70.00 Ft **Width:** 80.00 Ft **True Area:** 6.118.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	OL-AS	Overlay - AC Structural	\$0	2.00	True	1" MILL; 2" AC OVERLAY W/0.5" LEVELING COURSE
06/01/2007	OL-AS	Overlay - AC Structural	\$0	0.00	True	
08/01/1985	NC-AC	New Construction - AC	\$0	0.00	True	

**Network:** FXY **Branch:** T02FC (TAXIWAY 02 AT FOREST CITY) **Section:** 03 **Surface:** AAC  
**L.C.D.:** 06/01/2012 **Use:** TAXIWAY **Rank P Length:** 570.00 Ft **Width:** 40.00 Ft **True Area:** 27,616.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	OL-AS	Overlay - AC Structural	\$0	2.00	True	1" MILL; 2" AC OVERLAY W/0.5" LEVELING COURSE
07/01/1985	NU-IN	New Construction - Initial	\$0	0.00	True	

**Summary:**

<b>Work Description</b>	<b>Section Count</b>	<b>Area Total (SqFt)</b>	<b>Thickness Avg (in)</b>	<b>Thickness STD (in)</b>
Base Course - Aggregate	1	57,263.00	6.00	
Complete Reconstruction - PCC	2	82,784.00	3.00	4.24
Crack Sealing - AC	6	774,557.00	.00	.00
New Construction - AC	10	821,611.00	.00	.00
New Construction - Initial	1	27,616.00	.00	
New Construction - PCC	2	82,784.00	.00	
Overlay - AC Structural	9	703,974.00	1.06	1.01
Overlay - AC Structural (Major MR)	3	145,997.00	1.50	.00
Subgrade - Compacted	1	57,263.00	.00	

## **APPENDIX E**

# **LOCALIZED PREVENTATIVE MAINTENANCE POLICIES AND UNIT COST TABLES**

Table E-1. Localized preventive maintenance policy, asphalt-surfaced pavements.

<b>Distress Type</b>	<b>Severity Level</b>	<b>Maintenance Action</b>
Alligator Cracking	Low	Monitor
	Medium	AC Patch
	High	AC Patch
Bleeding	N/A	Monitor
Block Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal
Corrugation	Low	Monitor
	Medium	AC Patch
	High	AC Patch
Depression	Low	Monitor
	Medium	Monitor
	High	AC Patch
Jet Blast Erosion	N/A	AC Patch
Joint Reflection Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal
L&T Cracking	Low	Monitor
	Medium	Crack Seal
	High	Crack Seal
Oil Spill Damage	N/A	AC Patch
Patching	Low	Monitor
	Medium	AC Patch
	High	AC Patch
Polished Aggregate	N/A	Monitor
Raveling	Low	Monitor
	Medium	AC Patch
	High	AC Patch
Rutting	Low	Monitor
	Medium	Monitor
	High	AC Patch
Shoving	Low	Monitor
	Medium	AC Patch
	High	AC Patch
Slippage Cracking	N/A	AC Patch
Swelling	Low	Monitor
	Medium	Monitor
	High	AC Patch
Weathering	Low	Monitor
	Medium	Monitor
	High	AC Patch

Table E-2. Localized preventive maintenance policy, PCC pavements.

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

Table E-3. 2015 unit costs for preventive maintenance actions.

Maintenance Action	Unit Cost
AC Patch – Asphalt-Surfaced Pavement	\$13.39/sf
Crack Sealing – Asphalt-Surfaced Pavement	\$2.29/lf
Partial Depth PCC Patch – PCC Pavement	\$34.28/sf
Full Depth PCC Patch – PCC Pavement	\$15.31/sf
Crack Sealing – PCC Pavement	\$2.75/lf
Joint Resealing – PCC Pavement	\$2.75/lf
Grinding – PCC Pavement	\$0.33/sf
Slab Replacement – PCC Pavement	\$15.31/sf

Table E-4. 2015 unit costs (per square foot) based on PCI Ranges.

Pavement Type	PCI Range										
	0	10	20	30	40	50	60	70	80	90	100
Asphalt-Surfaced	\$9.51	\$9.51	\$9.51	\$9.51	\$9.51	\$4.50	\$4.50	\$4.50	\$0.00	\$0.00	\$0.00
PCC	\$15.87	\$15.87	\$15.87	\$15.87	\$15.87	\$7.50	\$7.50	\$7.50	\$0.00	\$0.00	\$0.00

## **APPENDIX F**

# **YEAR 2016 LOCALIZED PREVENTIVE MAINTENANCE DETAILS**

Table F-1. Year 2016 localized preventive maintenance details.

Branch <sup>1</sup>	Section <sup>1</sup>	Distress Type <sup>2</sup>	Severity	Distress Quantity	Unit	Maintenance Action	Unit Cost	Estimated Cost <sup>3</sup>
R09FC	01	L&T Cracking	Medium	82	Ft	Crack Sealing - AC	\$2.29	\$188
	02	L&T Cracking	Medium	267	Ft	Crack Sealing - AC	\$2.29	\$612
R15FC	01	L&T Cracking	Medium	5,793	Ft	Crack Sealing - AC	\$2.29	\$13,266
	02	L&T Cracking	Medium	3,240	Ft	Crack Sealing - AC	\$2.29	\$7,421
T01FC	01	L&T Cracking	Medium	108	Ft	Crack Sealing - AC	\$2.29	\$247
	02	L&T Cracking	Medium	273	Ft	Crack Sealing - AC	\$2.29	\$624
T02FC	01	Alligator Cracking	Medium	16	SqFt	Patching - AC	\$13.39	\$479
		L&T Cracking	Medium	158	Ft	Crack Sealing - AC	\$2.29	\$361
	02	L&T Cracking	Medium	40	Ft	Crack Sealing - AC	\$2.29	\$92
	03	L&T Cracking	Medium	253	Ft	Crack Sealing - AC	\$2.29	\$580

<sup>1</sup>See Figure 3 for the location of the branch and section.

<sup>2</sup>L&T Cracking = Longitudinal and Transverse Cracking; LTD Cracking = Longitudinal, Transverse, and Diagonal Cracking; ASR = Alkali-Silica Reaction.

<sup>3</sup>Cost estimates are shown in 2016 dollar amounts. These estimates are based on broad statewide numbers and should be adjusted to reflect local costs.



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