Osceola Municipal Airport

PAVEMENT MANAGEMENT REPORT

PREPARED BY

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applied pavement TECHNOLOGY

OSCEOLA MUNICIPAL AIRPORT
PAVEMENT MANAGEMENT REPORT

PREPARED FOR:

IOWA DEPARTMENT OF TRANSPORTATION
AVIATION BUREAU

PREPARED BY:

APPLIED PAVEMENT TECHNOLOGY, INC.

IN ASSOCIATION WITH:

ROBINSON ENGINEERING COMPANY

August 2019

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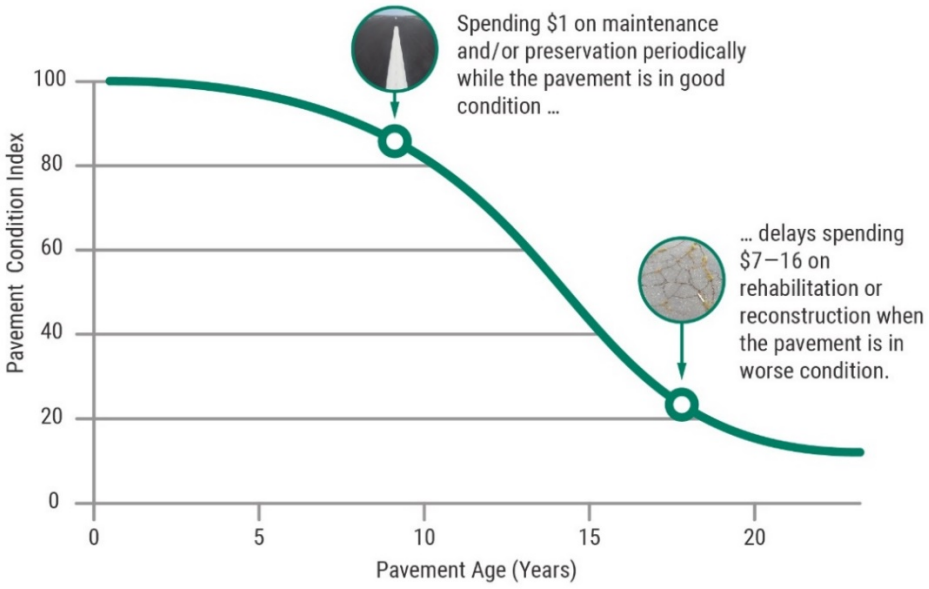
INTRODUCTION

Applied Pavement Technology, Inc. (APTech), with assistance from Robinson Engineering Company, updated the Airport Pavement Management System (APMS) for the Iowa Department of Transportation, Aviation Bureau (Iowa DOT). The APMS provides a means to monitor the condition of the pavements within the state of Iowa and to proactively plan for their preservation.

As part of this project, pavement conditions at Osceola Municipal Airport were assessed in December 2018 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 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. 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 Osceola Municipal Airport are presented within this report and can be used by the Iowa DOT, the Federal Aviation Administration (FAA), and Osceola Municipal Airport to identify, 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 the Iowa DOT's website.

PAVEMENT INVENTORY

The pavement network at Osceola 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, aprons, and T-hangars are also separate branches.

Each branch was 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 this approach, if a runway was built in 1968 and then extended in 1984, it would contain 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 the pavement inspection, and the collected information was extrapolated to predict the condition of the section as a whole.

Approximately 441,109 square feet of pavement were evaluated at Osceola Municipal Airport, as illustrated in Figure 2. This figure also shows the area-weighted age in years of the pavements at the time of the inspection. 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 Osceola Municipal Airport.

Figure 2. Pavement area by branch use.

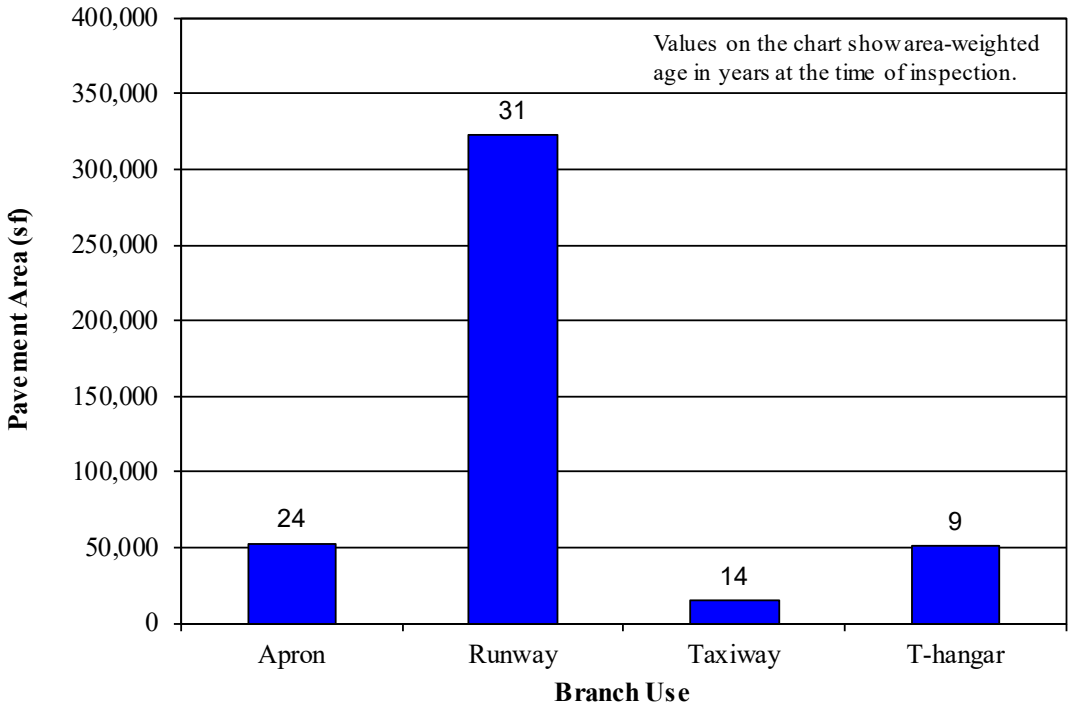
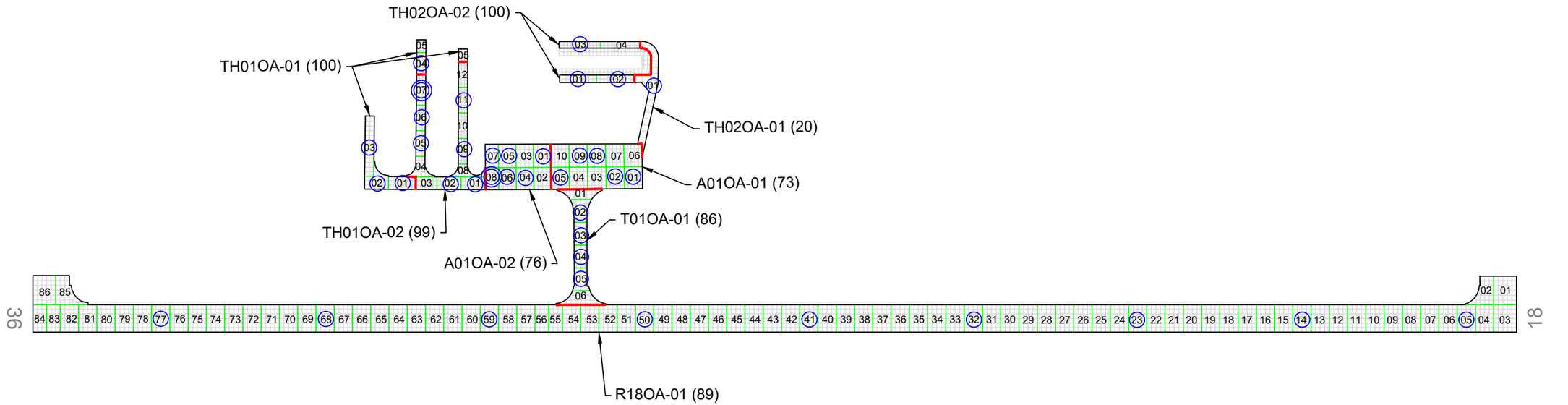


FIGURE 3. NETWORK DEFINITION MAP.



NETWORK DEFINITION LEGEND

- BRANCH IDENTIFIER
- SECTION IDENTIFIER
- PCI VALUE

R18AL-01 (71)

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

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AGENCY:	Iowa Department of Transportation Office of Aviation
LOCATION:	Osceola Municipal Airport Osceola, Iowa
PAGE TITLE:	Network Definition Map

PROJECT DATE:	CREATION DATE:	PROJECT MANAGER:	JOB NUMBER:
OCT. 2018	OCT. 2018	LJR	17-020-AM02
DRAWING SCALE:	LAST MODIFIED DATE:	REVISED BY:	DRAWN BY:
1"=300'	JAN. 2019	DSP	DSP
FILENAME:		LAYOUT NAME/NUMBER:	PAGE NUMBER:
Osceola.dwg		NET. DEF.	3

PAVEMENT EVALUATION

Pavement Evaluation Procedure

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

- FAA Advisory Circular 150/5380-6C, *Guidelines and Procedures for Maintenance of Airport Pavements* (https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5380-6C.pdf).
- FAA Advisory Circular 150/5380-7B, *Airport Pavement Management Program (PMP)* (https://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 ranges from a value of 0 (representing a pavement in a failed condition) to a value of 100 (representing a pavement in excellent condition).

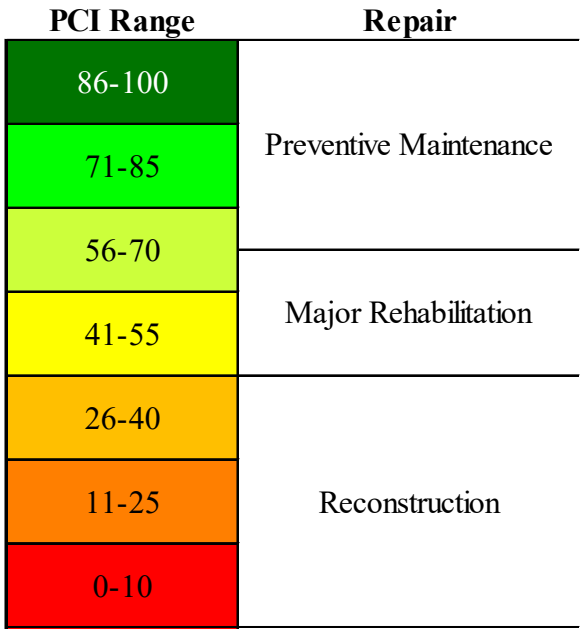
Figure 4. Visual representation of PCI scale on typical pavement surfaces[1].

PCI = 100 PCI = 60 PCI = 35

[1]Photographs shown are not specific to Osceola Municipal Airport.

Generally, 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 and provides the corresponding colors used for the maps and charts in this report for each range of PCIs.

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 Osceola Municipal Airport were inspected on December 2, 2018. The 2018 area-weighted condition of Osceola Municipal Airport is 87, with conditions ranging from 20 to 100 (on a scale of 0 [failed] to 100 [excellent]). During the previous pavement inspection in 2014, the area-weighted PCI of the airport was 93.

Figure 6 summarizes the overall condition of the pavements at Osceola 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. Pavement area by PCI range at Osceola Municipal Airport.

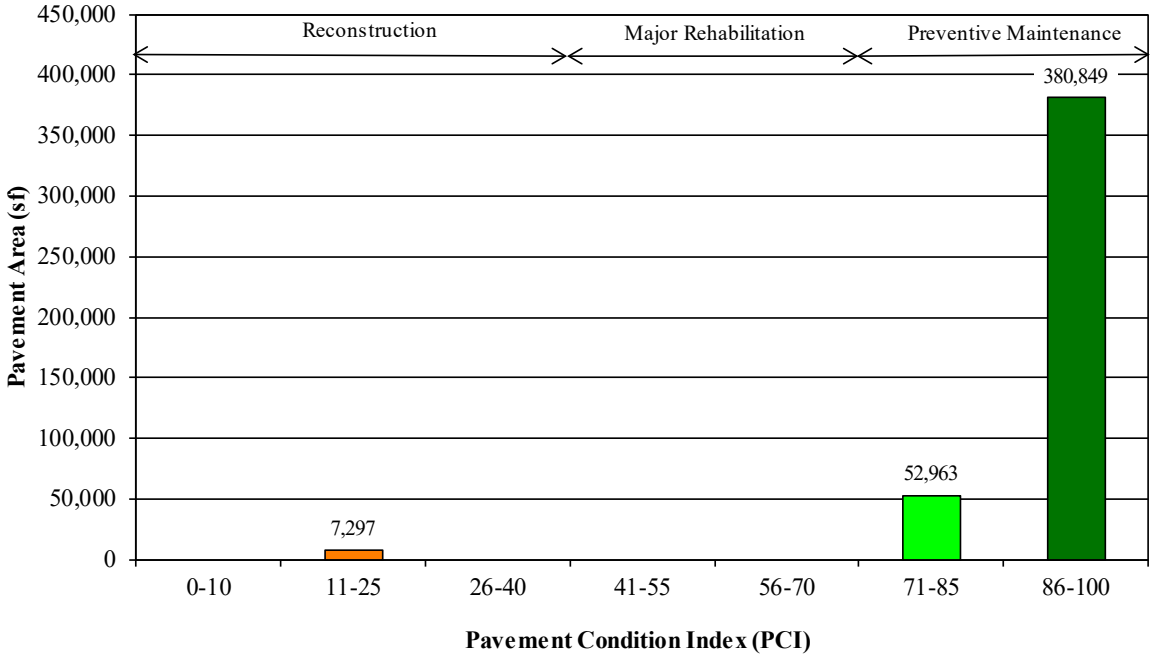


Figure 7. PCI by branch use at Osceola Municipal Airport.
(Values on chart are area-weighted)

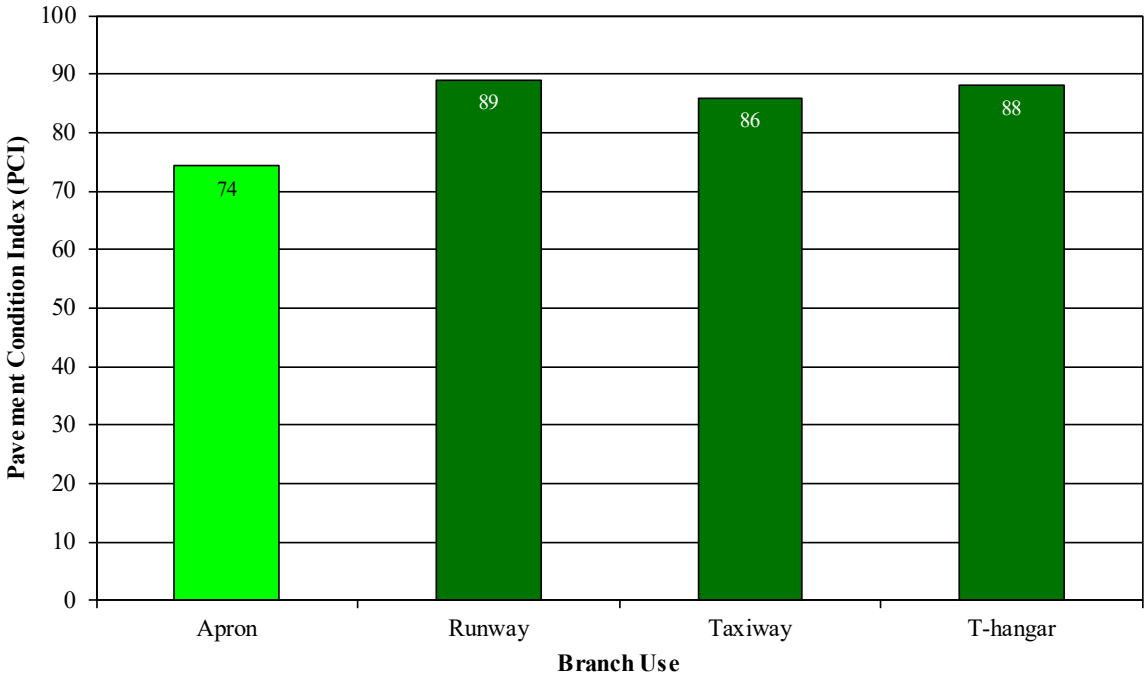
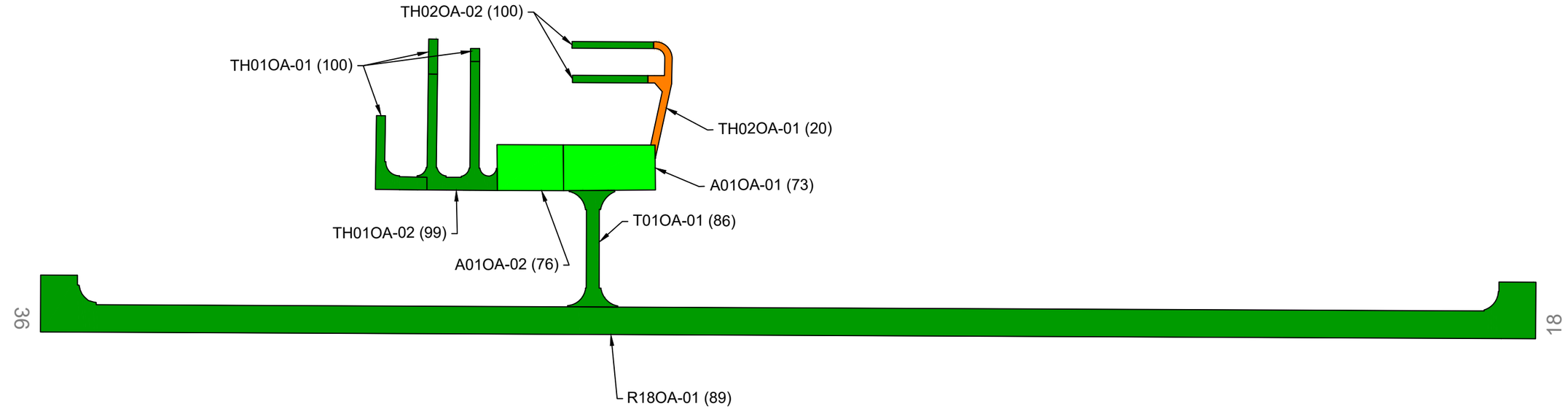


FIGURE 8. PCI MAP.



LEGEND

R18AL-01 (71)
- BRANCH IDENTIFIER
- SECTION IDENTIFIER
- PCI VALUE
- SECTION BREAK LINE

PAVEMENT CONDITION INDEX

PCI

86-100
71-85
56-70
41-55
26-40
11-25
0-10

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AGENCY: Iowa Department of Transportation
Office of Aviation

LOCATION: Osceola Municipal Airport
Osceola, Iowa

PAGE TITLE: 2018 Pavement Condition Index Map

PROJECT DATE:	CREATION DATE:	PROJECT MANAGER:	JOB NUMBER:
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DRAWING SCALE:	LAST MODIFIED DATE:	REVISED BY:	DRAWN BY:
1"=300'	APR. 2019	DSP	DSP
FILENAME:		LAYOUT NAME/NUMBER:	PAGE NUMBER:
Osceola.dwg		PCI	7

Table 1. 2018 pavement evaluation results.

Branch[1]	Section[1]	Surface Type[2]	Section Area (sf)	LCD[3]	2018 PCI	% Distress due to Load[4]	% Distress due to Climate/ Durability[5]	% Distress due to Other[6]	Type of Distresses[7]
A01OA	01	PCC	30,500	6/2/1987	73	43	33	24	ASR, Corner Break, Corner Spalling, Faulting, Joint Seal Damage, Joint Spalling, Large Patch, LTD Cracking, Scaling, Shattered Slab
A01OA	02	PCC	22,463	11/19/2004	76	62	32	6	Corner Break, Corner Spalling, Joint Seal Damage, Joint Spalling, LTD Cracking
R18OA	01	PCC	322,358	6/2/1987	89	9	53	38	Corner Spalling, Faulting, Joint Seal Damage, Joint Spalling, LTD Cracking, Shrinkage Cracking
T01OA	01	PCC	14,720	6/2/2004	86	0	85	15	Corner Spalling, Joint Seal Damage, Joint Spalling
TH01OA	01	PCC	12,750	4/5/2013	100	0	0	0	No Distress
TH01OA	02	PCC	22,923	2/14/2010	99	45	0	55	Corner Break, Joint Spalling
TH02OA	01	PCC	7,297	1/1/1994	20	62	8	30	ASR, Corner Break, Corner Spalling, Faulting, Joint Seal Damage, Joint Spalling, Large Patch, LTD Cracking, Shattered Slab, Shrinkage Cracking, Small Patch
TH02OA	02	PCC	8,098	4/5/2013	100	0	0	0	No Distress

Table 1. 2018 pavement evaluation results (continued).

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

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

[3]LCD = last construction date.

[4]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 a PCC pavement.

[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, 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.

[6]Other refers to distresses not attributed to one factor but rather may be caused by a combination of factors.

[7]Distress types are defined by ASTM D5340-12. L&T Cracking = Longitudinal and Transverse Cracking; LTD Cracking = Longitudinal, Transverse, and Diagonal Cracking; ASR = Alkali-Silica Reaction.

Inspection Comments

Osceola Municipal Airport was inspected on December 2, 2018. There were eight pavement sections defined during the inspection. Suspected alkali-silica reaction (ASR) was recorded on multiple pavement sections at this airport in accordance with ASTM D5340-12. Laboratory testing and analysis is the only definitive way to validate the presence of ASR.

Runway

Runway 18/36 consisted of one section. Medium- and high-severity corner spalling, low-severity faulting, low- and high-severity joint seal damage, shrinkage cracking, and medium-severity joint spalling and longitudinal, transverse, and diagonal (LTD) cracking were recorded in Section 01.

Taxiway

Taxiway 01 was defined by one section that was located between the apron area and Runway 18/36. High-severity joint seal damage was identified throughout the section, along with isolated amounts of high-severity corner spalling and medium-severity joint spalling.

Apron

The apron area contained two sections. Low-severity ASR, corner break, faulting, scaling, and large patching; all severities of corner spalling; high-severity joint seal damage; medium-severity joint spalling and shattered slab; and low- and medium-severity LTD cracking were recorded in Section 01. Section 02 was observed with low- and medium-severity corner break and LTD cracking and high-severity joint seal damage. An atypical area with low- and medium-severity corner spalling and medium-severity joint spalling was inspected as an additional sample unit according to ASTM D5340-12.

T-hangars

T-hangar 01, located south of the apron area, consisted of two sections in excellent condition. No distresses were observed in Section 01 during the inspection. Section 02 was identified with only one area of low-severity corner break and medium-severity joint spalling that was recorded as an additional sample unit according to ASTM D5340-12.

T-hangar 02 was defined by two sections that were located to the west of the apron area. Section 01 was in poor condition with low-severity ASR, corner break, corner spalling, faulting, and large patching; high-severity joint seal damage; medium-severity joint spalling; low- and medium-severity LTD cracking, shattered slab, and small patching; and shrinkage cracking recorded throughout. Section 02 was in excellent condition with no distresses identified during the inspection.

PAVEMENT MAINTENANCE AND REHABILITATION PROGRAM

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

Analysis Parameters

Critical PCIs

PAVER uses critical PCIs to determine whether localized preventive maintenance or major rehabilitation is the appropriate repair action. Above the critical PCI, localized preventive maintenance activities are recommended. Below the critical PCI, major rehabilitation actions, such as an overlay or reconstruction, are recommended. The Iowa DOT set the critical PCIs at 65 for runways, 60 for taxiways, and 55 for aprons and T-hangars.

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 Osceola 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 the costs for major rehabilitation, 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, 2019, and an inflation rate of 1.5 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. During this analysis, major rehabilitation was recommended for pavements in the year they dropped below their critical PCI. For the first year (2019) 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 2020 or 2021, then localized maintenance was not recommended for 2019. While localized preventive maintenance should be an annual undertaking at Osceola 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 2019 localized preventive maintenance plan as a baseline for that work. As the pavements age, it can be assumed that the amount of localized preventive maintenance required will increase.

Analysis Results

A summary of the M&R program for Osceola Municipal Airport is presented in Table 2. Detailed information on the recommended localized preventive maintenance plan for 2019 is contained in Appendix F.

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

Year	Branch[1]	Section[1]	Surface Type[2]	Type of Repair[3]	Estimated Cost[4]
2019	A01OA	01	PCC	Localized Maintenance	$19,599
2019	A01OA	02	PCC	Localized Maintenance	$11,063
2019	R18OA	01	PCC	Localized Maintenance	$27,582
2019	T01OA	01	PCC	Localized Maintenance	$5,585
2019	TH01OA	02	PCC	Localized Maintenance	$475
2019	TH02OA	01	PCC	Major Rehabilitation	$118,138
				Total Estimated Cost: $183,000	

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

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

[3]Major Rehabilitation: such as pavement reconstruction or an overlay. Localized Preventive Maintenance: such as crack sealing or patching.

[4]The costs provided are of a general nature for the entire state and may require adjustment to reflect specific conditions at the airport.

The recommendations made in this report are based on a broad network-level analysis and meant to provide Osceola 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 Osceola Municipal Airport should adjust the plan to reflect local costs.

Because an unlimited budget was used in the analysis, it is possible that the pavement repair program may need to be adjusted to consider economic and/or operational constraints. The identification of 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, Osceola 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 the Iowa DOT. 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 mowing programs of 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)

Because Osceola 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, Osceola Municipal Airport will also need to undertake monthly drive-by inspections of pavement conditions and track pavement-related maintenance activities.

FAA Advisory Circular 150/5380-7B provides detailed guidance pertaining to the requirements for an acceptable pavement management program (PMP). Appendix A of FAA Advisory Circular 150/5380-7B outlines what needs to be included in a 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 Advisory Circular.**

FAA Advisory Circular 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, aprons, and T-hangars at Osceola 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, aprons, and T-hangars 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. The current pavement history for Osceola Municipal Airport is provided in Appendix D of this report.

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: _____

Branch[1]	Section[1]	Distress Description/Dimensions/Severity/ Recommended Action	Description of Repair	Date Performed	Cost	Funding Source
A01OA	01					
A01OA	02					
R18OA	01					
T01OA	01					
TH01OA	01					
TH01OA	02					

Table 3. Pavement inspection report (continued).

Inspected By: _____

Date Inspected: _____

Branch[1]	Section[1]	Distress Description/Dimensions/Severity/ Recommended Action	Description of Repair	Date Performed	Cost	Funding Source
TH02OA	01					
TH02OA	02					

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

SUMMARY

This report documents the results of the pavement evaluation conducted at Osceola Municipal Airport. A visual inspection of the pavements in 2018 found that the overall condition of the pavement network is a PCI of 87. A 5-year pavement repair program, shown in Table 2, was generated for Osceola Municipal Airport, which revealed that approximately $183,000 needs to be expended on M&R. Osceola 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.

Distress Type	Probable Cause of Distress
Alligator Cracking	Fatigue failure of the asphalt surface under repeated traffic loading.
Bleeding	Excessive amounts of asphalt cement or tars in the mix or low air void content, or both.
Block Cracking	Shrinkage of the asphalt 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 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 Spillage	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.

Distress Type	Probable Cause of Distress
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.
Blowup	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

A01OA-01. Overview.

A01OA-01. Joint Spalling (Sample Unit No. 01).

A01OA-01. LTD Cracking (Sample Unit No. 02).

A01OA-01. Shattered Slab (Sample Unit No. 05).

A01OA-02. Overview.

A01OA-02. Joint Seal Damage (Sample Unit No. 06).

A01OA-02. LTD Cracking (Additional Sample Unit No. 08).

A01OA-02. LTD Cracking (Sample Unit No. 06).

R18OA-01. Overview.

R18OA-01. Joint Spalling (Sample Unit No. 23).

R18OA-01. Joint Spalling (Sample Unit No. 50).

T01OA-01. Overview.

T01OA-01. Corner Spalling (Sample Unit No. 02).

T01OA-01. Joint Seal Damage (Sample Unit No. 05).

TH01OA-01. Overview.

TH01OA-02. Overview (1).

TH01OA-02. Overview (2).

TH01OA-02. Corner Break (Additional Sample Unit No. 07).

TH01OA-02. Joint Spalling (Additional Sample Unit No. 07).

TH02OA-01. Overview.

TH02OA-01. Shattered Slab (Sample Unit No. 01) (1).

TH02OA-01. Shattered Slab (Sample Unit No. 01) (2).

TH02OA-01. Small Patching (Sample Unit No. 01).

TH02OA-02. Overview.

APPENDIX C

INSPECTION REPORT

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: A01OA Name: APRON AT OSCEOLA Use: APRON Area: 52,963.00SqFt

Section: 01 of 2 From: To: Last Const.: 06/02/1987
Surface: PCC Family: IowaPCCAPSC Zone: Category: Rank: P
Area: 30,500.00SqFt Length: 250.00Ft Width: 122.00Ft
Slabs: 244 Slab Width: 12.50Ft Slab Length: 10.00Ft Joint Length: 5,118.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 10 Surveyed: 5
Conditions: PCI : 73
Inspection Comments:

Sample Number: 001 Type: R Area: 25.00Slabs PCI = 61
Sample Comments:

63 LINEAR CRACKING	M	3.00 Slabs	Comments:	
62 CORNER BREAK	L	1.00 Slabs	Comments:	
75 CORNER SPALLING	L	1.00 Slabs	Comments:	
63 LINEAR CRACKING	L	2.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	25.00 Slabs	Comments:	
74 JOINT SPALLING	M	1.00 Slabs	Comments:	

Sample Number: 002 Type: R Area: 25.00Slabs PCI = 84
Sample Comments:

63 LINEAR CRACKING	L	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	25.00 Slabs	Comments:	

Sample Number: 005 Type: R Area: 25.00Slabs PCI = 67
Sample Comments:

70 SCALING/CRAZING	L	1.00 Slabs	Comments:	
67 LARGE PATCH/UTILITY	L	1.00 Slabs	Comments:	
75 CORNER SPALLING	M	1.00 Slabs	Comments:	
63 LINEAR CRACKING	L	1.00 Slabs	Comments:	
72 SHATTERED SLAB	M	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	25.00 Slabs	Comments:	

Sample Number: 008 Type: R Area: 25.00Slabs PCI = 71
Sample Comments:

75 CORNER SPALLING	M	2.00 Slabs	Comments:	
75 CORNER SPALLING	L	2.00 Slabs	Comments:	
76 ASR	L	2.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	25.00 Slabs	Comments:	
71 FAULTING	L	1.00 Slabs	Comments:	

Sample Number: 009 Type: R Area: 25.00Slabs PCI = 84
Sample Comments:

75 CORNER SPALLING	H	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	25.00 Slabs	Comments:	

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: A01OA Name: APRON AT OSCEOLA Use: APRON Area: 52,963.00SqFt

Section: 02 of 2 From: A01OA-01 To: SEE MAP Last Const.: 11/19/2004
Surface: PCC Family: IowaPCCAPSC Zone: Category: Rank: P
Area: 22,463.00SqFt Length: 180.00Ft Width: 125.00Ft
Slabs: 150 Slab Width: 12.50Ft Slab Length: 12.00Ft Joint Length: 3,370.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 8 Surveyed: 6
Conditions: PCI : 76
Inspection Comments:

Sample Number: 01 Type: R Area: 20.00Slabs PCI = 88
Sample Comments:

65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:	

Sample Number: 04 Type: R Area: 20.00Slabs PCI = 88
Sample Comments:

65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:	

Sample Number: 05 Type: R Area: 20.00Slabs PCI = 84
Sample Comments:

62 CORNER BREAK	L	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:	

Sample Number: 06 Type: R Area: 20.00Slabs PCI = 81
Sample Comments:

63 LINEAR CRACKING	L	3.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:	

Sample Number: 07 Type: R Area: 15.00Slabs PCI = 53
Sample Comments:

63 LINEAR CRACKING	M	5.00 Slabs	Comments:	
62 CORNER BREAK	M	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	15.00 Slabs	Comments:	

Sample Number: 08 Type: A Area: 15.00Slabs PCI = 34
Sample Comments:

75 CORNER SPALLING	M	1.00 Slabs	Comments:	
74 JOINT SPALLING	M	1.00 Slabs	Comments:	
63 LINEAR CRACKING	M	7.00 Slabs	Comments:	
75 CORNER SPALLING	L	1.00 Slabs	Comments:	
62 CORNER BREAK	L	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	15.00 Slabs	Comments:	

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: R18OA Name: RUNWAY 18/36 AT OSCEOLA Use: RUNWAY Area: 322,358.00SqFt

Section: 01 of 1 From: RUNWAY END 18 To: RUNWAY END 36 Last Const.: 06/02/1987
Surface: PCC Family: IowaPCCRWSC Zone: Category: Rank: P
Area: 322,358.00SqFt Length: 4,015.00Ft Width: 75.00Ft
Slabs: 2,063 Slab Width: 12.50Ft Slab Length: 12.50Ft Joint Length: 44,090.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 86 Surveyed: 9
Conditions: PCI : 89
Inspection Comments:

Sample Number: 005 Type: R Area: 24.00Slabs PCI = 82
Sample Comments:

65 JOINT SEAL DAMAGE	H	24.00 Slabs	Comments:	
71 FAULTING	L	3.00 Slabs	Comments:	

Sample Number: 014 Type: R Area: 24.00Slabs PCI = 98
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Sample Number: 023 Type: R Area: 24.00Slabs PCI = 75
Sample Comments:

71 FAULTING	L	6.00 Slabs	Comments:	
74 JOINT SPALLING	M	4.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Sample Number: 032 Type: R Area: 24.00Slabs PCI = 76
Sample Comments:

75 CORNER SPALLING	H	1.00 Slabs	Comments:	
75 CORNER SPALLING	M	2.00 Slabs	Comments:	
71 FAULTING	L	4.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Sample Number: 041 Type: R Area: 24.00Slabs PCI = 88
Sample Comments:

73 SHRINKAGE CRACKING	N	1.00 Slabs	Comments:	
63 LINEAR CRACKING	M	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Sample Number: 050 Type: R Area: 24.00Slabs PCI = 95
Sample Comments:

74 JOINT SPALLING	M	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Sample Number: 059 Type: R Area: 24.00Slabs PCI = 91
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	
71 FAULTING	L	2.00 Slabs	Comments:	

Sample Number: 068 Type: R Area: 24.00Slabs PCI = 98
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Sample Number: 077 Type: R Area: 24.00Slabs PCI = 98
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:	

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: T01OA Name: TAXIWAY 01 AT OSCEOLA Use: TAXIWAY Area: 14,720.00SqFt

Section: 01 of 1 From: APRON 01 To: RUNWAY 18/36 Last Const.: 06/02/2004
Surface: PCC Family: IowaPCCTWSC Zone: Category: Rank: P
Area: 14,720.00SqFt Length: 318.00Ft Width: 35.00Ft
Slabs: 136 Slab Width: 8.75Ft Slab Length: 12.50Ft Joint Length: 1,809.40Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments: Slab width is an average (2 rows @ 12.5 & 2 @ 5)

Last Insp. Date: 12/02/2018 Total Samples: 6 Surveyed: 4
Conditions: PCI : 86
Inspection Comments:

Sample Number: 002 Type: R Area: 24.00Slabs PCI = 81
Sample Comments:

75 CORNER SPALLING	H	1.00 Slabs	Comments:	
74 JOINT SPALLING	M	1.00 Slabs	Comments:	
65 JOINT SEAL DAMAGE	H	24.00 Slabs	Comments:	

Sample Number: 003 Type: R Area: 20.00Slabs PCI = 88
Sample Comments:

65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:

Sample Number: 004 Type: R Area: 20.00Slabs PCI = 88
Sample Comments:

65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:

Sample Number: 005 Type: R Area: 20.00Slabs PCI = 88
Sample Comments:

65 JOINT SEAL DAMAGE	H	20.00 Slabs	Comments:

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: TH01OA Name: T-HANGAR 01 AT OSCEOLA Use: T-HANGAR Area: 35,673.00SqFt

Section: 01 of 2 From: SEE MAP To: SEE MAP Last Const.: 04/05/2013
Surface: PCC Family: IowaPCCTH Zone: Category: Rank: P
Area: 12,750.00SqFt Length: 430.00Ft Width: 25.00Ft
Slabs: 129 Slab Width: 8.33Ft Slab Length: 10.00Ft Joint Length: 1,910.52Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 5 Surveyed: 4
Conditions: PCI : 100
Inspection Comments:

Sample Number: 01 Type: R Area: 18.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 02 Type: R Area: 21.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 03 Type: R Area: 26.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 04 Type: R Area: 18.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: TH01OA Name: T-HANGAR 01 AT OSCEOLA Use: T-HANGAR Area: 35,673.00SqFt

Section: 02 of 2 From: SEE MAP To: SEE MAP Last Const.: 02/14/2010
Surface: PCC Family: IowaPCCTH Zone: Category: Rank: P
Area: 22,923.00SqFt Length: 1,025.00Ft Width: 25.00Ft
Slabs: 164 Slab Width: 12.50Ft Slab Length: 12.50Ft Joint Length: 3,050.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 12 Surveyed: 7
Conditions: PCI : 99
Inspection Comments:

Sample Number: 01 Type: R Area: 18.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 02 Type: R Area: 18.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 05 Type: R Area: 21.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 06 Type: R Area: 21.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 07 Type: A Area: 24.00Slabs PCI = 90
Sample Comments:

62 CORNER BREAK	L	1.00 Slabs	Comments:
74 JOINT SPALLING	M	2.00 Slabs	Comments:

Sample Number: 09 Type: R Area: 21.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 11 Type: R Area: 21.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: TH02OA Name: T-HANGAR 02 AT OSCEOLA Use: T-HANGAR Area: 15,395.00SqFt

Section: 01 of 2 From: SEE MAP To: SEE MAP Last Const.: 01/01/1994
Surface: PCC Family: IowaPCCTH Zone: Category: Rank: P
Area: 7,297.00SqFt Length: 340.00Ft Width: 20.00Ft
Slabs: 21 Slab Width: 20.00Ft Slab Length: 20.00Ft Joint Length: 320.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 1 Surveyed: 1
Conditions: PCI : 20
Inspection Comments:

Sample Number: 01 Type: R Area: 21.00Slabs PCI = 20
Sample Comments:

67	LARGE PATCH/UTILITY	L	3.00 Slabs	Comments:
66	SMALL PATCH	L	3.00 Slabs	Comments:
76	ASR	L	2.00 Slabs	Comments:
74	JOINT SPALLING	M	3.00 Slabs	Comments:
75	CORNER SPALLING	L	5.00 Slabs	Comments:
73	SHRINKAGE CRACKING	N	2.00 Slabs	Comments:
63	LINEAR CRACKING	L	6.00 Slabs	Comments:
66	SMALL PATCH	M	1.00 Slabs	Comments:
62	CORNER BREAK	L	1.00 Slabs	Comments:
72	SHATTERED SLAB	L	1.00 Slabs	Comments:
72	SHATTERED SLAB	M	3.00 Slabs	Comments:
71	FAULTING	L	1.00 Slabs	Comments:
63	LINEAR CRACKING	M	6.00 Slabs	Comments:
65	JOINT SEAL DAMAGE	H	21.00 Slabs	Comments:

Re-inspection Report

IA2018ALL
Report Generated Date: June 25, 2019

Network: I75 Name: OSCEOLA MUNICIPAL AIRPORT

Branch: TH02OA Name: T-HANGAR 02 AT OSCEOLA Use: T-HANGAR Area: 15,395.00SqFt

Section: 02 of 2 From: SEE MAP To: SEE MAP Last Const.: 04/05/2013
Surface: PCC Family: IowaPCCTH Zone: Category: Rank: P
Area: 8,098.00SqFt Length: 410.00Ft Width: 40.00Ft
Slabs: 164 Slab Width: 10.00Ft Slab Length: 10.00Ft Joint Length: 2,830.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 12/02/2018 Total Samples: 4 Surveyed: 3
Conditions: PCI : 100
Inspection Comments:

Sample Number: 01 Type: R Area: 20.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 02 Type: R Area: 20.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

Sample Number: 03 Type: R Area: 22.00Slabs PCI = 100
Sample Comments:
<NO DISTRESSES>

APPENDIX D

WORK HISTORY REPORT

Work History Report

Pavement Database:IA2018All

Network: I75 **Branch:** A01OA (APRON AT OSCEOLA) **Section:** 01 **Surface:** PCC
L.C.D.: 06/02/1987 **Use:** APRON **Rank:** P **Length:** 250.00 Ft **Width:** 122.00 Ft **True Area:** 30,500.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/02/1987	NC-PC	New Construction - PCC	$0	5.00	True	5" P501 PCC SURFACE
06/01/1987	BA-AG	Base Course - Aggregate	$0	4.00	False	4" P209 CABC

Network: I75 **Branch:** A01OA (APRON AT OSCEOLA) **Section:** 02 **Surface:** PCC
L.C.D.: 11/19/2004 **Use:** APRON **Rank:** P **Length:** 180.00 Ft **Width:** 125.00 Ft **True Area:** 22,463.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
11/19/2004	NC-PC	New Construction - PCC	$162,302	5.00	True	P-599
11/18/2004	SB-AG	Subbase - Aggregate	$0	4.00	False	P-154

Network: I75 **Branch:** R18OA (RUNWAY 18/36 AT OSCEOLA) **Section:** 01 **Surface:** PCC
L.C.D.: 06/02/1987 **Use:** RUNWAY **Rank:** P **Length:** 4,015.00 Ft **Width:** 75.00 Ft **True Area:** 322,358.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/2012	JS-LC	Joint Seal (Localized)	$0	0.00	False	-
06/01/2012	CS-PC	Crack Sealing - PCC	$0	0.00	False	-
06/02/1987	NC-PC	New Construction - PCC	$0	5.00	True	5" P501 PCC
06/01/1987	BA-AG	Base Course - Aggregate	$0	4.00	False	4" P209 CABC

Network: I75 **Branch:** T01OA (TAXIWAY 01 AT OSCEOLA) **Section:** 01 **Surface:** PCC
L.C.D.: 06/02/2004 **Use:** TAXIWAY **Rank:** P **Length:** 318.00 Ft **Width:** 35.00 Ft **True Area:** 14,720.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/02/2004	NC-PC	New Construction - PCC	$0	5.00	True	5" P599 PCC SURFACE
06/01/2004	SB-AG	Subbase - Aggregate	$0	4.00	False	4" P154 SUBBASE
06/01/1987	NC-PC	New Construction - PCC	$0	0.00	True	WIDENED IN 2004 (Cost $20,098)

Network: I75 **Branch:** TH01OA (T-HANGAR 01 AT OSCEOLA) **Section:** 01 **Surface:** PCC
L.C.D.: 04/05/2013 **Use:** T-HANGAR **Rank:** P **Length:** 430.00 Ft **Width:** 25.00 Ft **True Area:** 12,750.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/05/2013	NC-PC	New Construction - PCC	$0	5.00	True	5" P-505 PCC
04/04/2013	SB-AG	Subbase - Aggregate	$0	4.00	False	4" P-154 SUBBASE

Network: I75 **Branch:** TH01OA (T-HANGAR 01 AT OSCEOLA) **Section:** 02 **Surface:** PCC
L.C.D.: 02/14/2010 **Use:** T-HANGAR **Rank:** P **Length:** 1,025.00 Ft **Width:** 25.00 Ft **True Area:** 22,923.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
02/14/2010	NC-PC	New Construction - PCC	$0	5.00	True	5" P-505 PCC
02/13/2010	SB-AG	Subbase - Aggregate	$0	4.00	False	4" P-154 SUBBASE
02/12/2010	SG-CO	Subgrade - Compacted	$0	12.00	False	12" SUBGRADE

Network: I75 **Branch:** TH02OA (T-HANGAR 02 AT OSCEOLA) **Section:** 01 **Surface:** PCC
L.C.D.: 01/01/1994 **Use:** T-HANGAR **Rank:** P **Length:** 340.00 Ft **Width:** 20.00 Ft **True Area:** 7,297.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/2013	PA-PP	Patching - PCC Partial Depth	$0	0.00	False	FIELD EST.
01/01/1994	NC-PC	New Construction - PCC	$0	0.00	True	EST. VIA GE BETWEEN 1994 AND 2004

Network: I75 **Branch:** TH02OA (T-HANGAR 02 AT OSCEOLA) **Section:** 02 **Surface:** PCC
L.C.D.: 04/05/2013 **Use:** T-HANGAR **Rank:** P **Length:** 410.00 Ft **Width:** 40.00 Ft **True Area:** 8,098.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/05/2013	NC-PC	New Construction - PCC	$0	6.00	True	6" P-505 PCC
04/04/2013	SB-AG	Subbase - Aggregate	$0	4.00	False	4" P-154 SUBBASE

Summary:

Work Description	Section Count	Area Total (SqFt)	Thickness Avg (in)	Thickness STD (in)
Base Course - Aggregate	2	352,858.00	4.00	.00
Crack Sealing - PCC	1	322,358.00	.00	-
Joint Seal (Localized)	1	322,358.00	.00	-
New Construction - PCC	9	455,829.00	4.00	2.29
Patching - PCC Partial Depth	1	7,297.00	.00	-
Subbase - Aggregate	5	80,954.00	4.00	.00
Subgrade - Compacted	1	22,923.00	12.00	-

APPENDIX E

LOCALIZED PREVENTIVE MAINTENANCE POLICIES AND UNIT COST TABLES

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

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

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

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

Table E-3. 2019 unit costs for preventive maintenance actions.

Maintenance Action	Unit Cost
Asphalt Patch—Asphalt-Surfaced Pavement	$13.66/sf
Crack Sealing—Asphalt-Surfaced Pavement	$2.34/lf
Partial Depth PCC Patch—PCC Pavement	$34.97/sf
Full Depth PCC Patch—PCC Pavement	$15.62/sf
Crack Sealing—PCC Pavement	$2.81/lf
Joint Sealing—PCC Pavement	$2.81/lf
Grinding—PCC Pavement	$0.34/sf
Slab Replacement—PCC Pavement	$15.62/sf

Table E-4. 2019 unit costs (per square foot) based on pavement type and PCI ranges.

Pavement Type	PCI Range 0–40	PCI Range 40–50	PCI Range 50–60	PCI Range 60–70	PCI Range 70–80	PCI Range 80–90	PCI Range 90–100
AC	$9.70	$4.59	$4.59	$4.59	$0.00	$0.00	$0.00
PCC	$16.19	$7.65	$7.65	$7.65	$0.00	$0.00	$0.00

APPENDIX F

YEAR 2019 LOCALIZED PREVENTIVE MAINTENANCE DETAILS

Table F-1. Year 2019 localized preventive maintenance details.

Branch[1]	Section[1]	Distress Type[2]	Severity	Distress Quantity	Distress Unit	Maintenance Action	Unit Cost[3]	2019 Estimated Cost[3]
A01OA	01	Corner Break	Low	2	Slabs	Crack Sealing - PCC	$2.81	$45
A01OA	01	Corner Spalling	Medium	6	Slabs	Patching - PCC Partial Depth	$34.97	$551
A01OA	01	Corner Spalling	High	2	Slabs	Patching - PCC Partial Depth	$34.97	$184
A01OA	01	Joint Seal Damage	High	244	Slabs	Joint Seal (Localized)	$2.81	$14,382
A01OA	01	Joint Spalling	Medium	2	Slabs	Patching - PCC Partial Depth	$34.97	$441
A01OA	01	LTD Cracking	Medium	6	Slabs	Crack Sealing - PCC	$2.81	$185
A01OA	01	Shattered Slab	Medium	2	Slabs	Slab Replacement - PCC	$15.62	$3,811
A01OA	02	Corner Break	Low	2	Slabs	Crack Sealing - PCC	$2.81	$56
A01OA	02	Corner Break	Medium	1	Slabs	Patching - PCC Full Depth	$15.62	$717
A01OA	02	Corner Spalling	Medium	1	Slabs	Patching - PCC Partial Depth	$34.97	$94
A01OA	02	Joint Seal Damage	High	150	Slabs	Joint Seal (Localized)	$2.81	$9,485
A01OA	02	Joint Spalling	Medium	1	Slabs	Patching - PCC Partial Depth	$34.97	$226
A01OA	02	LTD Cracking	Medium	14	Slabs	Crack Sealing - PCC	$2.81	$486
R18OA	01	Corner Spalling	Medium	19	Slabs	Patching - PCC Partial Depth	$34.97	$1,798
R18OA	01	Corner Spalling	High	10	Slabs	Patching - PCC Partial Depth	$34.97	$899
R18OA	01	Joint Seal Damage	High	229	Slabs	Joint Seal (Localized)	$2.81	$13,765
R18OA	01	Joint Spalling	Medium	48	Slabs	Patching - PCC Partial Depth	$34.97	$10,785
R18OA	01	LTD Cracking	Medium	10	Slabs	Crack Sealing - PCC	$2.81	$335
T01OA	01	Corner Spalling	High	2	Slabs	Patching - PCC Partial Depth	$34.97	$152
T01OA	01	Joint Seal Damage	High	136	Slabs	Joint Seal (Localized)	$2.81	$5,067
T01OA	01	Joint Spalling	Medium	2	Slabs	Patching - PCC Partial Depth	$34.97	$366
TH01OA	02	Corner Break	Low	1	Slabs	Crack Sealing - PCC	$2.81	$23
TH01OA	02	Joint Spalling	Medium	2	Slabs	Patching - PCC Partial Depth	$34.97	$452

Table F-1. Year 2019 localized preventive maintenance details (continued).

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

[2]Distress types are defined by ASTM D5340-12. L&T Cracking = Longitudinal and Transverse Cracking; LTD Cracking = Longitudinal, Transverse, and Diagonal Cracking; ASR = Alkali-Silica Reaction.

[3]The costs provided are of a general nature for the entire state and may require adjustment to reflect specific conditions at the airport.

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