Alabama Statewide Airport Pavement Management Program Update

Thomas C Russell Field (ALX)

Final Report

February 2022

Submitted to

Alabama Aeronautics Bureau

Submitted by

JVIATION

All About Pavements, Inc (API)
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Pavement Management – Evaluation – Testing - Design

ALABAMA STATEWIDE AIRPORT PAVEMENT MANAGEMENT PROGRAM UPDATE

Thomas C Russell Field, Alexander City (ALX)

FINAL REPORT

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February 2022

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Executive Summary

The Jviation Inc. team, which included All About Pavements, Inc., (API) was awarded a contract by the Alabama Department of Transportation's Aeronautics Bureau (ALDOT) in 2018 to update the existing Alabama Statewide Airport Pavement Management Program (APMP). The scope of this project includes the airside pavement network at Thomas C Russell Field (ALX).

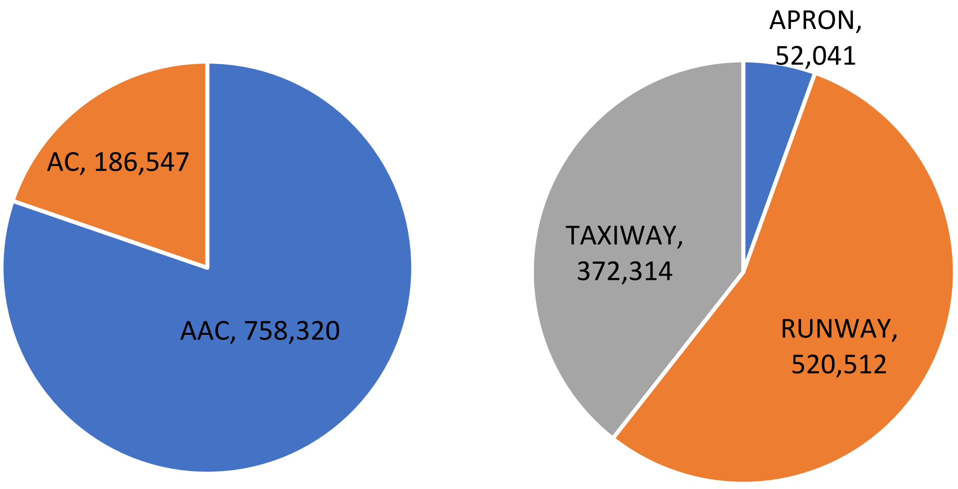
The following APMP tasks were completed to achieve the project objectives at ALX:

- Update the PAVER work history with records review information provided by ALDOT
- Conduct a visual pavement condition survey of the airfield pavements
- Update the PAVER database with inventory and condition data
- Update Maintenance and Rehabilitation (M&R) policies and unit costs
- Develop a 7-Year Pavement Capital Improvement Program (PCIP) with associated cost estimates

ES.1 Pavement Inventory

There are 8 branches and 14 sections within ALX's pavement network with a total surface area of approximately 1 million square feet (sf). Figure ES-1 shows the distribution of the pavement network by surface type and branch use.

Figure ES-1: Pavement Area (sf) by Surface Type and Branch Use.



ES.2 Pavement Condition

Visual pavement inspections were conducted in November 2019 using the Pavement Condition Index (PCI) method as specified in ASTM D5340-12 and FAA AC 150/5380-6C. The PCI is a numerical rating scale from 0 to 100 that provides a measure of the pavement's functional surface condition. The overall area-weighted network PCI (AW PCI) for the ALX pavement network is 78, representing a “Satisfactory” condition. The network area-weighted pavement age (AW Age) is 12 years.

Table ES-1 is a listing of the section PCI values and ratings.

Table ES-1: ALX Section PCI Values and Ratings.

Branch ID	Name	Section ID	Surface	Area, sf	PCI	PCI Category
A01	Apron 01	01	AAC	52,041	54	Poor
R1836	Runway 18-36	01	AAC	59,808	75	Satisfactory
R1836	Runway 18-36	02	AAC	460,704	77	Satisfactory
TC01	Taxiway Connector 01	01	AAC	18,961	100	Good
TC01	Taxiway Connector 01	02	AAC	8,284	44	Poor
TC01	Taxiway Connector 01	03	AC	6,270	30	Very Poor
TC01	Taxiway Connector 01	04	AC	27,903	91	Good
TC02	Taxiway Connector 02	01	AC	21,573	100	Good
THANG01	Taxiway Hangar 01	01	AAC	42,003	92	Good
THANG02	Taxiway Hangar 02	01	AAC	19,792	45	Poor
THANG02	Taxiway Hangar 02	02	AC	35,173	22	Serious
THANG03	Taxiway Hangar 03	01	AC	11,314	70	Fair
TP01	Taxiway Parallel 01	01	AC	84,314	96	Good
TP01	Taxiway Parallel 01	02	AAC	96,727	99	Good

ES.3 Pavement Maintenance and Repair Funding Levels

The PAVER database was updated with 2019 condition data, maintenance and repair (M&R) policies, and unit costs; which were then used to evaluate the effect of multiple funding levels on the overall future pavement condition. Figure ES-2 presents the forecasted ALX network PCI values for each funding level.

ES.4 Pavement Capital Improvement Program (PCIP)

The analysis output from the unlimited funding budget scenario was used as a starting point in developing the PCIP. For this scenario, sections were grouped into projects to allow for a logical construction sequence. Table ES-2 summarizes the 7-year PCIP, which has an estimated total cost of approximately $3.8 million. These recommendations are based on a network-level evaluation. Project-level evaluations should be conducted prior to developing design and bid package documents.

In addition to the major rehabilitation needs that are identified in the PCIP, PAVER was used to develop maintenance activities to repair specific PCI distresses in Year 1. The estimated costs for these maintenance activities are $83,194 as summarized in Table ES-3.

Figure ES-2: M&R Funding Levels.

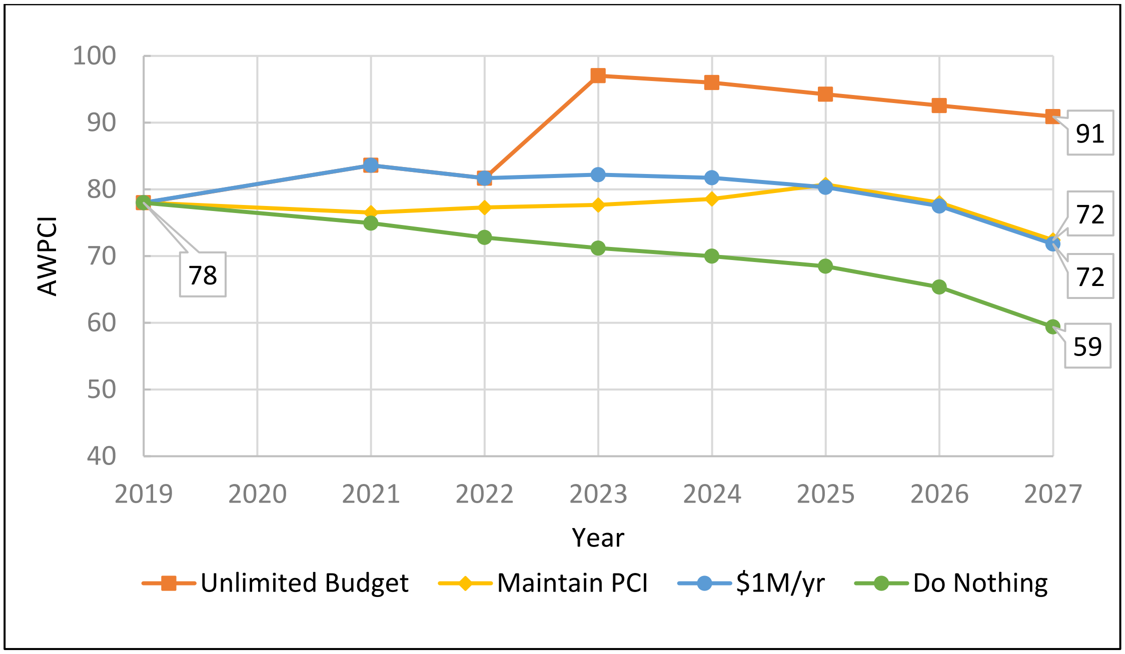


Table ES-2: Summary of Pavement Capital Improvement Program.

Project Year	CIP Project	Total Project Cost	Total Project Area, sf	AWPCI Before	AWPCI After
2021	ALX_21-01_Taxiway Hangar 01 Preservation	$61,278	69,906	88	96
	ALX_21-02_Apron Rehabilitation	$382,095	66,595	47	100
2022	ALX_22-01_Taxiway Hangar 02 Reconstruction	$481,296	54,965	22	100
2023	ALX_23-01_Runway 18-36 Rehabilitation	$2,220,732	531,826	70	100
2024	ALX_24-01_Apron Surface Treatment	$42,383	66,595	94	98
2025	ALX_25-01_Taixway Parallel Preservation	$218,606	221,575	87	94
2026	ALX_26-01_Runway 18-36 Surface Treatment	$351,445	520,512	96	99
	Total	**$3,757,834**			

Table ES-3: Summary of Localized Maintenance Plan.

Policy	Work Description	Work Quantity	Work Unit	Work Cost
Preventive	Patching - AC Full-Depth	85	SqFt	$2,119
	Patching - AC Partial-Depth	16	SqFt	$260
	Crack Sealing - AC	13,198	Ft	$52,133
Safety	Patching - AC Full-Depth	1,134	SqFt	$28,402
	Crack Sealing - AC	71	Ft	$279
			Total	**$83,194**

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1 Introduction

1.1. Overview

The Alabama Department of Transportation's Aeronautics Bureau (ALDOT) is responsible for preserving and enhancing Alabama's air transportation system, which consists of 74 general aviation airports throughout the State. ALDOT implemented an Airport Pavement Management Program (APMP) in 2008 using the PAVER system. ALDOT awarded a project in 2018 to Jviation Inc. (Jviation) to update the System Plan and conduct an Economic Analysis for the Alabama airports. The scope of work also included an update of the APMP for 59 general aviation airports, which was conducted by All About Pavements, Inc., (API), a Jviation team member.

With this update of the APMP, the Alabama airports continue to be eligible for FAA funding for major pavement rehabilitation work under the Airport Improvement Program (AIP) since an APMP meets the pavement maintenance management requirements described in Appendix A of AC 150/5380-6C.

This report discusses the evaluation of the airside pavements at Thomas C Russell Field (ALX), the current and forecasted pavement condition, and the development of the Pavement Capital Improvement Program (PCIP).

1.2. Work Scope

The goals of the Alabama Statewide Airport Pavement Management Update program are as follows:

- Conduct a visual pavement inspection of the asphalt surfaced pavements for 59 of the 74 general aviation airports in Alabama.
- Based on the visual inspection analysis results, develop a 7-year PCIP for each airport.

The scope of work is as shown below:

- Conduct a Records Review
- Update Pavement Network Definition
- Conduct Pavement Condition Surveys
- Update and customize existing APMP PAVER database
- Develop PCIP and associated project cost estimates
- Prepare Draft and Final Reports
- Develop a web-based viewer for reporting APMP data

As required in the Scope of Work, a detailed pavement condition survey was not conducted for any Portland Cement Concrete (PCC) aprons and PCC taxiways longer than 2,000 ft. Instead, a condition rating of "Good", "Fair", or "Poor" was assigned based on the overall pavement condition.

The deliverable products include a PAVER 7.0 database, individual airport evaluation reports, a statewide summary report, and the web viewer. The ALX report will be one of the 59 individual airport reports that will be available on ALDOT's website.

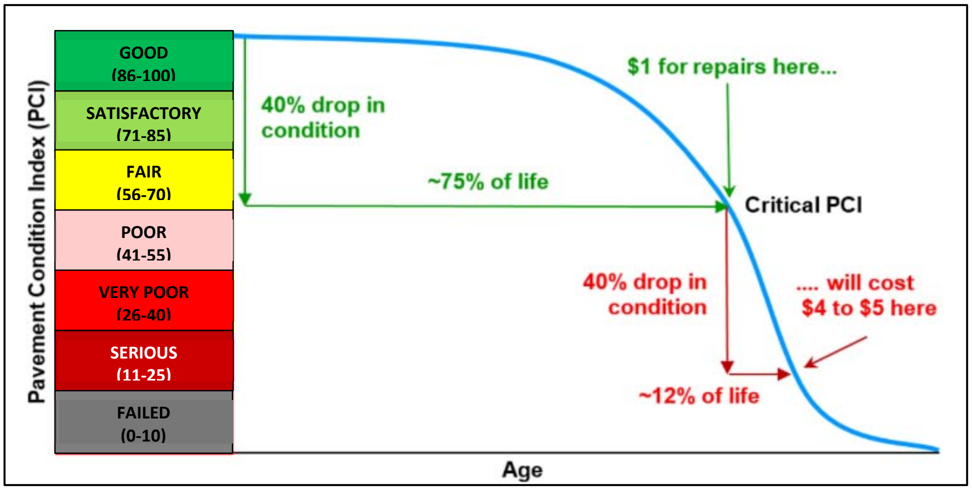
1.3. Pavement Management Concept

An APMP provides an integrated framework for comprehensive evaluation and decision making for managing airfield pavements. The essential components of an effective APMP provide for an objective evaluation of the condition of existing pavements, identification of short-term and long-range major rehabilitation work, necessary improvements in the pavement structural capacity, and the recurring maintenance work that should be completed each year. The APMP will also provide a budget for each of these types of pavement construction.

Historically, most organizations have made maintenance decisions based on past experience, without the benefit of documented data or analysis. This practice does not encourage life cycle cost analysis, nor the evaluation of cost effectiveness of alternate scenarios, and can lead to the inefficient use of funds. With limited allocated funding for Maintenance and Repair (M&R) Program projects, a defined procedure for setting priorities and schedules that will maximize the funds available is more important than ever.

In examining the lifespan of a 20-year pavement, a “Good” to “Fair” condition rating may last only 5 to 15 years. After that point, the rate of deterioration of pavements accelerates sharply as the age of the pavement increases, and within five years, the pavement may deteriorate to the point of failure. In order to extend pavement life, maintenance and repairs need to be scheduled and performed before the pavement surface declines to a “fair” condition. The point at which rehabilitation can be done before the steep decline occurs is called the “critical PCI”, and is generally considered to occur when the Pavement Condition Index (PCI) is between 60 and 70 for general aviation airports. If the work is done before deterioration accelerates, the cost of rehabilitation can be reduced as shown in Figure 1.1.

Figure 1.1: Pavement Management Concept.

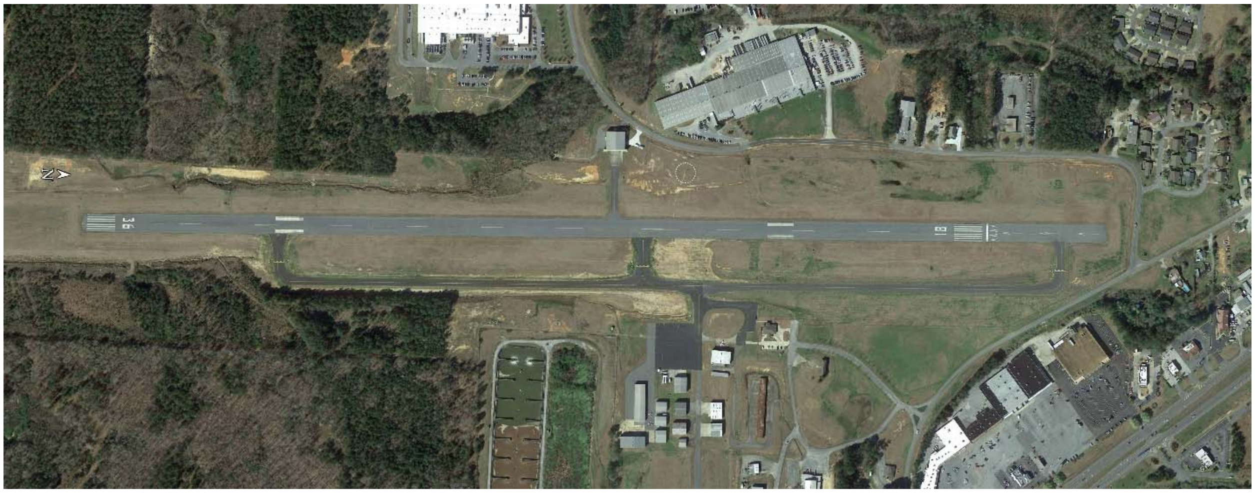


2 Airfield Pavement Inventory

2.1. Introduction

ALX is a General Aviation (GA) airport located approximately 2 miles southwest of Alexander City. The airport was activated in April 1940 and is owned and operated by the City of Alexander City. Figure 2.1 shows an aerial image of the airport.

Figure 2.1: Thomas C Russell Field.



(Source: Google Earth)

2.2. Pavement Inventory

ALX consists of one runway, a parallel taxiway, a connector taxiway, and an apron. The total pavement area is approximately 1 million square feet. Pavement surfaces at ALX include Asphalt Concrete (AC) and Asphalt Overlay on AC (AAC). A complete listing of the pavement sections is included in Appendix A. Runway 18-36 is 5,422 ft. long and 96 ft. wide.

A records search was undertaken to identify any preservation or rehabilitation work that has occurred at ALX since the last APMP update in 2009. The following records that were provided by ALDOT were reviewed, and the PAVER database was updated with work history information:

- Taxiway Development Project, 2013
- North Parallel Taxiway Extension, 2017
- Midfield Parallel Taxiway Rehabilitation, 2018

2.3. Climatic Conditions

Table 3.1 provides a summary of the climatic data for the geographic region that includes ALX. As the table shows, the pavements at ALX are exposed to freeze-thaw cycles in January. The mean air temperature for January ranges from an average low of 32 degrees °F to an average high of 54 degrees °F. The average annual rainfall at ALX is near 57 inches.

Table 2.1: Average Annual Temperatures and Rainfall for ALX.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Temp (°F)	54	59	68	75	81	88	91	90	85	76	66	57
Low Temp (°F)	32	34	41	47	57	65	68	67	62	49	41	34
Precip. (in)	6.0	5.2	6.6	4.6	4.3	4.5	5.4	4.1	4.1	2.8	4.6	5.1

Source: www.intellicast.com

2.4. Pavement Network Definition

A key element in developing an APMP system is defining the pavement network, which is the process of dividing an agency's pavements into a hierarchical order that facilitates inspection and M&R planning. The ALX network (e.g. all airside pavements) is then divided into branches, which are a readily identifiable part of the pavement system and have distinct functions. For airports, branches typically consist of individual runways, taxiways and aprons. Figure B1A in Appendix B shows the branches at ALX.

Once branches have been defined, pavement evaluation and analysis techniques require the airfield pavement system to be broken up into discrete sections. A pavement "section" is the smallest management unit that is used when considering the application and selection of maintenance and rehabilitation (M&R) treatments, and is defined in Section 2.1.8 of ASTM D 5340-12 as *"a contiguous pavement area having uniform construction, maintenance, usage history, and condition. A section should also have the same traffic volume and load intensity."* A complete list of the pavement inventory and the corresponding section designations are included in Appendix A. Figure B1B presents the section layout.

To facilitate the visual survey of the airside pavement, each section is further subdivided into conveniently defined sub-section areas, or sample units. Similar sizing is critical as studies have found that maintaining the size of the sample units to within 40 percent of the established norm may reduce the standard error of the average PCI values. To meet that criteria, ASTM recommends that sample units for asphalt pavements be 5,000 square feet (± 2,000).

Table 2.2 was used as a guideline in developing sampling rates that reflect typical rates that are used for other large pavement networks. In general, this sampling rate will not provide a 95% confidence level with a standard error of 5 PCI points. A higher level of sampling is recommended before a project-level rehabilitation design is developed for a pavement section or facility.

Sample units that include a one-time occurrence of a distress (i.e. a large patch) or an unusual severity or quantity of a distress seen elsewhere, were designated as "additional" sample units as described in the ASTM D5340 PCI procedure. This allows the PCI to be calculated without extrapolating the aberrant distress throughout the section as a whole. In Appendix B, Figure B1C shows the sample unit layout for ALX.

Table 2.2: PCI Sampling Rate for AC Surfaces.

Total Samples	Samples to Inspect
1	1
2	2
3 – 6	3
7 – 13	4
14 – 39	5
> 39	15 percent, but less than 12

2.5. Inventory Summary

There are 8 branches (facilities) at ALX that include 14 pavement sections and a total area of approximately 1 million square feet of paved surfaces, as shown in Table 2.3.

Table 2.3: ALX Pavement Branches.

Branch ID	Branch Name	Branch Use	Area, sf	Number of Sections
A01	Apron 01	APRON	52,041	1
R1836	Runway 18-36	RUNWAY	520,512	2
TC01	Taxiway Connector 01	TAXIWAY	61,418	4
TC02	Taxiway Connector 02	TAXIWAY	21,573	1
THANG01	Taxiway Hangar 01	TAXIWAY	42,003	1
THANG02	Taxiway Hangar 02	TAXIWAY	54,965	2
THANG03	Taxiway Hangar 03	TAXIWAY	11,314	1
TP01	Taxiway Parallel 01	TAXIWAY	181,041	2
		Total	**944,867**	**14**

Table 2.4 shows the distribution of airfield pavement by age with the area-weighted age being 12 years for all airside pavements at ALX.

Table 2.4: ALX Pavement Age.

Age (Years)	Number of Sections	Percent of Area	Area, sf
0 – 5	3	21.4	202,614
6 – 10	7	18.5	175,254
11 – 15	3	56.3	531,826
16 – 20	0	0.0	0
> 20	1	3.7	35,173

Figure 2.2 shows the distribution by surface type. Figure 2.3 presents the distribution by pavement use (e.g. runway, taxiway, and apron).

Figure 2.2: ALX Pavement Area by Surface Type.

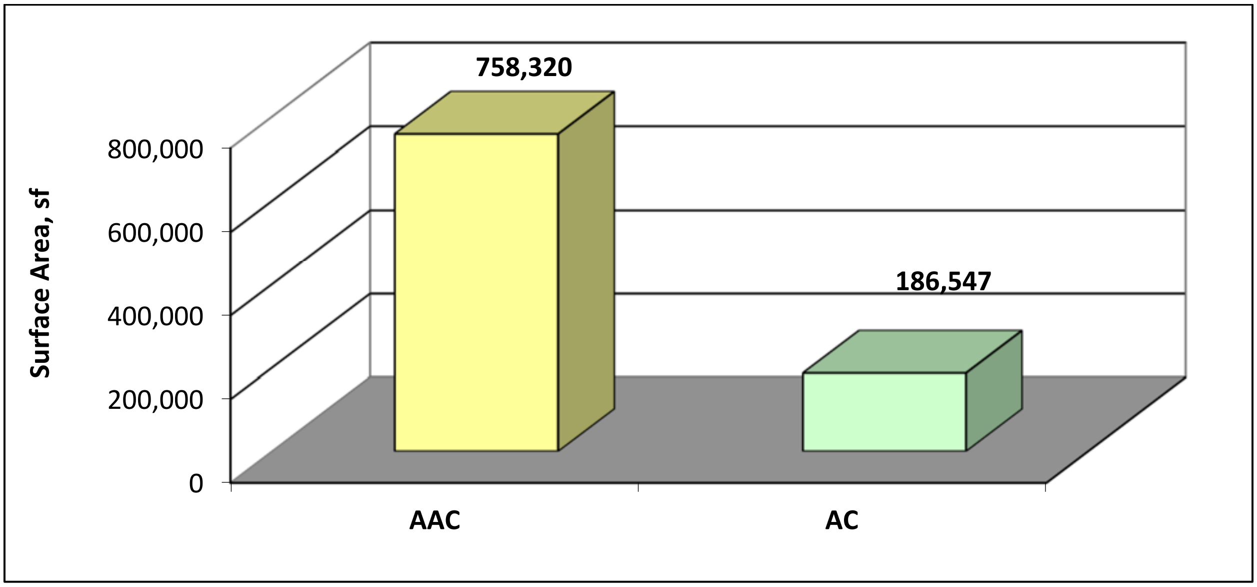
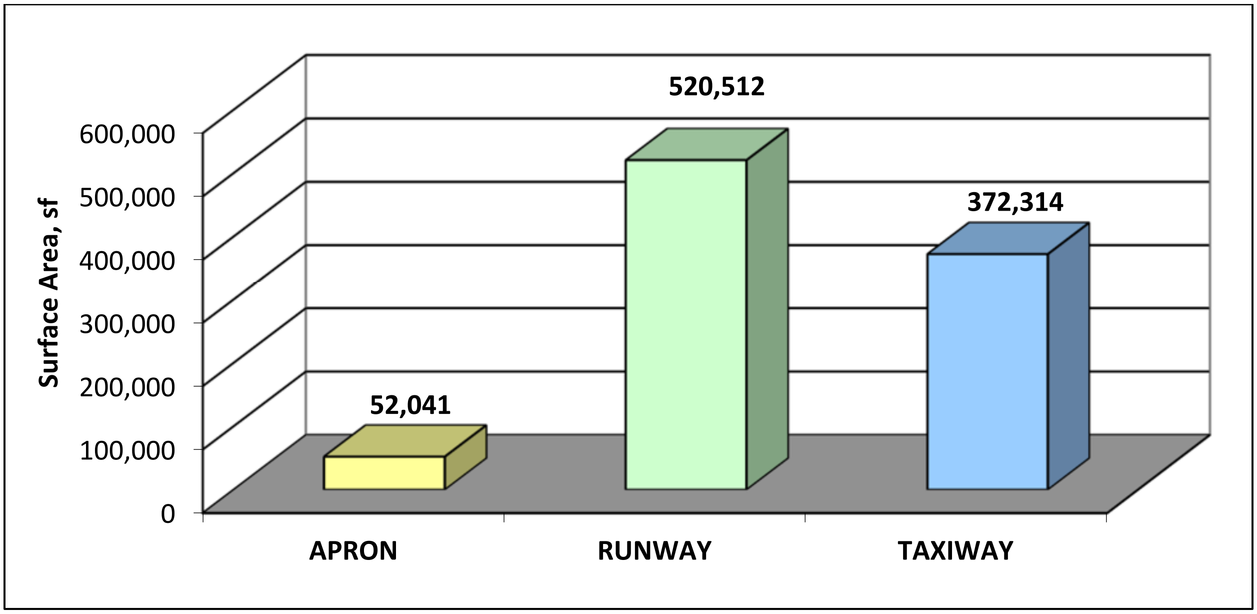


Figure 2.3: ALX Pavement Area by Branch Use.



Maps B1D, B1E, and B1F show the pavement type, branch use, and pavement age, respectively.

3 Pavement Condition

3.1. Introduction

A visual PCI survey of the airside pavements at ALX was conducted in order to assist in the development of a realistic PCIP. The PCI survey measures and records pavement distresses that exist within each of the inspected sample units. This survey was conducted in November 2019 by a 2-person team. The survey was performed in accordance with the methods described in ASTM D 5340-12 and FAA AC 150/5380-7B, using the sampling rates from Chapter 2 of this API report.

During the pavement survey, Quality Control (QC) and data verification were performed on both the individual distresses and the calculated section PCI values. QC included the following activities;

- Review of distress quantities to identify data entry errors (100% review at the sample unit level). General guidance was used from ASTM D5340-12, section 13, which addresses the precision of distress quantities that are recorded during PCI surveys.
- Duplicate surveys were performed to ensure consistency between each of the inspectors in a 2-person PCI survey team.

3.2. Pavement Condition Rating Methodology

The PCI is a measure of the pavement's functional surface condition. It provides insight into the causes of each distress, and whether the distress is primarily caused by load, climatic conditions, and other material related deficiencies. The PCI is a numerical rating (on a scale of 0 to 100) that is based on the type, severity and quantity of each distress that is found in an inspected sample unit.

The PCI survey results are displayed using seven categories and ratings in accordance with the ASTM, but can also be presented using a simplified 3-category rating system for use in comparing with other distress related indices, as shown in Table 3.1.

Table 3.1: Pavement Condition Index Rating Scale.

	Simplified PCI Color Legend	ASTM PCI Color Legend	PCI Range	PCI Ratings and Definition
GOOD	🟩	🟩	86-100	GOOD: Pavement has minor or no distresses and should require only routine maintenance.
		🟩	71-85	SATISFACTORY: Pavement has scattered low-severity distresses that should require only routine maintenance.
FAIR	🟨	🟨	56-70	FAIR: Pavement has a combination of generally low- and medium-severity distresses. Near-term maintenance and repair needs may range from routine to major.
POOR	🟥	🟥	41-55	POOR: Pavement has low-, medium-, and high-severity distresses that probably cause some operational problems. Near-term M&R needs range from routine to major. requirement for
		🟥	26-40	VERY POOR: Pavement has predominantly medium- and high-severity distresses that cause considerable maintenance & operational problems. Near-term M&R needs will be major.
		🟫	11-25	SERIOUS: Pavement has mainly high-severity distresses that cause operational restrictions; immediate repairs are needed.
		⬛	0-10	FAILED: Pavement deterioration has progressed to the point that safe aircraft operations are no longer possible; complete reconstruction is required.

3.3. Distress Types

The ASTM D5340 standard considers 17 distresses, which tend to fall into one of the following four cause categories:

- Load related: AC distresses include alligator cracking, corrugation, depression, polished aggregate, rutting and slippage cracking; PCC distresses include corner breaks, longitudinal cracking, divided slabs, polished aggregate, pumping and joint spalling.
- Climate and durability related: AC distresses include bleeding, block cracking, joint reflection cracking, longitudinal and transverse (L&T) cracking, swelling, raveling, and weathering; PCC distresses include blow-ups, “D” cracking, longitudinal cracking, pop-outs, pumping, scaling, shrinkage cracks, and joint and corner spalling.
- Moisture & Drainage related: AC distresses include alligator cracking, depressions, potholes and swelling; PCC distresses include corner breaks, divided slabs and pumping.
- Other factors: Oil spillage, jet blast erosion, bleeding, patching and concrete slab joint faulting.

As described above, distress may have more than one cause. For example, depressions may be caused by incorrect compaction during construction, or by subgrade softening due to environmental factors. In addition, a distress may be initiated by one cause but may progress to a distress of higher severity by another cause. Therefore, engineering judgment is critical in analyzing the actual causes of the distress.

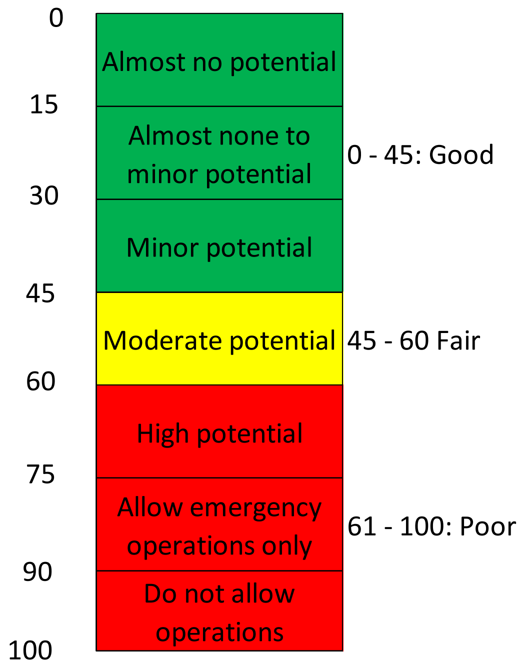
Distress descriptions provided in Appendix C were taken from the "PCI Field Manual," developed by the U.S. Army Construction Engineering Research Lab (CERL), latest edition. Appendix C provides a detailed explanation of each type of AC and PCC surface distress.

3.4. Additional PCI-based Indices

The distress data used to compute PCI can also be used to calculate additional indices that are helpful in understanding the condition of the pavement and developing PCIP recommendations. One additional index that was computed is the Foreign Object Damage (FOD) potential index.

The FOD index was developed by the US Air Force and is described in detail in the US Army Corp of Engineers Engineering Technical Letter (ETL) 04-09, Pavement Engineering Assessment (EA) Standards. Loose objects on an airfield pavement surface resulting from pavement distresses can be detrimental to aircraft engines, specifically engines that are low to the ground. The objects are ingested into the engines causing costly damage and presenting a safety hazard. Not all pavement distresses create a FOD potential. Therefore, an additional index was identified that uses the results of the PCI distress survey. As shown in Figure 3.1, the scale ranges from 0 to 100 with 0 being no FOD potential. Note that the FOD index uses a simplified three color scale.

Figure 3.1: FOD Potential Rating Scale.


0
Almost no potential
15
Almost none to minor potential
30
Minor potential
45
Moderate potential
60
High potential
75
Allow emergency operations only
90
Do not allow operations
100
0 - 45: Good
45 - 60 Fair
61 - 100: Poor

3.5. PCI Survey Results

The airside pavements at ALX include 14 sections with 205 sample units. The sample number of sample units that were surveyed in the field is 58, which is 28 percent of the total samples. Data from the inspected sample units were input into the PAVER database and a resultant PCI for each section was computed.

Figure 3.2 presents the area-weighted PCI by use and the overall airside network.

Figure 3.2: Pavement Condition by Branch Use.

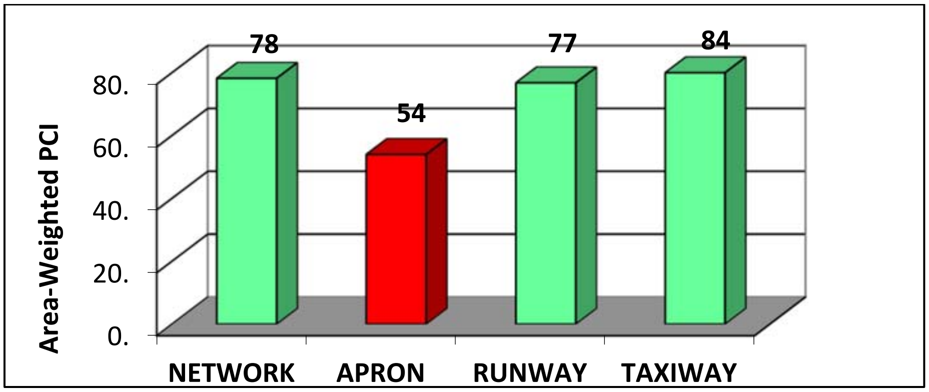


Figure 3.3 shows the distribution of the ALX pavement network by condition. Approximately 13 percent of the network is in “Poor” or worse condition.

Figure 3.3: Pavement Condition by Percent of Area.

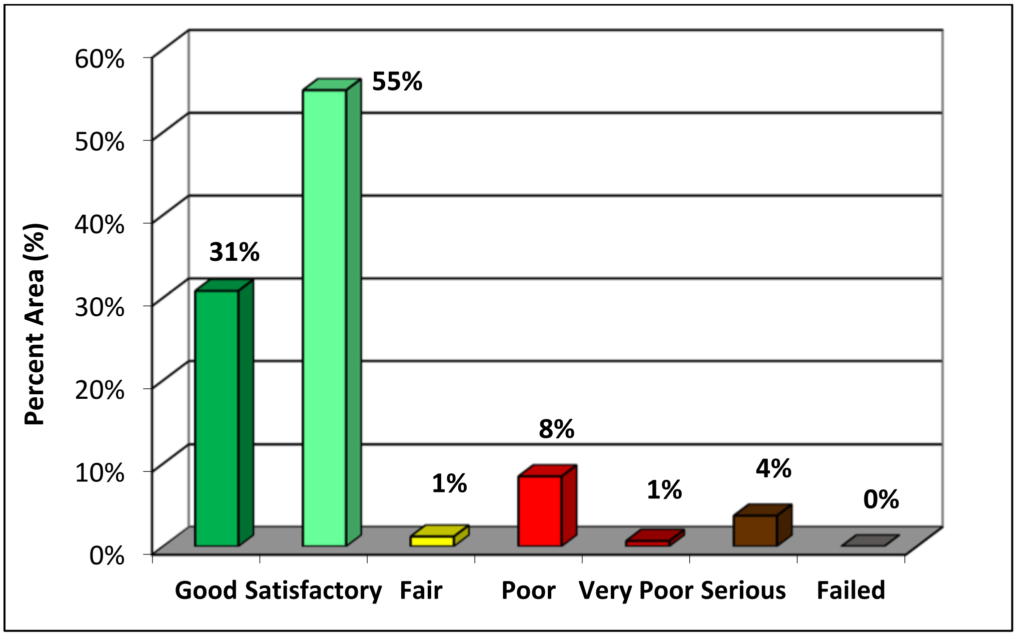


Table 3.2 is a listing of the section PCI.

Table 3.2: Section PCI.

Branch ID	Name	Section ID	Surface	Area, sf	PCI	PCI Category	FOD
A01	Apron 01	01	AAC	52,041	54	Poor	53
R1836	Runway 18-36	01	AAC	59,808	75	Satisfactory	38
R1836	Runway 18-36	02	AAC	460,704	77	Satisfactory	35
TC01	Taxiway Connector 01	01	AAC	18,961	100	Good	0
TC01	Taxiway Connector 01	02	AAC	8,284	44	Poor	61
TC01	Taxiway Connector 01	03	AC	6,270	30	Very Poor	70
TC01	Taxiway Connector 01	04	AC	27,903	91	Good	19
TC02	Taxiway Connector 02	01	AC	21,573	100	Good	0
THANG01	Taxiway Hangar 01	01	AAC	42,003	92	Good	18
THANG02	Taxiway Hangar 02	01	AAC	19,792	45	Poor	58
THANG02	Taxiway Hangar 02	02	AC	35,173	22	Serious	79
THANG03	Taxiway Hangar 03	01	AC	11,314	70	Fair	43
TP01	Taxiway Parallel 01	01	AC	84,314	96	Good	13
TP01	Taxiway Parallel 01	02	AAC	96,727	99	Good	10

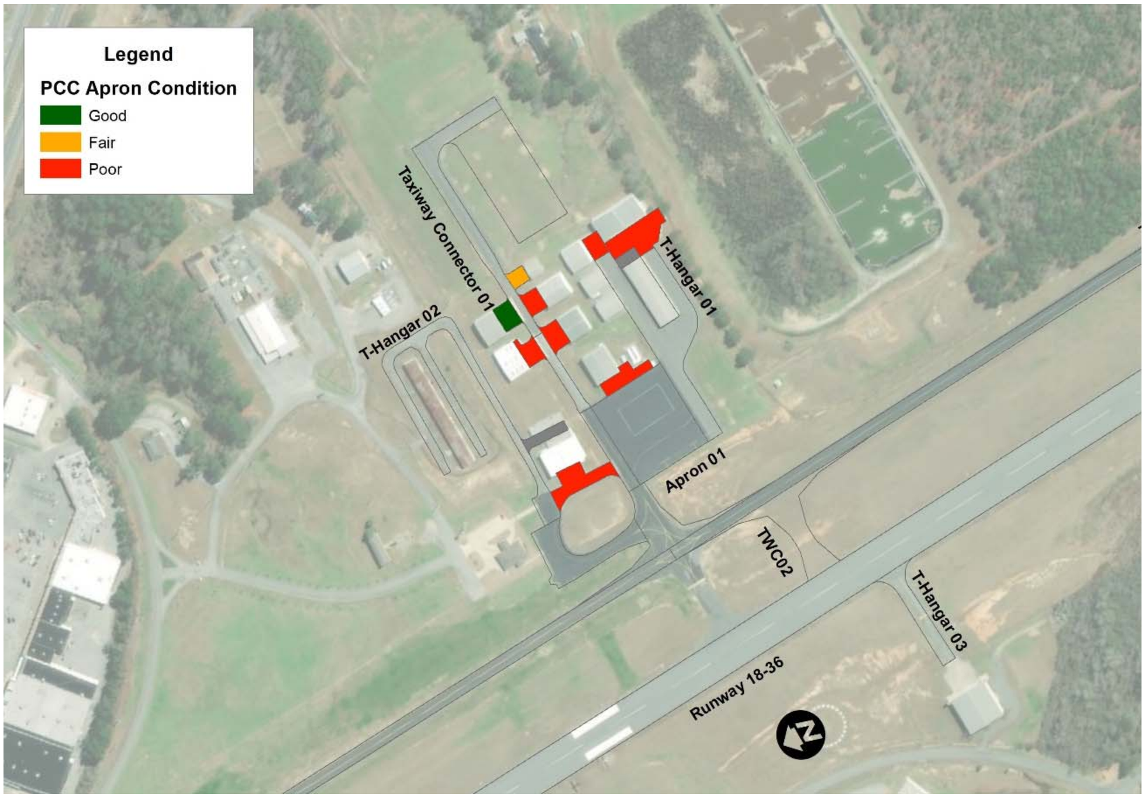
Figure B2A and B2B in Appendix B are maps of the section PCI in 7- and 3-scale categories, respectively. Figures B2C is a map of the FOD rating. Appendix D contains a detailed report of the PCI values and distress type, quantity, and severity data for each sample unit that was surveyed in a section. Appendix E is a summary report of the extrapolated distress data at the section level.

Appendix F contains current section and branch PCI data and forecasted section PCI values. FOD values by section and branch are also presented. Figure B2D in Appendix B shows the locations of the photos that were taken during the survey. Photos are included in Appendix J.

3.6. PCC Pavements

As stated earlier, the project scope did not include a detailed pavement condition survey for any Portland Cement Concrete (PCC) aprons. For these pavements, a rating of “Good”, “Fair”, or “Poor” was assigned based on the overall pavement condition. Figure 3.4 shows the condition of the PCC aprons at ALX.

Figure 3.4: PCC Apron Condition Rating.


Legend
PCC Apron Condition
🟩 Good
🟧 Fair
🟥 Poor
Taxiway Connector 01
T-Hangar 01
T-Hangar 02
Apron 01
TWC02
T-Hangar 03
Runway 18-36
N

4 Pavement Capital Improvement Program

4.1. Introduction

PCI data were collected and entered into the PAVER database. In addition, the database customization included the following components, which are described in detail in this chapter.

1. Performance Modeling
2. Maintenance & Repair (M&R) Triggers (Critical PCI)
3. M&R Policies
4. Unit Costs

Once the database was customized, it was used to run budget analysis scenarios and develop a 7-year PCIP.

4.2. Performance Modeling

To determine long-term M&R needs, a APMP must be able to predict future pavement condition. Future pavement condition is predicted using equation models that are generated from current and historical PCI data. Equation models are developed by grouping pavements based on similar performance characteristics such as region, construction history, surface type, traffic, priority and use. Mathematical techniques such as straight-line extrapolation and regression that include boundary and outlier filters are used to develop models that provide the best fit equation for the pavement condition data. PAVER's Prediction Modeling module was used to develop pavement performance models that are commonly referred to as 'Family Curves'.

Prediction models are used at the section level to compute future conditions based on the typical performance of the pavement sections that are included in each model. Future condition is computed by defining its position relative to the prediction model. The section prediction curve, or equation, is drawn through the current PCI-age point for each specific section. Since the shifted curve will run parallel to the computed prediction model, the predicted condition can be computed for any future age. Figure 4.1 is an illustration of this process.

Prediction models provide an effective way to compute future pavement performance based on past and current conditions, and pavement maintenance and rehabilitation practices. As new PCI inspection surveys are conducted, these models should be updated accordingly. In the case of the Alabama statewide airport pavement network, the best fit family curves were developed for each region by grouping pavements according to branch use (e.g. runway, taxiway) and surface type (e.g. AC, AAC, and APC). The family curves for ALDOT were developed based on branch use and are presented in Figure 4.2.

Figure 4.1: PCI Forecasting.

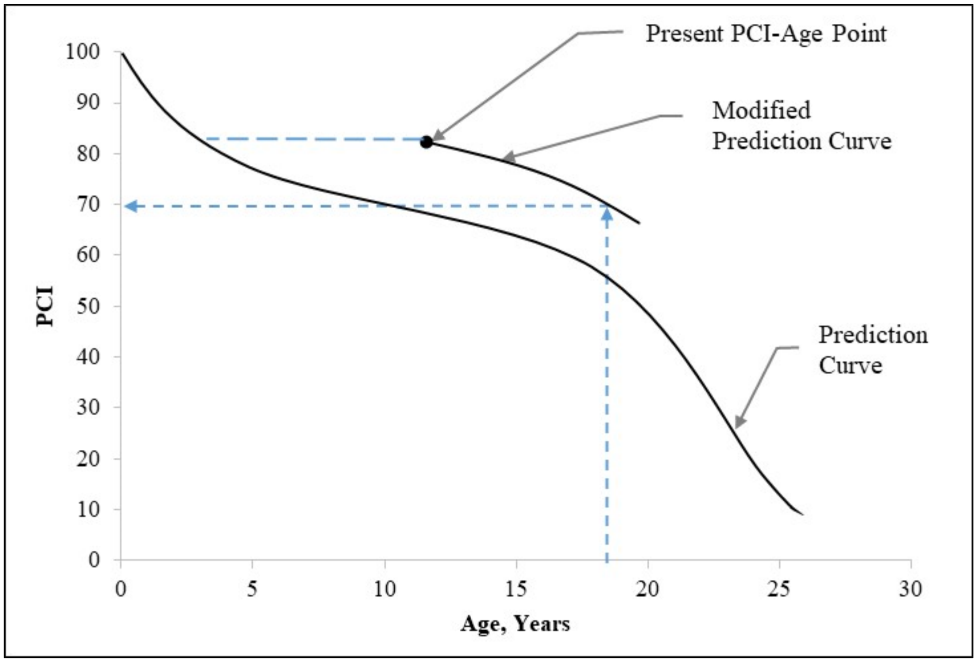
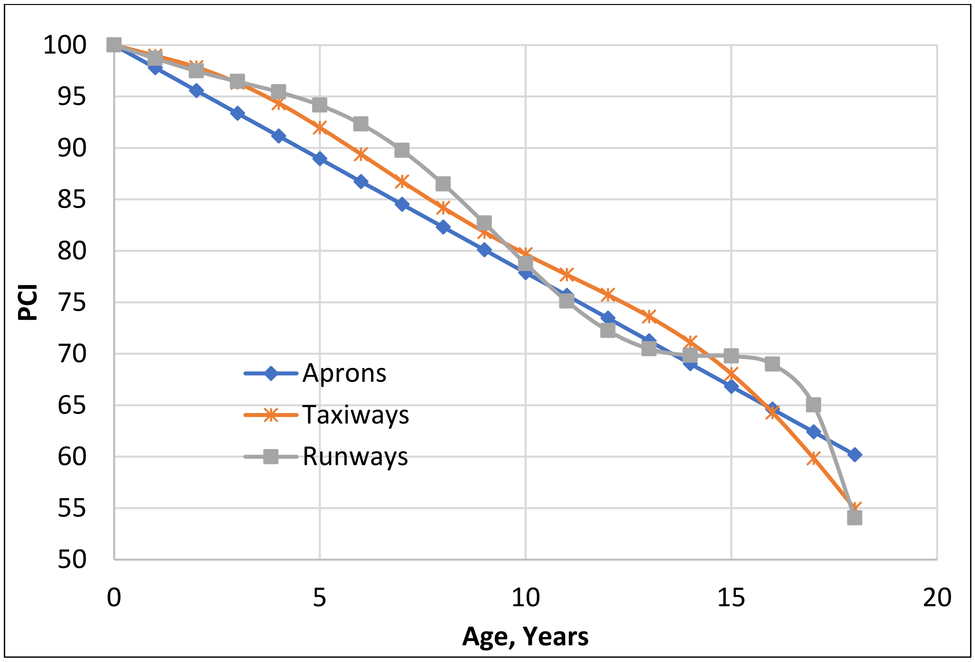


Figure 4.2: Family Curves.



4.3. Critical PCI Values

The Critical PCI value is defined as "*the PCI value at which the rate of PCI loss increases with time, or the cost of applying localized preventive maintenance increases significantly*." This definition is incorporated into PAVER in defining and measuring the critical PCI values. These values, or M&R triggers, are assigned for each prediction model. As such, the critical PCI values are directly related to the branch use.

These critical PCI levels are selected based on several factors including a review of performance models; experience; other airport triggers; and acknowledge that time is required for funding approval and design. Note that preventive maintenance is recommended, and it should generally be performed above the critical PCI (trigger) values and Major M&R is generally performed below them. The critical PCI (CP) values were set at 70 for runways and taxiways, and 65 for other pavements.

4.4. M&R Policies and Unit Costs

M&R policies refer to the activities that are applied at different condition levels to maintain and repair a pavement section.

Maintenance activities are localized activities which are typically assigned in the first year of the M&R plan based on the observed distresses. Safety (stopgap) maintenance addresses distresses that would affect operational safety if left unrepaired and is applied to pavements below the critical PCI. Preventive maintenance activities are aimed at slowing the rate of deterioration through consistent maintenance of existing pavements and are generally applied to pavements above the critical PCI. Appendix G presents the policies for preventive and safety maintenance.

Repair activities are conducted for larger areas, typically at the section level and are assigned based on the critical PCI. Repair activities broadly consist of three categories: preservation, rehabilitation, and reconstruction. Pavement preservation involves activities like surface treatments that are used to extend pavement service life and to delay more expensive rehabilitation work. These are applied when the pavement is in relatively good condition and does not exhibit any structural distress. Rehabilitation activities are used to repair pavements below or around the critical PCI and typically include mill and overlay. Reconstruction is recommended when the pavement has deteriorated to a level where rehabilitation is no longer cost effective.

Table 4.1 lists the pavement activity types, the individual activities within each type, and their associated 2020 unit costs. A more detailed description of the M&R activities and the development of the M&R unit costs is presented in Appendix H.

In accordance with ALDOT's focus on preservation, surface treatment is applied to all resurfaced and reconstructed runways, taxiways, and aprons three years after construction work is complete. Taxilanes and T-Hangar pavements are excluded from this requirement. This policy is applicable for projects in the PCIP between 2021 and 2024. For cost estimating, this surface treatment is assumed to have the same cost as the runway surface treatment.

Table 4.1: M&R Activities and Unit Costs.

Activity Type	PCI	Activity	Cost/sf
Maintenance	Note 1	Seal Cracks – AC ($/lf)	$3.95
		AC Full-Depth Patching	$25.05
		AC Partial-Depth Patching	$16.28
Preservation	75-90	Runway Surface Treatment	$0.57
		Taxiway and Apron Surface Treatment	$0.85
Rehabilitation	> CP	2" AC OL[2]	$3.54
	55 - CP	Mill 2" & 2" AC OL	$3.90
	45 - 55	Mill 2" & 2" AC OLP (With Pre-Overlay Repairs)	$4.82
Reconstruction	0 - 45	AC Reconstruction	$8.25

[1] Preventive > CP; Safety (Stopgap) < CP

[2] For sections with structural distress and PCI > CP

4.5. Pavement CIP Development

The PAVER database, updated with condition data and customized with condition performance priorities, policies, and costs; was used to evaluate the effect of multiple funding levels on the overall future pavement condition. This output was further used to develop the PCIP. Figure 4.3 illustrates the process that PAVER uses in the funding analysis.

The following M&R funding levels were used for the ALX pavement network to help establish the 7-Year PCIP. Figure 4.4 presents the network area-weighted average PCI for each of the following funding scenarios at the end of the analysis period:

- Unlimited Funding: Unlimited funding is available for all pavement needs. The PCI increases to 91 by 2027.
- Maintain PCI: Maintain existing PCI of 78.
- Constrained Funding: This scenario constrains the funding to $1 million each year (total of $7 million). The PCI decreases to 72 in 2027.
- Do Nothing: Performing no M&R would reduce the network PCI from 78 to 59 by 2027.

Figure 4.3: Budget Analysis Process.

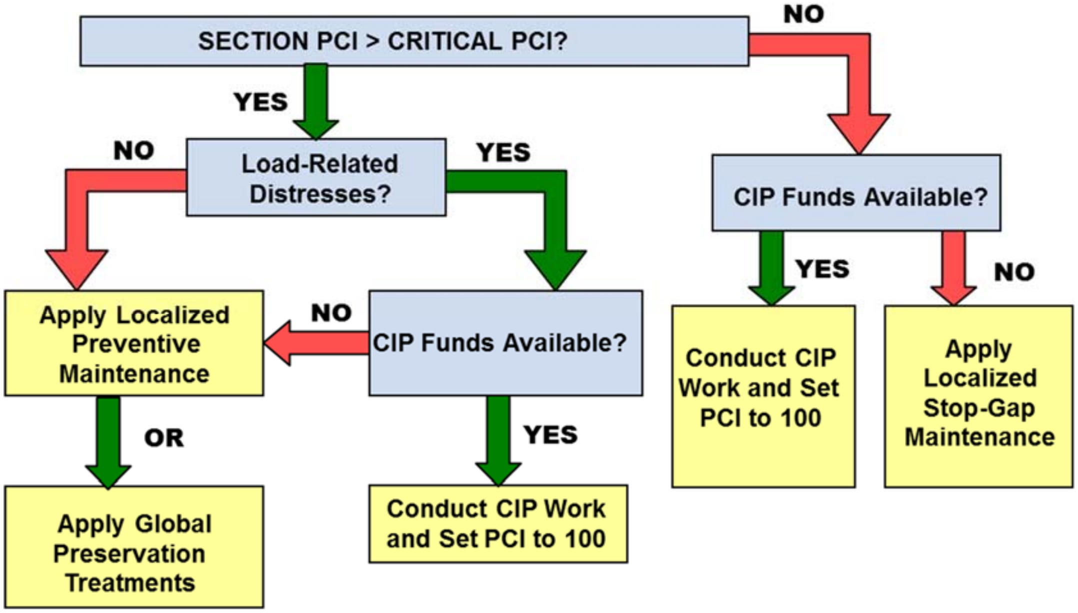

SECTION PCI > CRITICAL PCI?
NO
YES
NO
Load-Related Distresses?
YES
CIP Funds Available?
YES
NO
Apply Localized Preventive Maintenance
NO
CIP Funds Available?
Conduct CIP Work and Set PCI to 100
Apply Localized Stop-Gap Maintenance
OR
YES
Apply Global Preservation Treatments
Conduct CIP Work and Set PCI to 100

Figure 4.4: M&R Funding Levels.

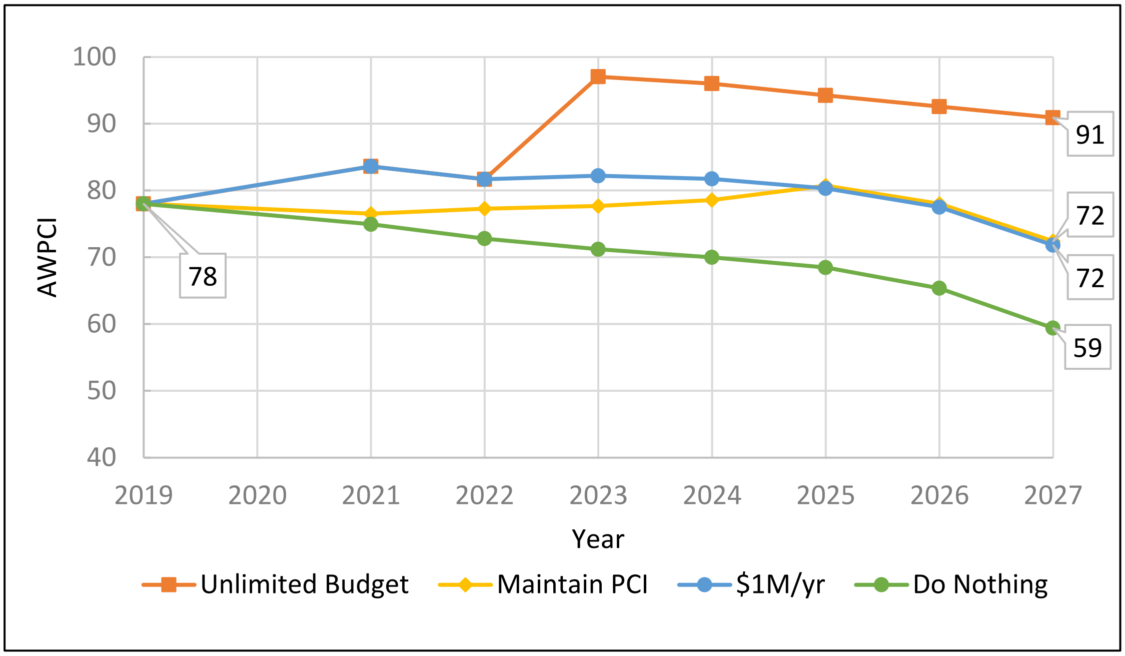


Table 4.2 summarizes the annual funding required for the above analyses. For the unlimited analysis, all pavement needs are funded in the year they are required. Therefore, the unfunded costs are zero. The total funded amount over the 7-year period is approximately $3.2 million. For the annual funding level of $1 million per year, funding is prioritized based on the prioritization matrix. When the needs exceed the funding for any year, the remaining sections are transferred to the succeeding year and the amount

for these activities are represented as "unfunded". The "unfunded" repairs in 2027 for this funding level is approximately $2.3 million.

Table 4.2: Summary of M&R Funding Level Analyses.

Year	Unlimited	Maintain PCI	Constrained $1M/year	Do Nothing
2021	$890,000	$208,000	$890,000	$0
2022	$18,000	$310,000	$18,000	$0
2023	$2,157,000	$276,000	$255,000	$0
2024	$83,000	$334,000	$88,000	$0
2025	$6,000	$337,000	$11,000	$0
2026	$8,000	$13,000	$14,000	$0
2027	$10,000	$20,000	$21,000	$0
Total	**$3,172,000**	**$1,498,000**	**$1,296,000**	**$0**
2027 Backlog	**-**	**$2,308,000**	**$2,308,000**	**$4,202,000**

Map B3A in Appendix B presents the 2027 forecasted PCI by section when the M&R activities recommended in the CIP are not conducted.

4.6. Pavement Capital Improvement Program

The unlimited funding analysis contains rehabilitation activities for sections from the same branch spread out over the seven-year period, which is not always operationally feasible to construct. The analysis output was treated as a starting point in developing the CIP. Sections were often integrated together to account for construction feasibility and other factors, resulting in larger projects which were more realistic. In addition, each project could contain sections whose condition did not trigger rehabilitation but were included to provide a logical plan which would avoid creating "islands" of newer pavement within a particular feature. For example, if the PAVER analysis showed rehabilitation was required for eight out of 10 sections on a runway, the entire runway would be recommended for rehabilitation to provide a continuous new pavement surface.

Table 4.3 shows the projects and the associated costs for the recommended 7-year PCIP. Table 4.4 is a more detailed view of the PCIP. This table lists the individual pavement section, section level M&R work, section repair cost, surface area and the PCI before the M&R is applied. The costs that are presented represent an annual escalation rate of 3% for the unit costs. The total 7-year PCIP cost is approximately $3.8 million. Map B3B shows the recommended repair types, while Map B3C presents the recommended projects and activities in the PCIP. Appendix I1 presents a summary of the recommended activities and cost by year for each section at ALX.

Table 4.3: Summary of 7-Year PCIP by Project.

Project Year	CIP Project	Total Project Cost	Total Project Area, sf	AWPCI Before	AWPCI After
2021	ALX_21-01_Taxiway Hangar 01 Preservation	$61,278	69,906	88	96
	ALX_21-02_Apron Rehabilitation	$382,095	66,595	47	100
2022	ALX_22-01_Taxiway Hangar 02 Reconstruction	$481,296	54,965	22	100
2023	ALX_23-01_Runway 18-36 Rehabilitation	$2,220,732	531,826	70	100
2024	ALX_24-01_Apron Surface Treatment	$42,383	66,595	94	98
2025	ALX_25-01_Taixway Parallel Preservation	$218,606	221,575	87	94
2026	ALX_26-01_Runway 18-36 Surface Treatment	$351,445	520,512	96	99
	Total	**$3,757,834**			

Table 4.4: Summary of 7-Year PCIP by Project and Section.

Branch	Section	Area, sf	PCI Before Rehab	Activity	Activity Type	Cost
ALX_21-01_Taxiway Hangar 01 Preservation						**$61,278**
TC01	04	27,903	88	Taxiway & Apron Surface Treatment	Preservation	$24,459
THANG01	01	42,003	89	Taxiway & Apron Surface Treatment	Preservation	$36,819
ALX_21-02_Apron Rehabilitation						**$382,095**
A01	01	52,041	51	Mill 2" & 2" AC OLP	Rehabilitation	$258,366
TC01	02	8,284	40	AC Reconstruction	Reconstruction	$70,425
TC01	03	6,270	26	AC Reconstruction	Reconstruction	$53,304
ALX_22-01_Taxiway Hangar 02 Reconstruction						**$481,296**
THANG02	01	19,792	37	AC Reconstruction	Reconstruction	$173,307
THANG02	02	35,173	14	AC Reconstruction	Reconstruction	$307,989
ALX_23-01_Runway 18-36 Rehabilitation						**$2,220,732**
R1836	01	59,808	70	Mill 2" & 2" AC OL	Rehabilitation	$255,167
R1836	02	460,704	70	Mill 2" & 2" AC OL	Rehabilitation	$1,965,564
THANG03	01	11,314	57	Mill 2" & 2" AC OL	Rehabilitation	See Note
ALX_24-01_Apron Surface Treatment						**$42,383**
A01	01	52,041	-	Surface Treatment	Preservation	$33,121
TC01	02	8,284	-	Surface Treatment	Preservation	$5,272
TC01	03	6,270	-	Surface Treatment	Preservation	$3,990
ALX_25-01_Taxiway Parallel Preservation						**$218,606**
TC01	01	18,961	92	Taxiway & Apron Surface Treatment	Preservation	$18,707
TC02	01	21,573	92	Taxiway & Apron Surface Treatment	Preservation	$21,284
TP01	01	84,314	83	Taxiway & Apron Surface Treatment	Preservation	$83,184

Branch	Section	Area, sf	PCI Before Rehab	Activity	Activity Type	Cost
TP01	02	96,727	89	Taxiway & Apron Surface Treatment	Preservation	$95,431
ALX_26-01_Runway 18-36 Surface Treatment						**$351,445**
R1836	01	59,808	-	Surface Treatment	Preservation	$40,382
R1836	02	460,704	-	Surface Treatment	Preservation	$311,063
					Total	**$3,757,834**

The FAA, under the Airport Improvement Program (AIP) provides approximately 90 percent of eligible costs for planning and development of public-use airports included in the NPIAS as grants. The remaining 10 percent of costs are shared between ALDOT and the airport sponsor. The following is the distribution of the 7-yr PCIP cost of $3.8 million for ALX:

➢ FAA (90%):	$3.4 million
➢ ALDOT (5%):	$0.2 million
➢ Airport Sponsor (5%):	$0.2 million

The recommendations within the PCIP are based on a network-level study and should be used for planning purposes only. A detailed project-level assessment should be conducted for each project to determine the appropriate repair activities and develop more accurate cost estimates.

Table 4.5 summarizes the maintenance activities that are recommended for Year 1 (2021). The estimated cost is approximately $83,194. A complete listing of the maintenance activities by section is presented in Appendix I2. This may be used as a basis for establishing an annual maintenance budget for the ALX pavements.

Table 4.5: Summary of Year-1 Maintenance Plan.

Policy	Work Description	Work Quantity	Work Unit	Work Cost
Preventive	Patching - AC Full-Depth	85	SqFt	$2,119
	Patching - AC Partial-Depth	16	SqFt	$260
	Crack Sealing - AC	13,198	Ft	$52,133
Safety	Patching - AC Full-Depth	1,134	SqFt	$28,402
	Crack Sealing - AC	71	Ft	$279
			Total	**$83,194**

APPENDIX A

INVENTORY

Appendix A
Pavement Inventory Report
Thomas C Russell Field (ALX)

Branch ID	Name	Branch Use	Section ID	Rank[1]	Length (ft)	Width (ft)	Area (sf)	LCD[2]	Surface[3]
A01	Apron 01 Alexander	APRON	01	S	216	246	52,041	6/1/2012	AAC
R1836	Runway 18-36 Alexander	RUNWAY	01	P	623	96	59,808	3/1/2009	AAC
R1836	Runway 18-36 Alexander	RUNWAY	02	P	4,799	96	460,704	3/1/2009	AAC
TC01	Taxiway Connector 01 Alexander	TAXIWAY	01	S	183	65	18,961	6/1/2012	AAC
TC01	Taxiway Connector 01 Alexander	TAXIWAY	02	S	244	35	8,284	6/1/2012	AAC
TC01	Taxiway Connector 01 Alexander	TAXIWAY	03	S	233	25	6,270	6/1/2013	AC
TC01	Taxiway Connector 01 Alexander	TAXIWAY	04	S	816	37	27,903	6/2/2013	AC
TC02	Taxiway Connector 02 Alexander	TAXIWAY	01	S	235	50	21,573	6/3/2018	AC
THANG01	Taxiway Hangar 01 Alexander	TAXIWAY	01	T	560	50	42,003	6/1/2012	AAC
THANG02	Taxiway Hangar 02 Alexander	TAXIWAY	01	T	440	35	19,792	6/1/2012	AAC
THANG02	Taxiway Hangar 02 Alexander	TAXIWAY	02	T	1,475	20	35,173	1/1/1940	AC
THANG03	Taxiway Hangar 03 Alexander	TAXIWAY	01	T	285	30	11,314	6/1/2006	AC
TP01	Taxiway Parallel 01 Alexander	TAXIWAY	01	P	2,095	35	84,314	6/3/2017	AC
TP01	Taxiway Parallel 01 Alexander	TAXIWAY	02	P	2,455	35	96,727	6/1/2018	AAC

[1] P = Primary pavement, S = Secondary pavement, T = Tertiary pavement

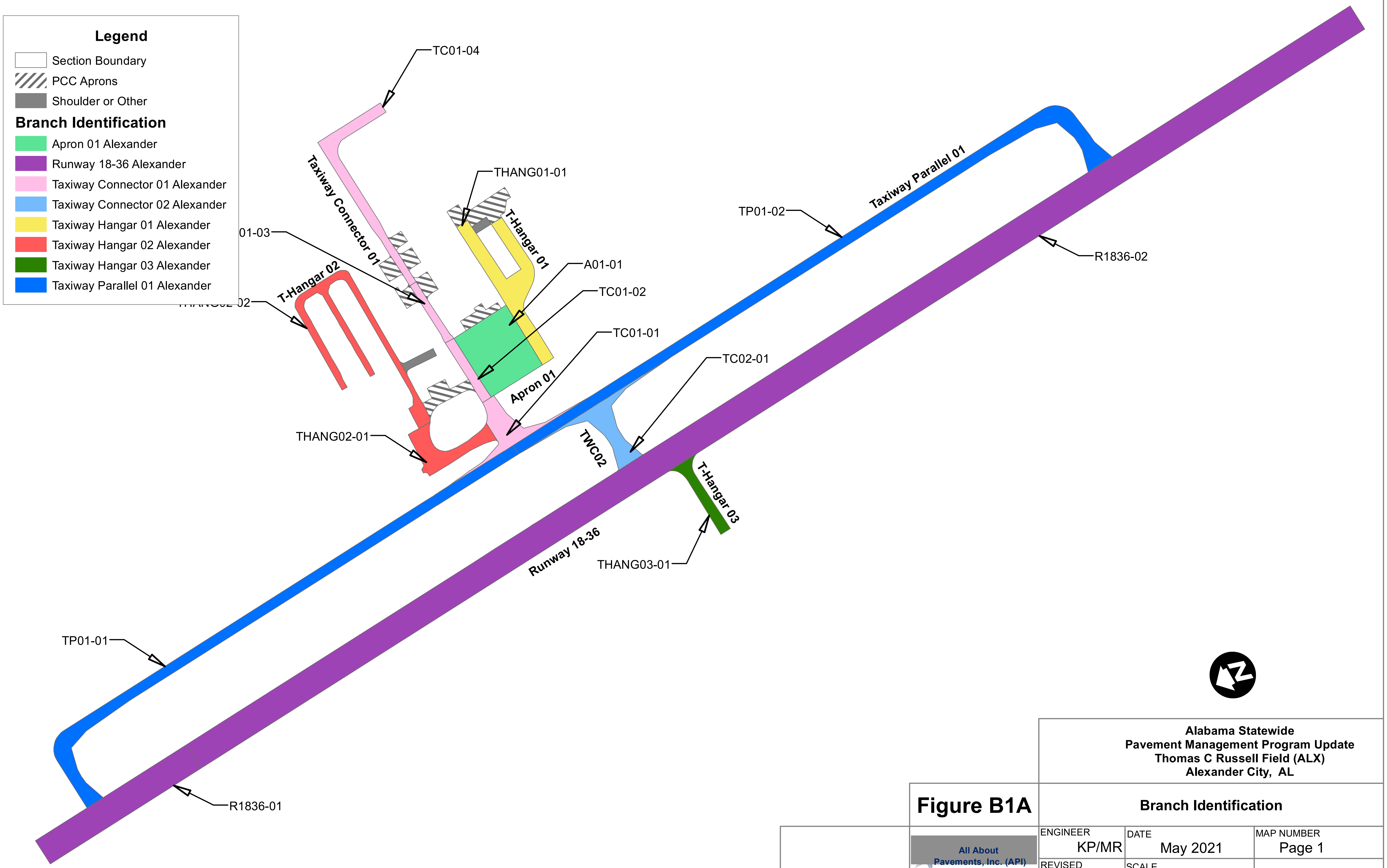
[2] LCD = Last construction date. The date of the last major pavement rehabilitation (e.g. AC overlay)

[3] AC = Asphalt Cement Concrete, AAC = Aphalt Overlay AC, PCC = Portland cement Concrete, APC = Asphalt Overlay PCC

APPENDIX B

PMP Maps

- B1: Inventory Maps
    - B1A: Branch Identification
    - B1B: Section Identification
    - B1C: Sample Unit Layout
    - B1D: Pavement Type
    - B1E: Branch Use
    - B1F: Pavement Age
- B2: Surface Condition Maps
    - B2A: 7-Color PCI
    - B2B: 3-Color PCI
    - B2C: FOD Rating
    - B2D: Survey Photo Locations
- B3: Pavement Capital Improvement Plan (PCIP) Maps
    - B3A: 2027 Forecasted PCI without PCIP
    - B3B: M&R Needs
    - B3C: PCIP Recommendations


Legend
Section Boundary
PCC Aprons
Shoulder or Other
Branch Identification
Apron 01 Alexander
Runway 18-36 Alexander
Taxiway Connector 01 Alexander
Taxiway Connector 02 Alexander
Taxiway Hangar 01 Alexander
Taxiway Hangar 02 Alexander
Taxiway Hangar 03 Alexander
Taxiway Parallel 01 Alexander
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
01-03
T-Hangar 02
02
A01-01
TC01-02
TC01-01
Apron 01
TP01-02
Taxiway Parallel 01
R1836-02
TC02-01
THANG02-01
TWC02
T-Hangar 03
Runway 18-36
THANG03-01
TP01-01
R1836-01
N

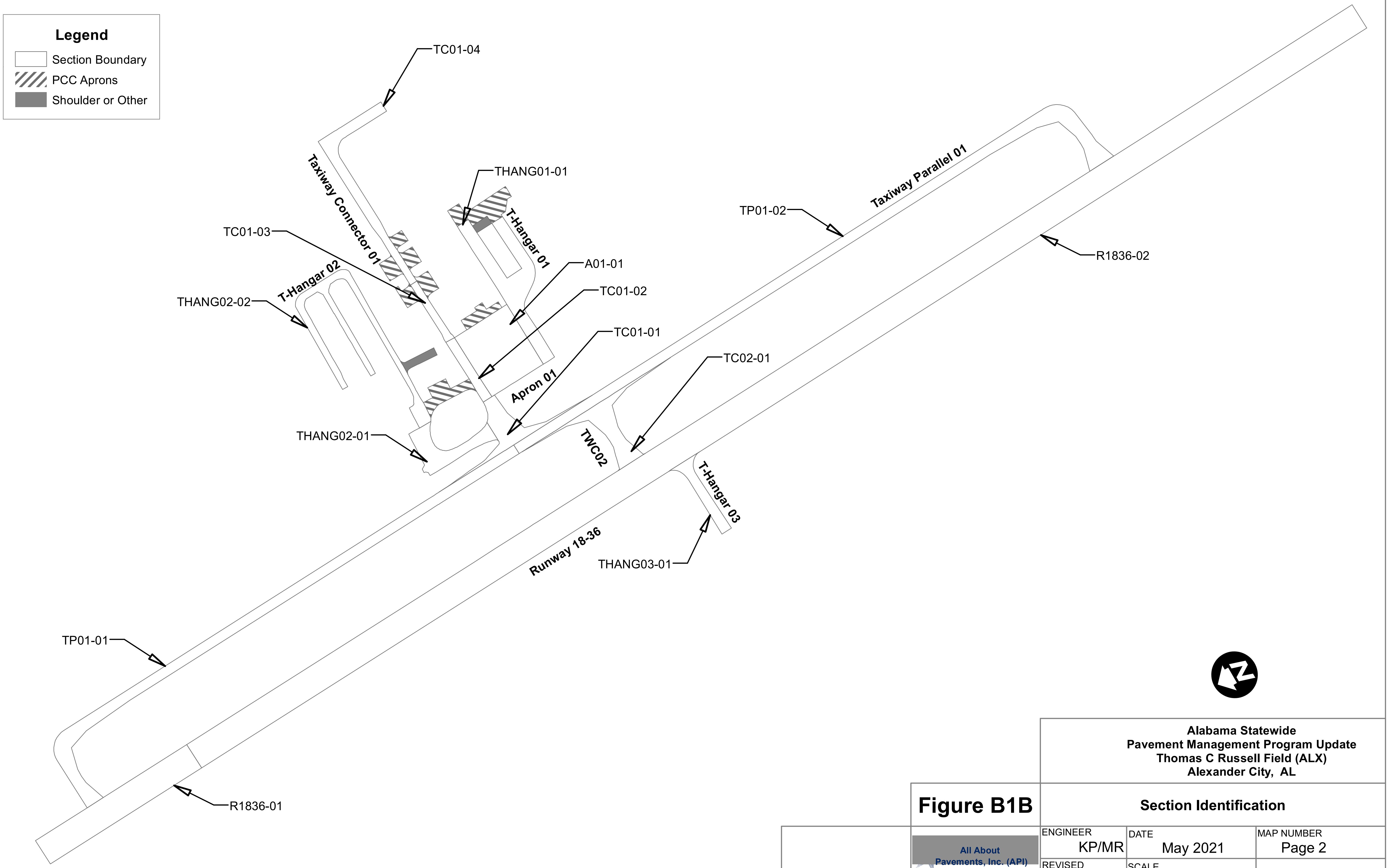
Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B1A

Branch Identification

ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 1
REVISED	SCALE	
JMA	1 in = 300 ft	**FINAL**

All About Pavements, Inc. (API)
www.allaboutpavements.com
Telephone: 217-586-2765 FAX: 217 586-1967


Legend
Section Boundary
PCC Aprons
Shoulder or Other
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
TC01-03
T-Hangar 02
THANG02-02
A01-01
TC01-02
Apron 01
TC01-01
THANG02-01
TWC02
TC02-01
T-Hangar 03
THANG03-01
Taxiway Parallel 01
TP01-02
R1836-02
Runway 18-36
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B1B

Section Identification

ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 2
REVISED JMA	SCALE 1 in = 300 ft	**FINAL**

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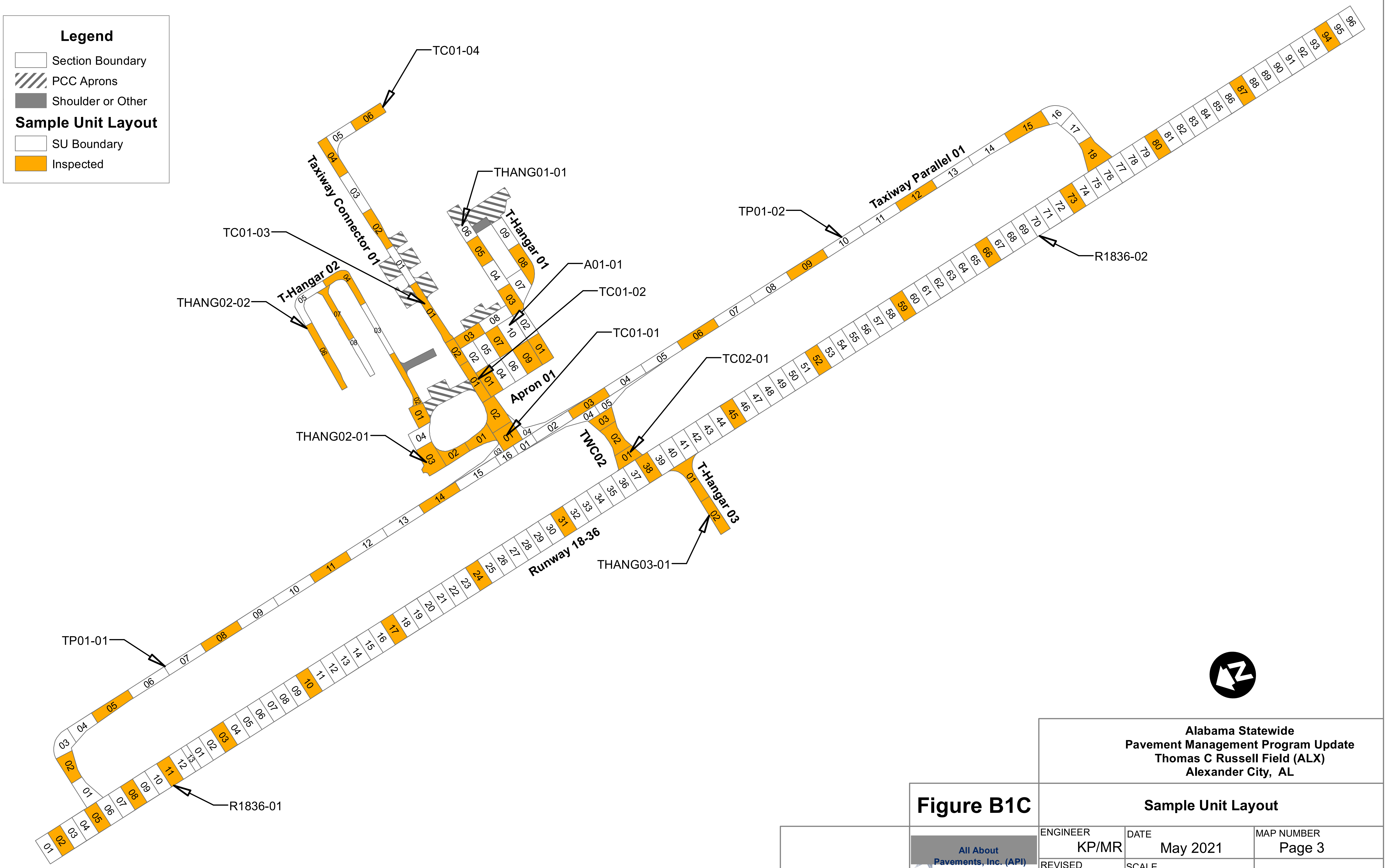
Legend
Section Boundary
PCC Aprons
Shoulder or Other
Sample Unit Layout
SU Boundary
Inspected
TC01-04
THANG01-01
Taxiway Connector 01
T-Hangar 01
TC01-03
A01-01
TC01-02
T-Hangar 02
THANG02-02
TC01-01
Apron 01
TC02-01
THANG02-01
TWC02
T-Hangar 03
THANG03-01
TP01-02
Taxiway Parallel 01
R1836-02
Runway 18-36
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B1C

Sample Unit Layout

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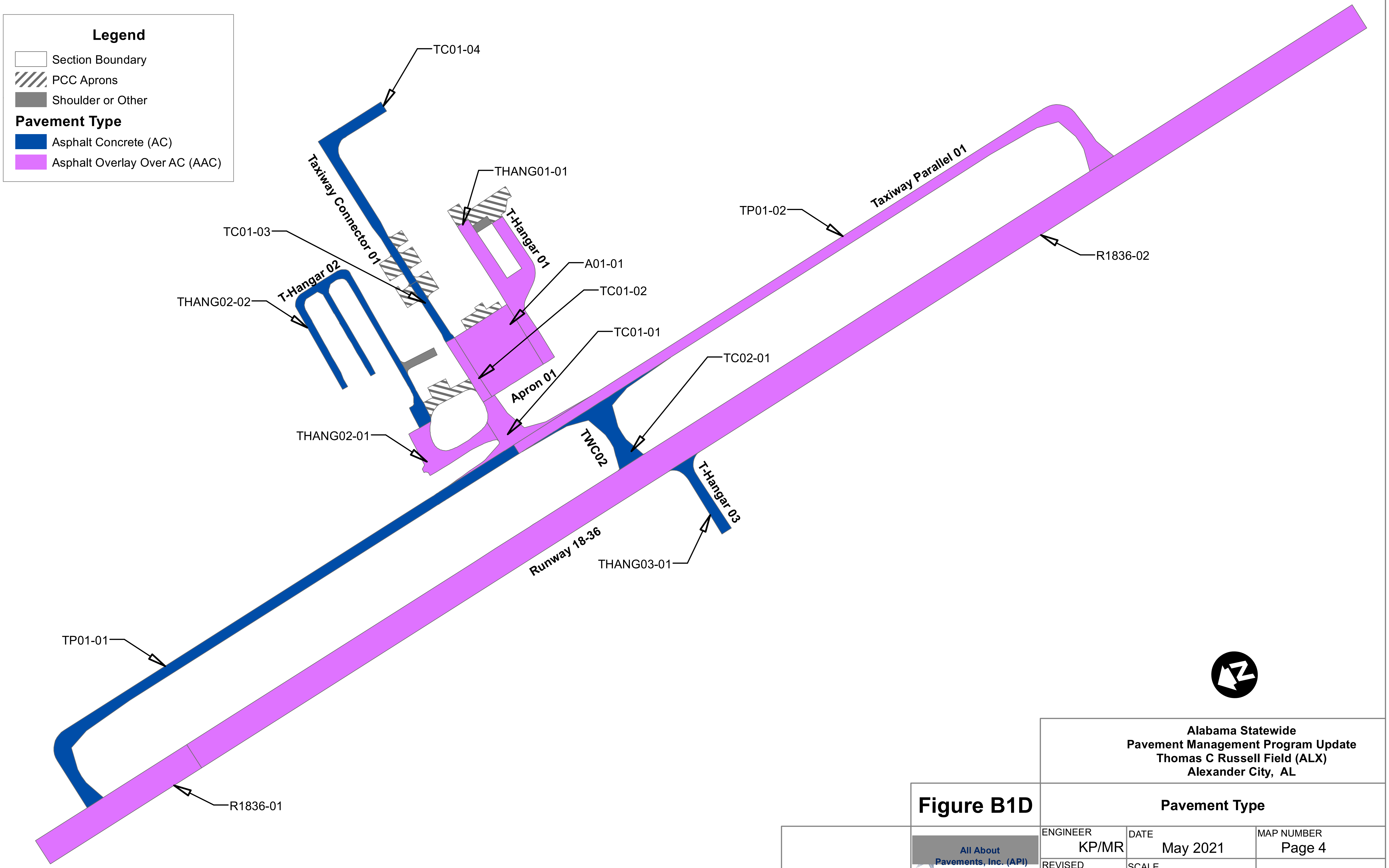
ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 3
REVISED	SCALE	
JMA	1 in = 300 ft	FINAL

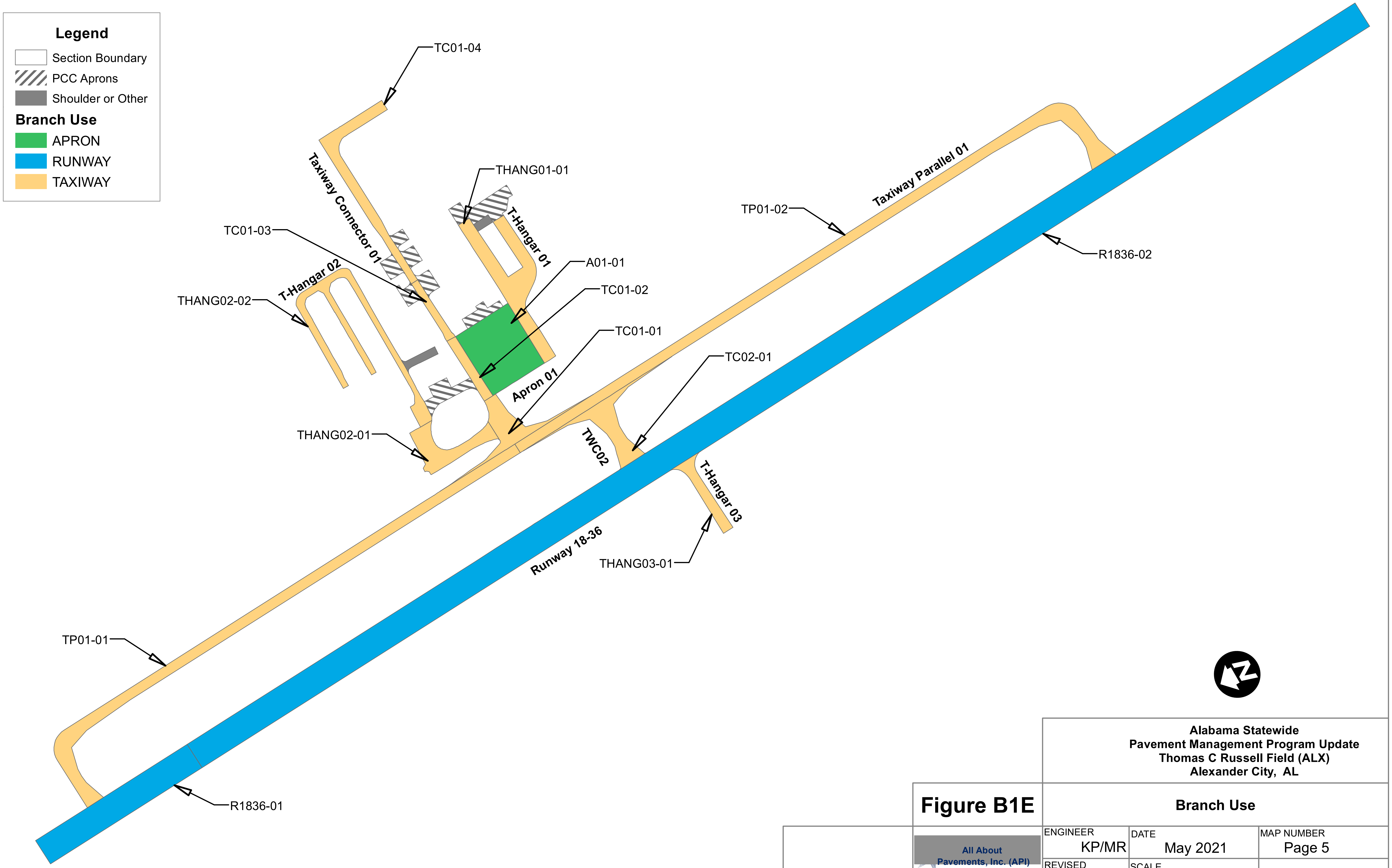

Legend
Section Boundary
PCC Aprons
Shoulder or Other
Pavement Type
Asphalt Concrete (AC)
Asphalt Overlay Over AC (AAC)
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
TC01-03
TP01-02
Taxiway Parallel 01
R1836-02
A01-01
TC01-02
THANG02-02
T-Hangar 02
TC01-01
TC02-01
Apron 01
THANG02-01
TWC02
T-Hangar 03
Runway 18-36
THANG03-01
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B1D

Pavement Type

All About Pavements, Inc. (API) www.allaboutpavements.com Telephone: 217-586-2765 FAX: 217 586-1967	ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 4
	REVISED JMA	SCALE 1 in = 300 ft	**FINAL**


Legend
Section Boundary
PCC Aprons
Shoulder or Other
Branch Use
APRON
RUNWAY
TAXIWAY
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
TC01-03
THANG02-02
T-Hangar 02
A01-01
TC01-02
TC01-01
Apron 01
TP01-02
Taxiway Parallel 01
R1836-02
TC02-01
THANG02-01
TWC02
T-Hangar 03
Runway 18-36
THANG03-01
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B1E

Branch Use

ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 5
REVISED JMA	SCALE 1 in = 300 ft	**FINAL**

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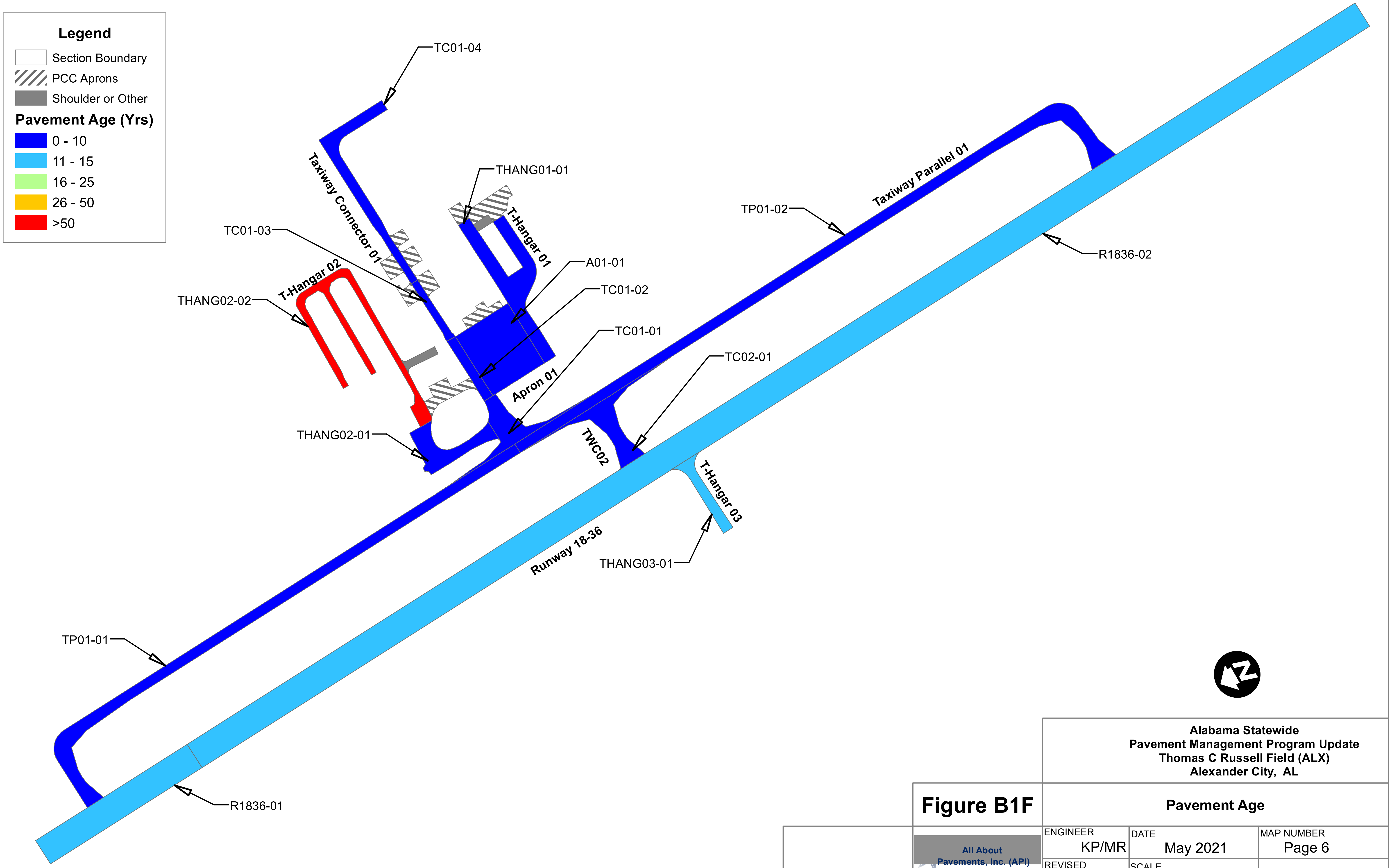
Legend
Section Boundary
PCC Aprons
Shoulder or Other
Pavement Age (Yrs)
0 - 10
11 - 15
16 - 25
26 - 50
>50
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
TC01-03
THANG02-02
T-Hangar 02
A01-01
TC01-02
TC01-01
Apron 01
TC02-01
TWC02
THANG02-01
TP01-02
Taxiway Parallel 01
R1836-02
T-Hangar 03
THANG03-01
Runway 18-36
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B1F

Pavement Age

ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 6
REVISED JMA	SCALE 1 in = 300 ft	**FINAL**

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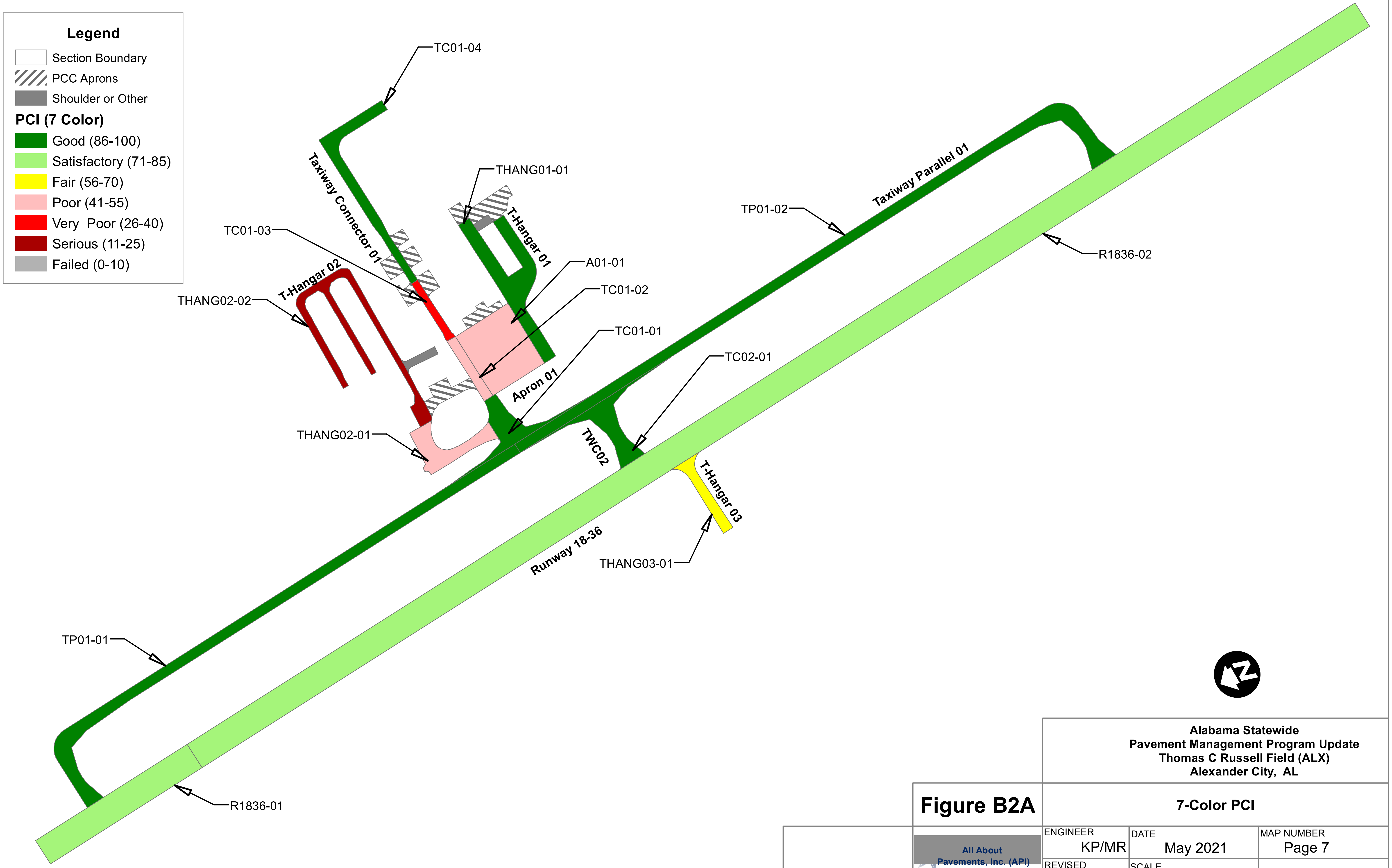
Legend
☐ Section Boundary
▨ PCC Aprons
■ Shoulder or Other
PCI (7 Color)
🟩 Good (86-100)
🟩 Satisfactory (71-85)
🟨 Fair (56-70)
■ Poor (41-55)
🟥 Very Poor (26-40)
🟥 Serious (11-25)
■ Failed (0-10)
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
TC01-03
T-Hangar 02
THANG02-02
A01-01
TC01-02
TC01-01
Apron 01
THANG02-01
TWC02
TC02-01
T-Hangar 03
THANG03-01
Runway 18-36
TP01-02
Taxiway Parallel 01
R1836-02
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B2A

7-Color PCI

ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 7
REVISED JMA	SCALE 1 in = 300 ft	**FINAL**

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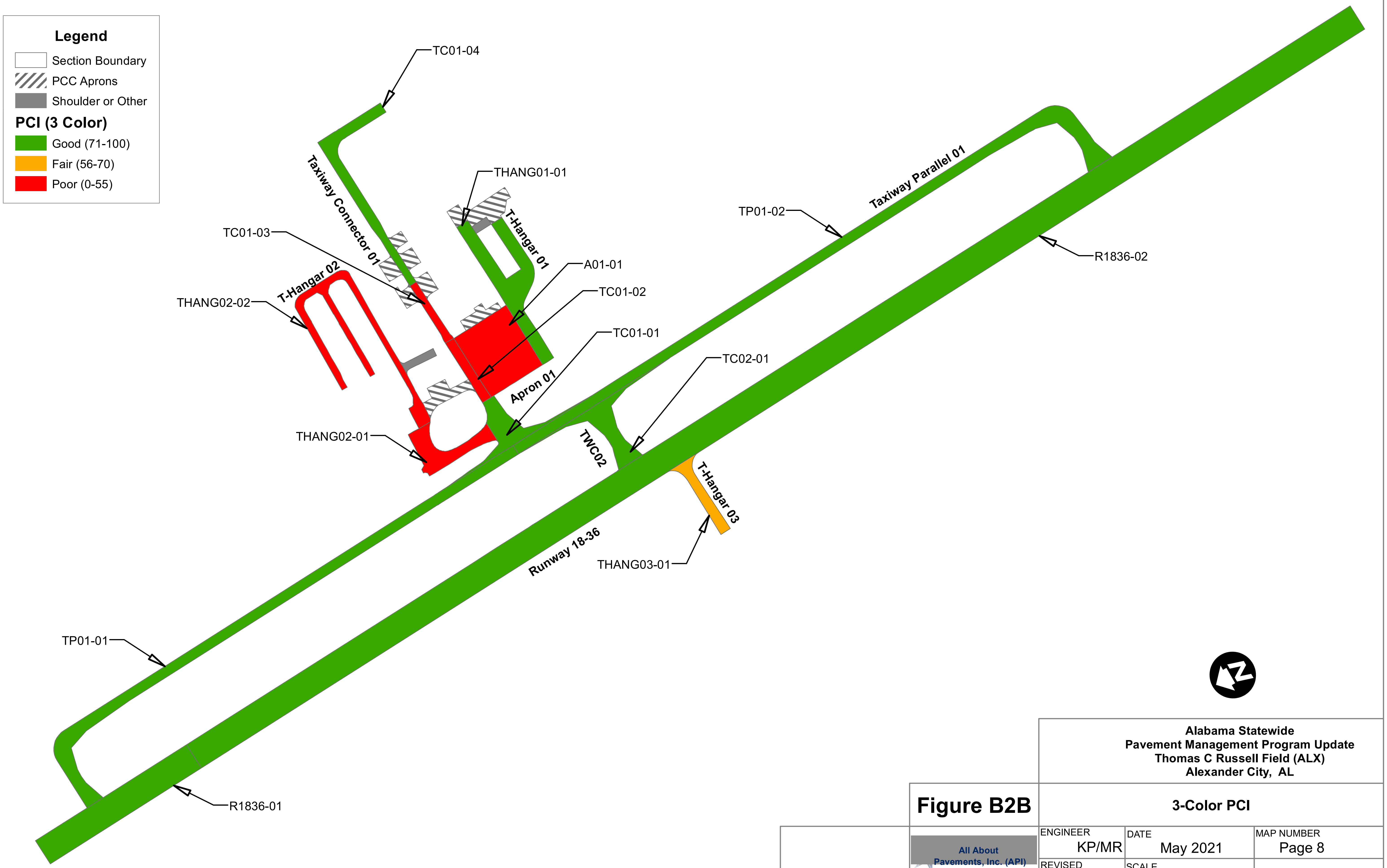
Legend
Section Boundary
PCC Aprons
Shoulder or Other
PCI (3 Color)
Good (71-100)
Fair (56-70)
Poor (0-55)
TC01-04
THANG01-01
Taxiway Connector 01
T-Hangar 01
TC01-03
T-Hangar 02
THANG02-02
A01-01
TC01-02
TC01-01
Apron 01
TC02-01
TP01-02
Taxiway Parallel 01
R1836-02
THANG02-01
TWC02
T-Hangar 03
Runway 18-36
THANG03-01
TP01-01
R1836-01
N

Alabama Statewide
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Alexander City, AL

Figure B2B

3-Color PCI

ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 8
REVISED JMA	SCALE 1 in = 300 ft	**FINAL**

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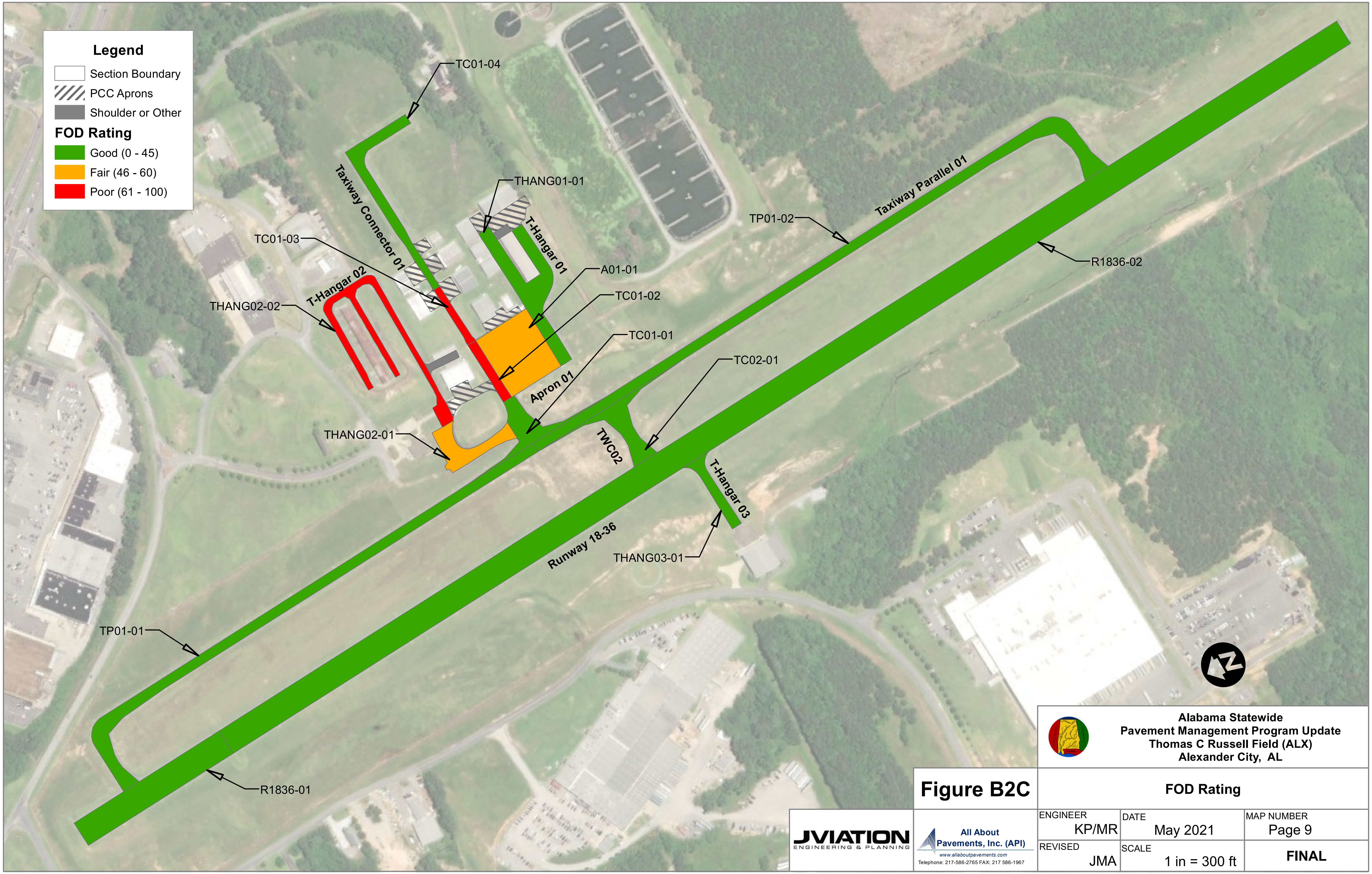
Legend
Section Boundary
PCC Aprons
Shoulder or Other
FOD Rating
🟩 Good (0 - 45)
🟧 Fair (46 - 60)
🟥 Poor (61 - 100)
TC01-04
THANG01-01
Taxiway Connector 01
T-Hangar 01
TC01-03
T-Hangar 02
A01-01
TC01-02
THANG02-02
TC01-01
TC02-01
Apron 01
THANG02-01
TWC02
T-Hangar 03
TP01-02
Taxiway Parallel 01
R1836-02
Runway 18-36
THANG03-01
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B2C

FOD Rating

JVIATION
ENGINEERING & PLANNING

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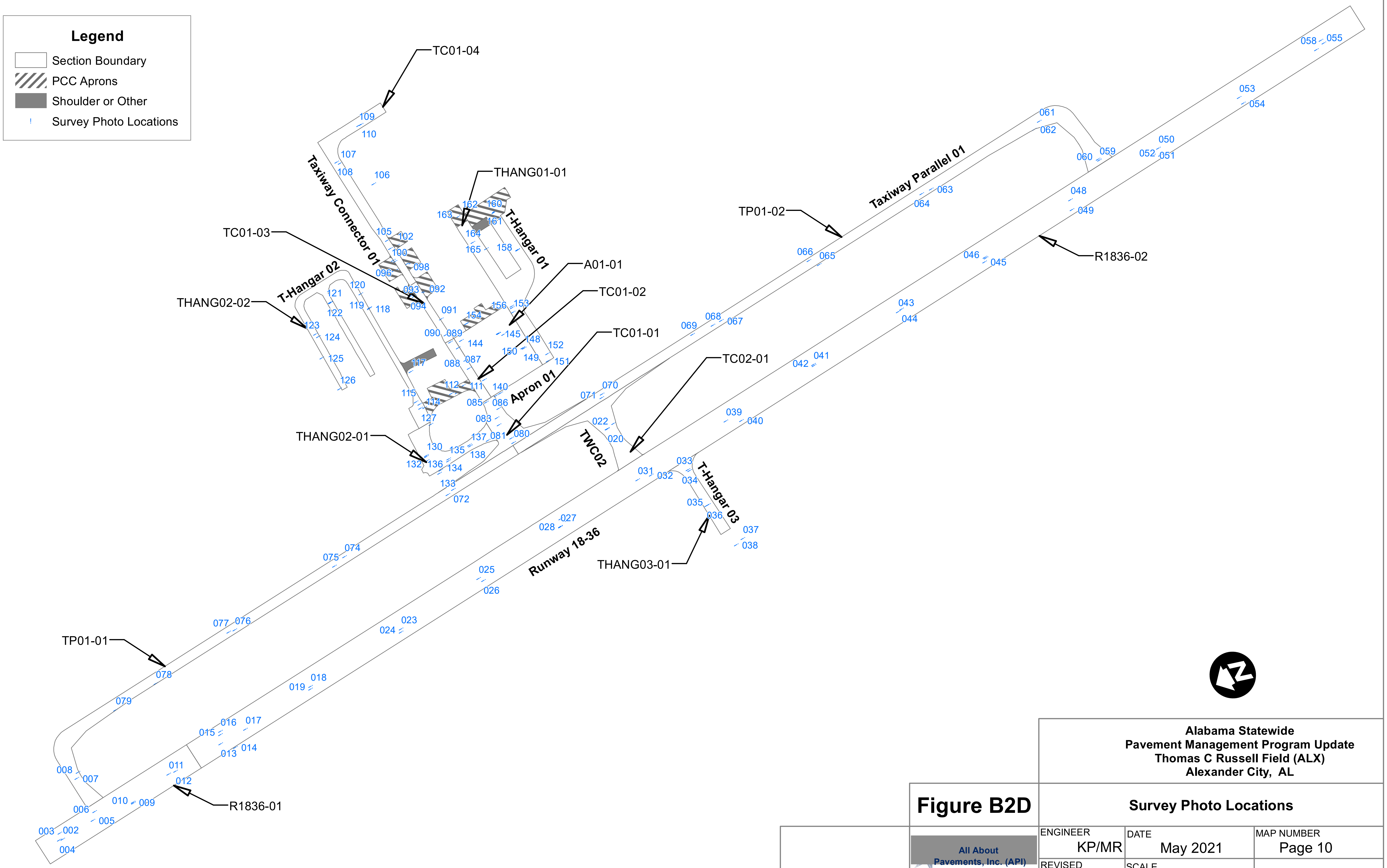
ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 9
REVISED	SCALE	
JMA	1 in = 300 ft	**FINAL**


Legend
Section Boundary
PCC Aprons
Shoulder or Other
Survey Photo Locations
TC01-04
TC01-03
THANG01-01
THANG02-02
THANG02-01
A01-01
TC01-02
TC01-01
TC02-01
TP01-02
TP01-01
R1836-02
R1836-01
THANG03-01
Taxiway Connector 01
T-Hangar 01
T-Hangar 02
T-Hangar 03
Apron 01
TWC02
Taxiway Parallel 01
Runway 18-36
N

Alabama Statewide
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Figure B2D

Survey Photo Locations

ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 10
REVISED	SCALE	
JMA	1 in = 300 ft	FINAL

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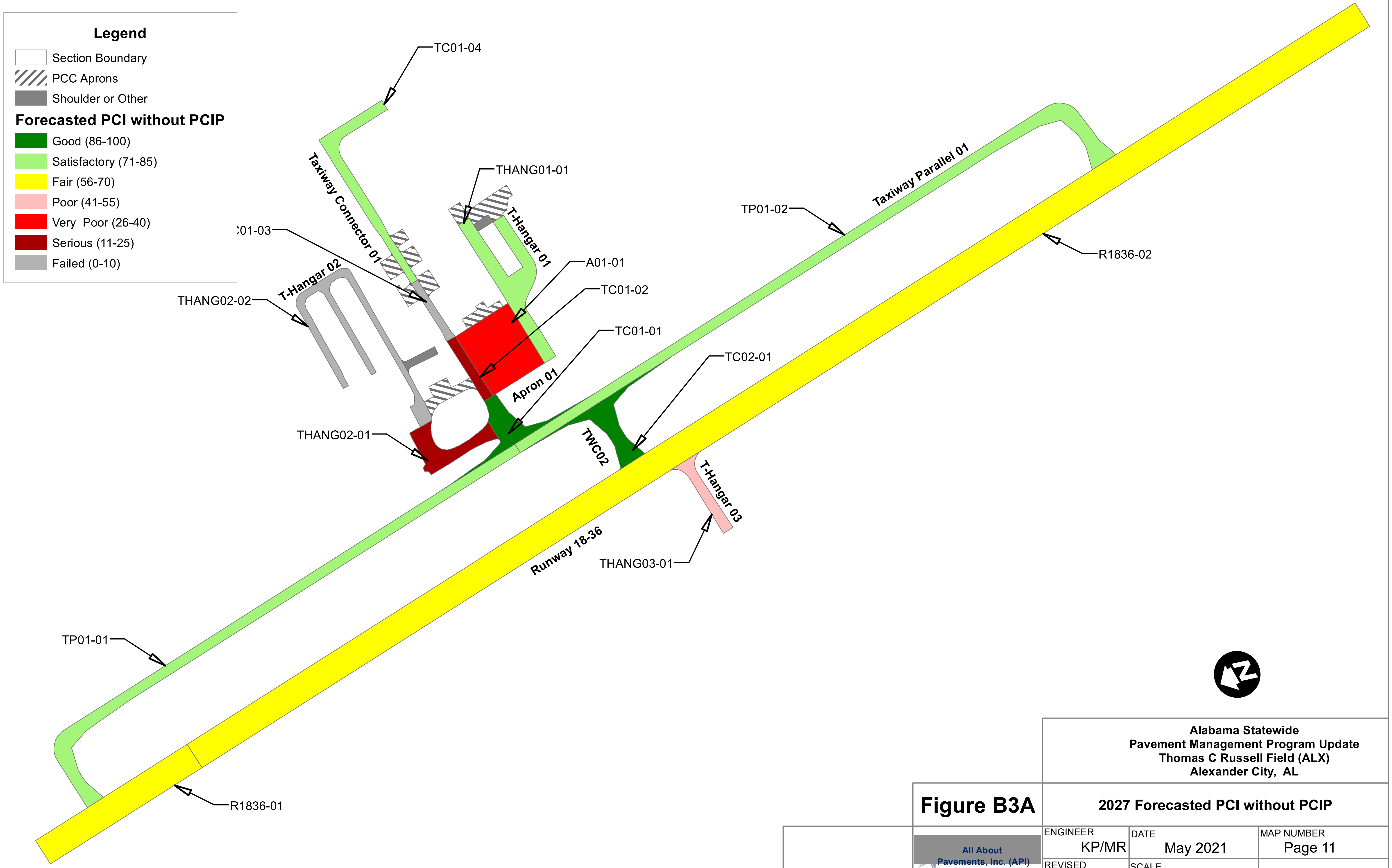
Legend
▭ Section Boundary
▨ PCC Aprons
■ Shoulder or Other
Forecasted PCI without PCIP
🟩 Good (86-100)
🟩 Satisfactory (71-85)
🟨 Fair (56-70)
■ Poor (41-55)
🟥 Very Poor (26-40)
🟥 Serious (11-25)
■ Failed (0-10)
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
C01-03
T-Hangar 02
THANG02-02
A01-01
TC01-02
TC01-01
Apron 01
TC02-01
TWC02
THANG02-01
Taxiway Parallel 01
TP01-02
R1836-02
T-Hangar 03
THANG03-01
Runway 18-36
TP01-01
R1836-01

Alabama Statewide
Pavement Management Program Update
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Alexander City, AL

Figure B3A

2027 Forecasted PCI without PCIP

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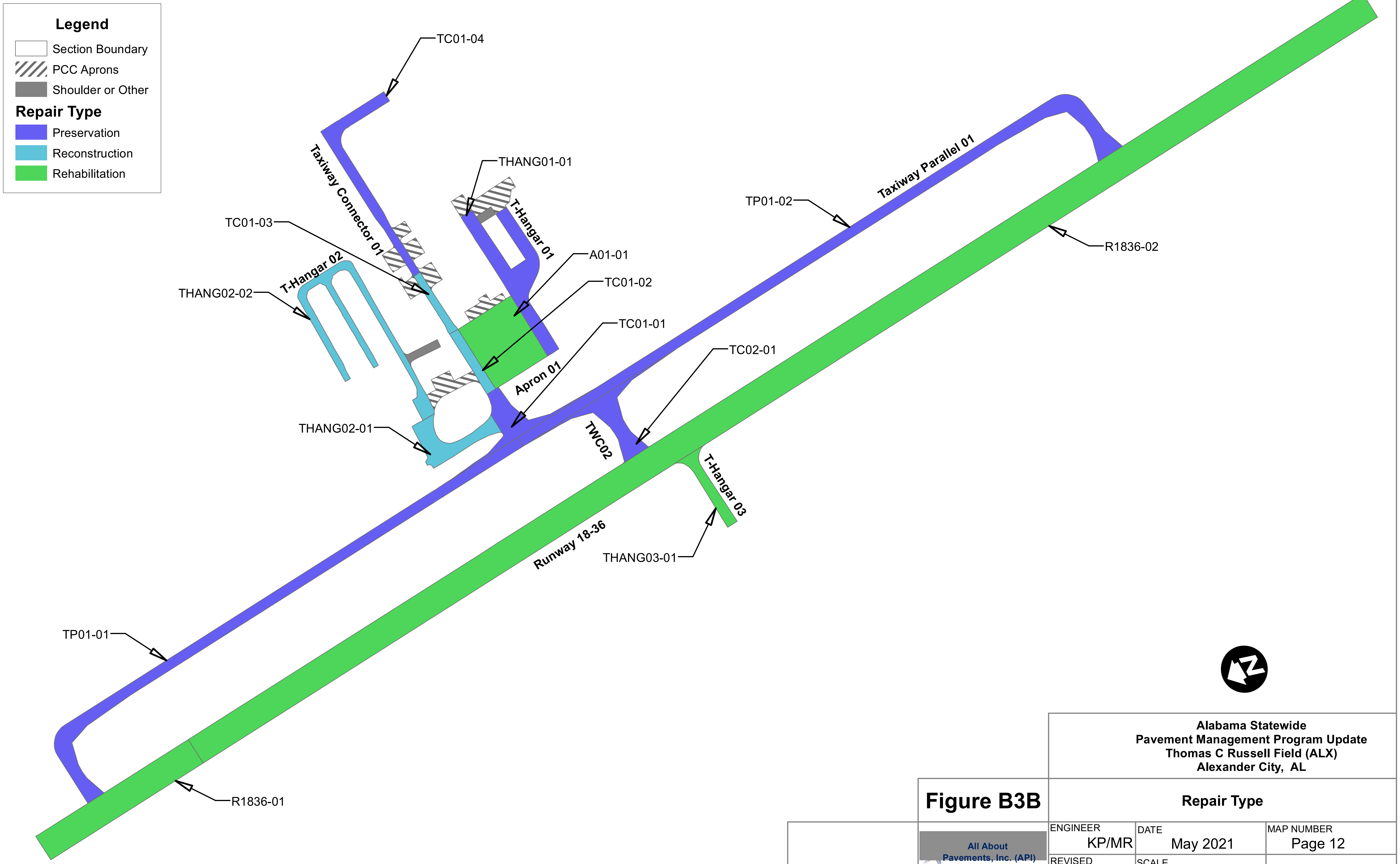
ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 11
REVISED JMA	SCALE 1 in = 300 ft	**FINAL**

All sections recommended for Rehabilitation or Reconstruction between 2021 and 2024 also receive Surface Treatment in the 3rd year of paving.


Legend
☐ Section Boundary
▨ PCC Aprons
■ Shoulder or Other
Repair Type
■ Preservation
■ Reconstruction
■ Rehabilitation
TC01-04
Taxiway Connector 01
THANG01-01
T-Hangar 01
TC01-03
T-Hangar 02
THANG02-02
A01-01
TC01-02
TC01-01
Apron 01
THANG02-01
TWC02
TC02-01
TP01-02
Taxiway Parallel 01
R1836-02
T-Hangar 03
Runway 18-36
THANG03-01
TP01-01
R1836-01

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B3B

Repair Type

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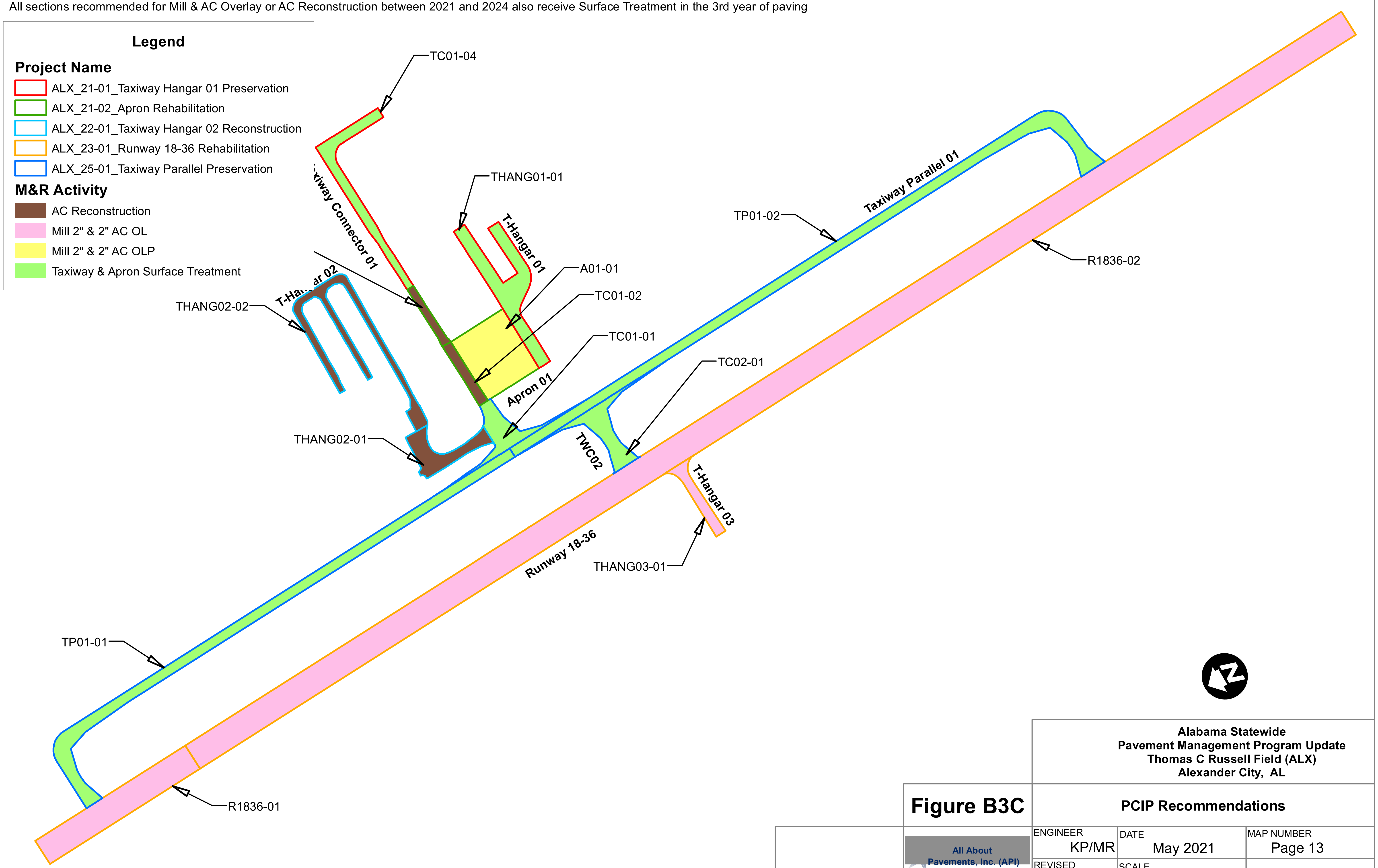
ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 12
REVISED	SCALE	
JMA	1 in = 300 ft	**FINAL**

All sections recommended for Mill & AC Overlay or AC Reconstruction between 2021 and 2024 also receive Surface Treatment in the 3rd year of paving


Legend
Project Name
ALX_21-01_Taxiway Hangar 01 Preservation
ALX_21-02_Apron Rehabilitation
ALX_22-01_Taxiway Hangar 02 Reconstruction
ALX_23-01_Runway 18-36 Rehabilitation
ALX_25-01_Taxiway Parallel Preservation
M&R Activity
AC Reconstruction
Mill 2" & 2" AC OL
Mill 2" & 2" AC OLP
Taxiway & Apron Surface Treatment
TC01-04
THANG01-01
Taxiway Connector 01
T-Hangar 01
A01-01
TC01-02
TC01-01
TC02-01
Taxiway Parallel 01
TP01-02
R1836-02
T-Hangar 02
THANG02-02
Apron 01
THANG02-01
TWC02
T-Hangar 03
THANG03-01
Runway 18-36
TP01-01
R1836-01
N

Alabama Statewide
Pavement Management Program Update
Thomas C Russell Field (ALX)
Alexander City, AL

Figure B3C

PCIP Recommendations

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ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 13
REVISED	SCALE	
JMA	1 in = 300 ft	**FINAL**

APPENDIX C

OVERVIEW OF PAVEMENT DISTRESSES

1. Alligator Cracking (AC)

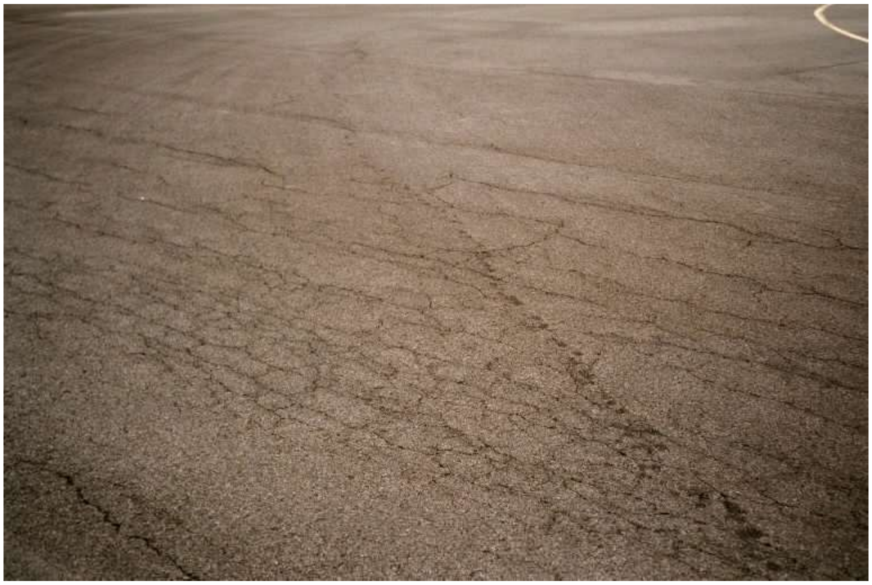
Alligator cracking is a series of interconnecting cracks caused by fatigue failure of the asphalt concrete surface where tensile stress and strain is highest under wheel loads. The cracks propagate to the surface initially as a series of parallel cracks. After repeated traffic loading the cracks connect, forming many sided, sharp angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are less than 2 feet long on the longest side. Alligator cracking occurs only in areas that are subjected to repeated traffic loading, such as wheel paths, and is considered a major structural distress.

Severities:

- **Low - made up of fine, hair-like cracks running parallel to each other with none or only a few inter-connecting cracks. The cracks are not spalled;**
- **Medium - Further development of light alligator cracking into a pattern or network of cracks that may be lightly spalled. Medium-severity alligator cracking is defined by a well-defined pattern of interconnecting cracks, where all pieces are securely held in place (good aggregate interlock between pieces);**
- **High - has progressed so that the pieces are well defined and spalled at the edges. Some of the pieces may rock under traffic and may cause FOD potential.**

Repair options:

- **Low - No action, surface seal or overlay for low severity distress;**
- **Medium - partial or full depth patch, overlay or reconstruct;**
- **High - partial or full depth patch, overlay or reconstruct.**

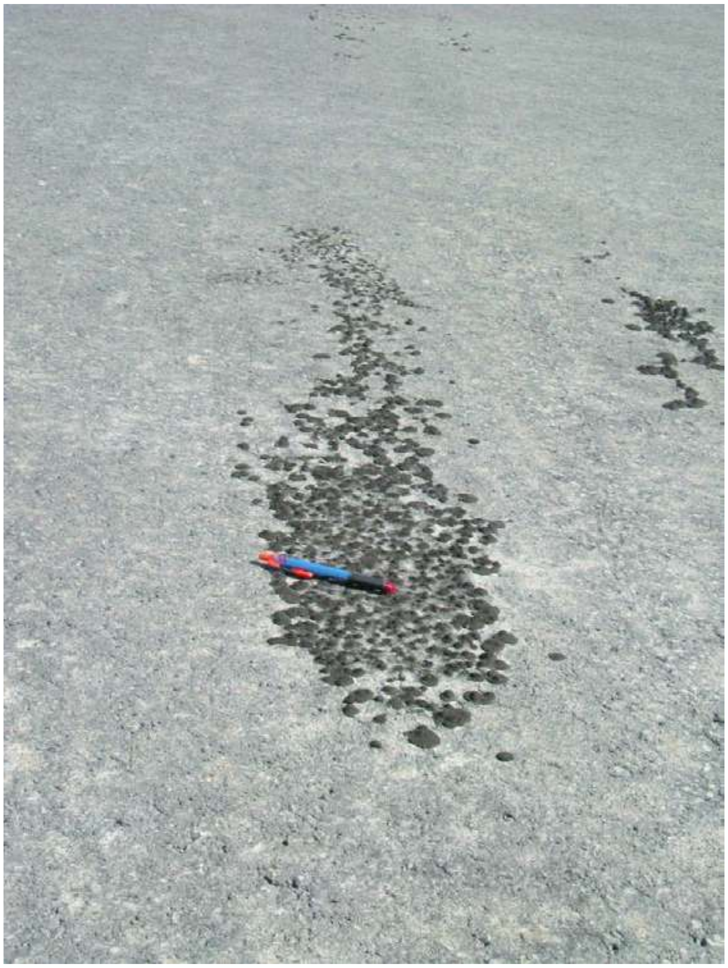


2. Bleeding (AC)

Bleeding is a film of bituminous material on the pavement surface that creates a shiny, glass-like, reflecting surface that usually becomes quite sticky. Bleeding is caused by excessive amounts of asphaltic cement or tars in the mix or low-air void content, or both. It occurs when asphalt fills the voids of the mix during hot weather and then expands out onto the surface of the pavement. Since the bleeding process is not reversible during cold weather, asphalt or tar will accumulate on the surface.

Severities: No degrees of severity are defined. Bleeding should be noted when it is extensive enough to reduce skid resistance.

Repair Policies: Do nothing; sand blot the distressed area by applying heat and roll sand into the areas affected with bleeding, remove the excess material; patch.



3. Block Cracking (AC)

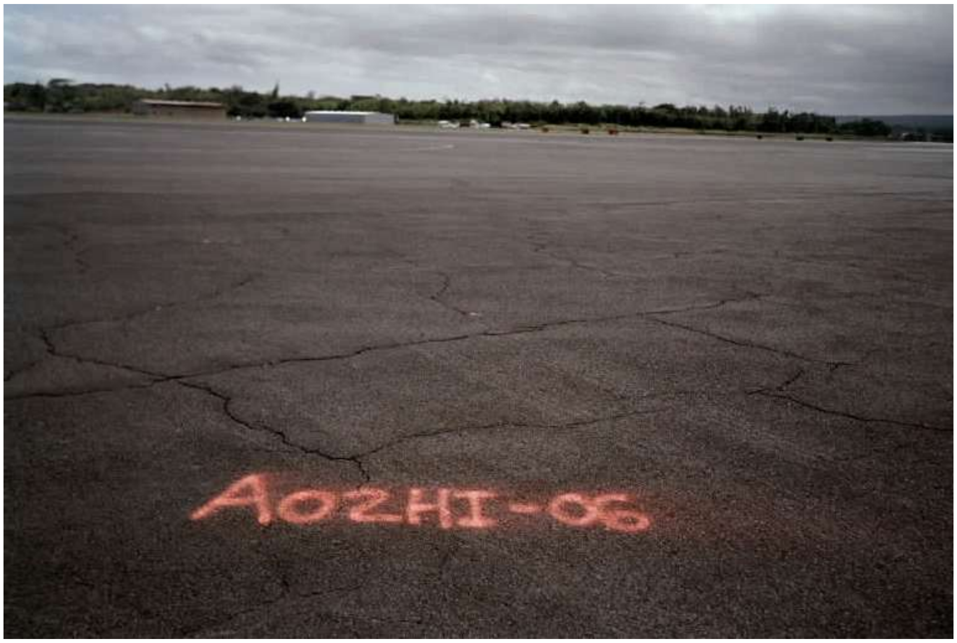
Block cracks are interconnected cracks that divide the pavement into rectangular shaped pieces. The blocks may range in size from 1 by 1 foot to 10 by 10 feet. Block cracking is caused mainly by shrinkage of the asphalt concrete and is not load associated. The occurrence of block cracking usually indicates that the asphalt has hardened significantly. Block cracking normally occurs over a large proportion of the pavement area, but will sometimes occur only in the non-traffic areas.

Severities:

- **Low - defined by cracks that are at most lightly spalled, causing no foreign object damage (FOD) potential. Un-filled cracks have 1/4 inch or less mean width, and filled cracks have filler in satisfactory condition;**
- **Medium - defined by cracks that are moderately spalled (some FOD potential), un-filled cracks that are at most lightly spalled, but have a mean width greater than 1/4 inch or filled cracks that are at most lightly spalled but have filler in unsatisfactory condition;**
- **High - defined by cracks that are severely spalled, causing a definite FOD potential.**

Repair Policies:

- **Low - No action;**
- **Medium - seal cracks, apply rejuvenator, recycle surface or heat scarify and overlay;**
- **High - recycle surface or heat scarify and overlay.**



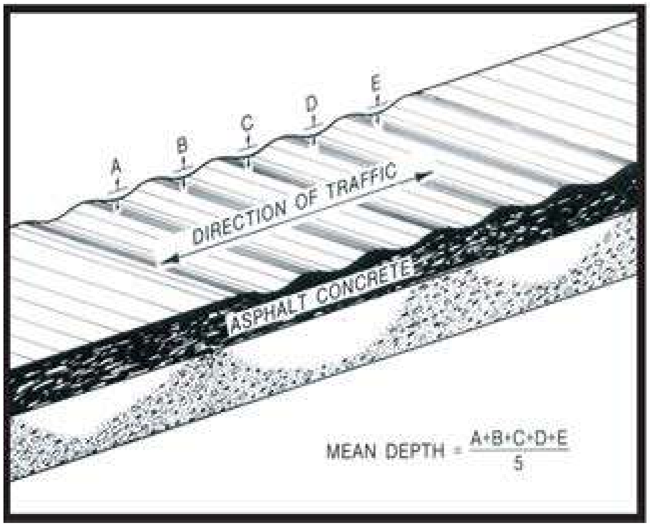
4. Corrugation (AC)

Description

Corrugation is a series of closely spaced ridges and valleys (ripples) occurring at fairly regular intervals, usually less than 5 feet (1.5 meters) along the pavement. The ridges are perpendicular to the traffic direction. Traffic action combined with an unstable pavement surface or base usually causes this type of distress.

Severity Levels

L	**Corrugations are minor and do not significantly affect ride quality (see measurement criteria below).**
M	**Corrugations are noticeable and significantly affect ride quality (see measurement criteria below).**
H	**Corrugations are easily noticed and severely affect ride quality (see measurement criteria below).**



5. Depression (AC)

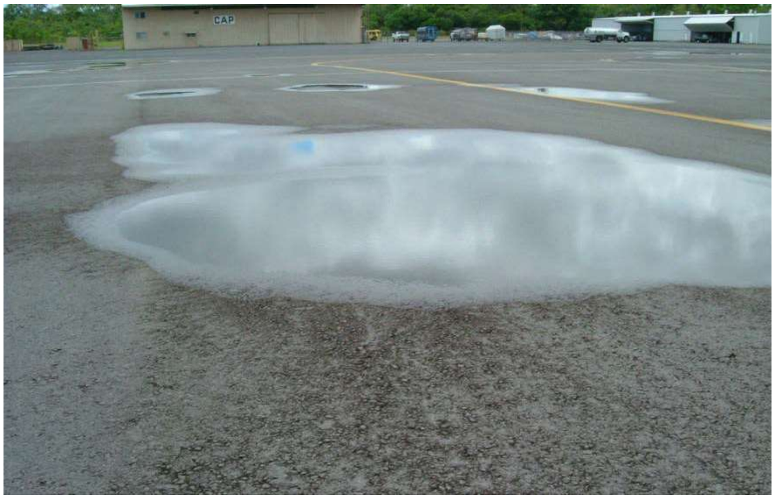
Depressions are localized pavement surface areas having elevations slightly lower than those of the surrounding pavement. In many instances, light depressions are not noticeable until after a rain, when ponding water creates ñbirdbathò areas; but the depressions can also be located without rain because of stains created by ponding of water. Depressions can be caused by settlement of the foundation soil or can be built during construction. Depressions cause roughness and, when filled with water of sufficient depth, could cause hydroplaning of aircraft.

Severities:

- **Low - Depression can be observed or located by stained areas, only slightly affects pavement riding quality, and may cause hydroplaning potential on runways. Maximum depth 1/8 to 1/2 inch for runways, 1/2 to 1 inch for taxiways and aprons;**
- **Medium - The depression can be observed, moderately affects pavement riding quality, and causes hydroplaning potential on runways. Maximum depth 1/2 to 1 inch for runways, 1 to 2 inches for taxiways and aprons;**
- **High - The depression can be readily observed, severely affects pavement riding quality, and causes definite hydroplaning potential; Depth greater than 1 inch for runways, greater than 2 inches for taxiways and aprons;.**

Repair Policies:

- **Low - No action;**
- **Medium - Shallow, partial or full depth patch;**
- **High - Shallow, partial or full depth patch.**



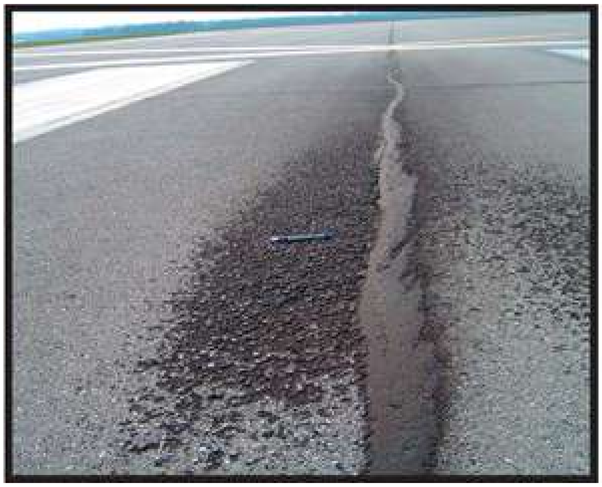
6. Jet Blast (AC)

Description

Jet blast erosion causes darkened areas on the pavement surface when bituminous binder has been burned or carbonized; localized burned areas may vary in depth up to approximately 1/2 inch (13 millimeters).

Severity Levels

No degrees of severity are defined. It is sufficient to indicate that jet blast erosion exists.



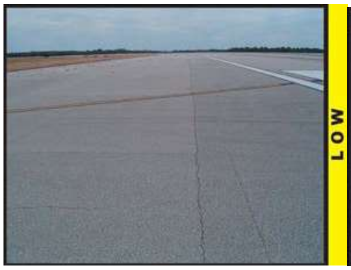
7. Joint Reflection Cracking (AC)

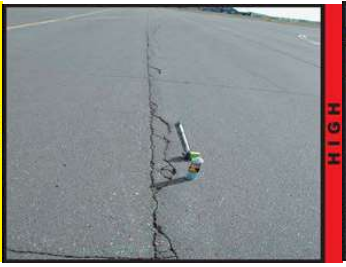
Description

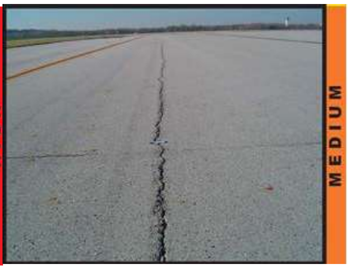
This distress occurs only on pavements having an asphalt or tar surface over a PCC slab. This category does not include reflection cracking from any other type of base (i. e., cement stabilized, lime stabilized); such cracks are listed as longitudinal and transverse cracks. Joint-reflection cracking is caused mainly by movement of the PCC slab beneath the AC surface because of thermal and moisture changes; it is not load related. However, traffic loading may cause a breakdown of the AC near the crack, resulting in spalling and FOD potential. If the pavement is fragmented along a crack, the crack is said to be spalled. A knowledge of slab dimensions beneath the AC surface will help to identify these cracks.

Severity Levels

L	Cracks have only light spalling (little or no FOD potential) or no spalling and can be filled or non-filled. If non-filled, the cracks have a mean width of 1/4 inch (6 millimeters) or less. Filled cracks are of any width, but their filler material is in satisfactory condition.
M	One of the following conditions exists: (1) cracks are moderately spalled (some FOD potential) and can be either filled or non-filled of any width; (2) filled cracks are not spalled or are only lightly spalled, but the filler is in unsatisfactory condition; (3) non-filled cracks are not spalled or are only lightly spalled, but the mean crack width is greater than 1/4 inch (6 millimeters); or (4) light random cracking exists near the crack or at the corner of intersecting cracks.
H	Cracks are severely spalled (definite FOD potential) and can be either filled or non-filled of any width.







8. Longitudinal and Transverse Cracking (AC)

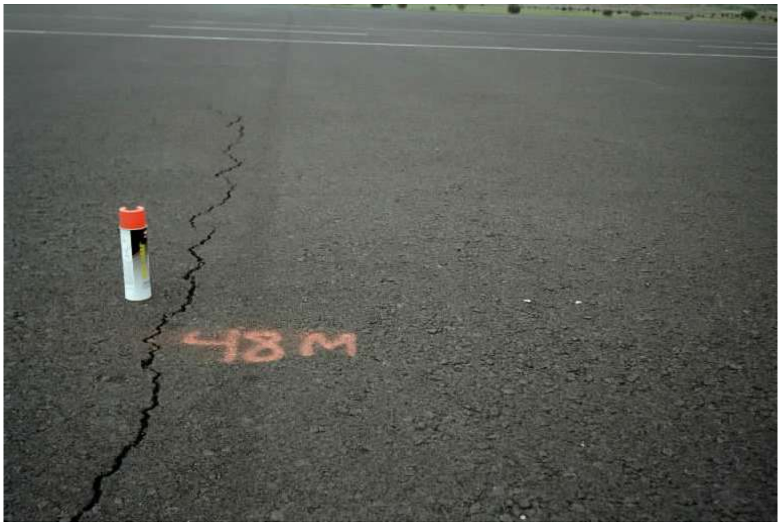
Longitudinal and transverse (L&T) cracks are parallel to the pavementôs centerline or laydown direction. They may be caused by: 1) a poorly constructed paving lane joint, 2) shrinkage of the AC surface due to hardening of the asphalt, or 3) a reflective crack caused by cracks beneath the surface course. Transverse cracks extend across the pavement perpendicularly to the pavement centerline or laydown direction, and may be caused by items 2) or 3) as stated above. These types of cracks are not usually load related.

Severities:

- **Low - have either minor spalling or no spalling. The cracks can be filled or un-filled. Un-filled cracks have a mean width of 1/4 inch or less. Filled cracks are any width but their filler is in satisfactory condition;**
- **Medium - one of the following conditions exists: 1) cracks are moderately spalled and can be either filled or un-filled of any width; 2) filled cracks are not spalled or only lightly spalled, but the filler is in unsatisfactory condition; 3) un-filled cracks are not spalled or only lightly spalled, but the crack width exceeds 1/4 inch; or 4) light random cracking exists near the crack or at the corner of the intersecting cracks;**
- **High - severely spalled with a definite FOC potential. They can be either filled or un-filled.**

Repair Policies:

- **Low - No action;**
- **Medium - seal cracks;**
- **High - seal cracks or perform a full depth patch.**



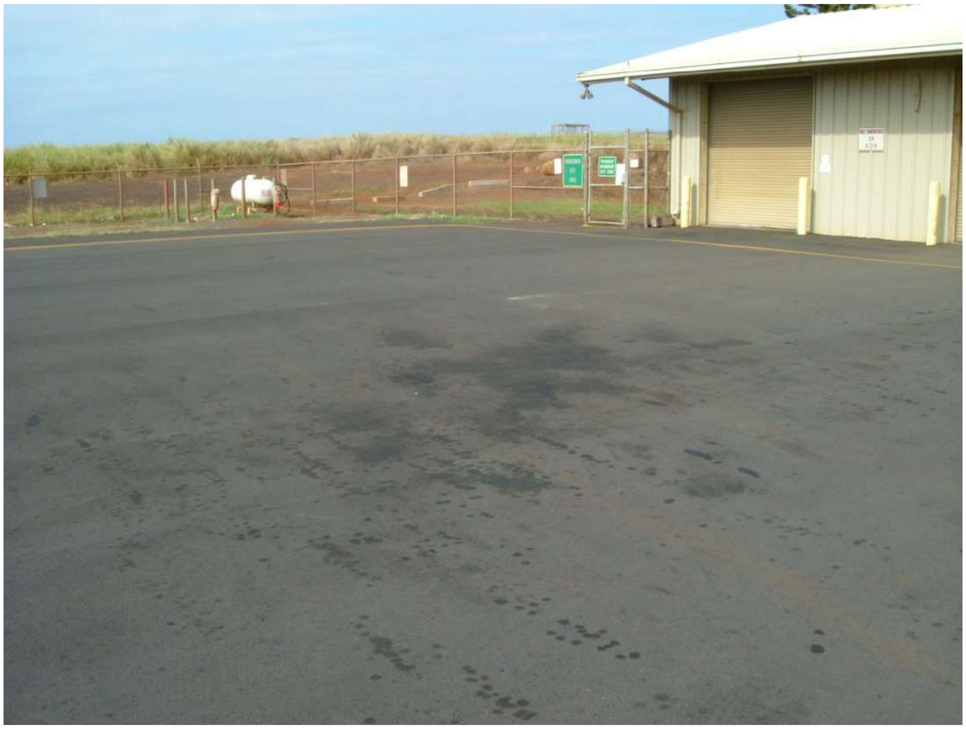
9. Oil Spillage (AC)

Oil spillage is the deterioration or softening of the pavement surface caused by the spilling of oil, fuel, or other solvents.

Severities: No degrees of severity are defined. It is sufficient to indicate that oil spillage exists.

Repair Policies:

- **Do nothing;**
- **Partial or full depth patch.**



10. Patching

Repair patching and utility cut patching is considered a defect, regardless of how well it performs or was constructed.

Severities:

- **Low - in good condition and is performing satisfactorily;**
- **Medium - is somewhat deteriorated and affects riding quality to some extent;**
- **High - is badly deteriorated and affects riding quality significantly or has high FOD potential.**

Repair options:

- **Low - No action;**
- **Medium - seal cracks, repair the distresses in the patch or replace the patch;**
- **High - replace the patch.**

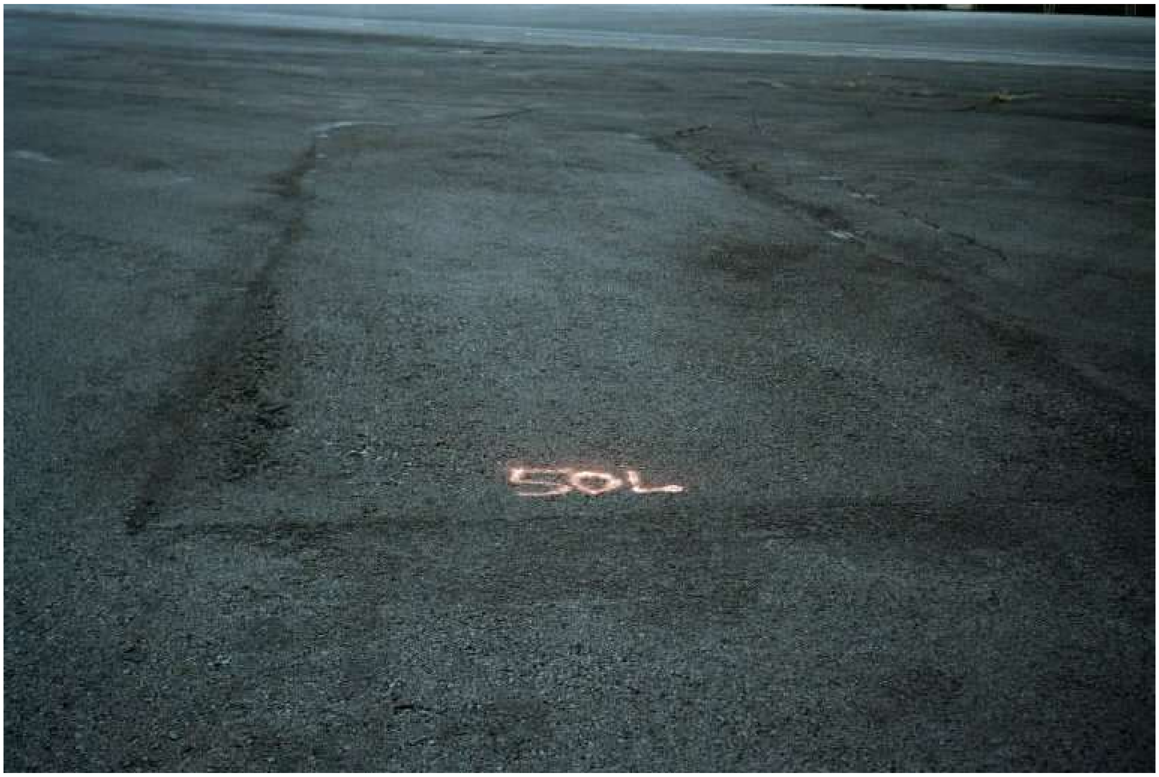


Figure C.7: Asphalt Patching.

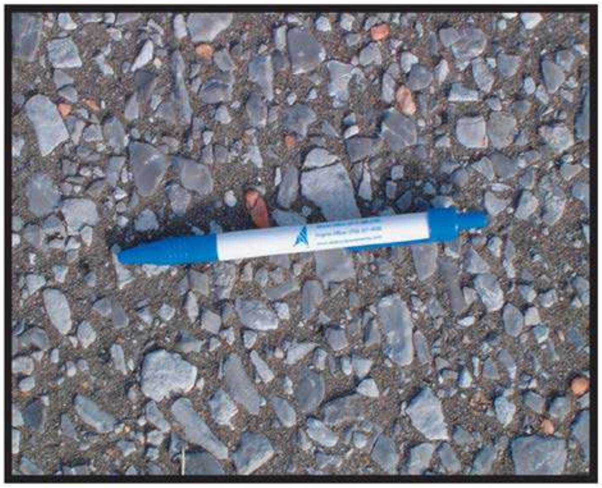
11. Polished Aggregate (AC)

Description

Aggregate polishing is caused by repeated traffic applications. Polished aggregate is present when close examination of a pavement reveals that the portion of aggregate extending above the asphalt is either very small or there are no rough or angular aggregate particles to provide good skid resistance. Existence of this type of distress is also indicated when the number on a skid resistance rating test is low or has dropped significantly from previous ratings.

Severity Levels

No degrees of severity are defined. However, the degree of polishing should be significant before it is included in the condition survey and rated as a defect.



12. Raveling (AC)

Definition

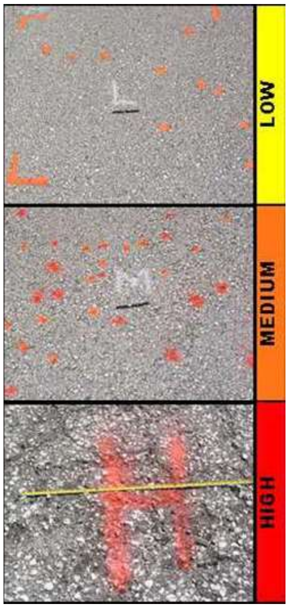
Raveling is the dislodging of coarse aggregate particles from the pavement surface .

Dense Mix Severity Levels.

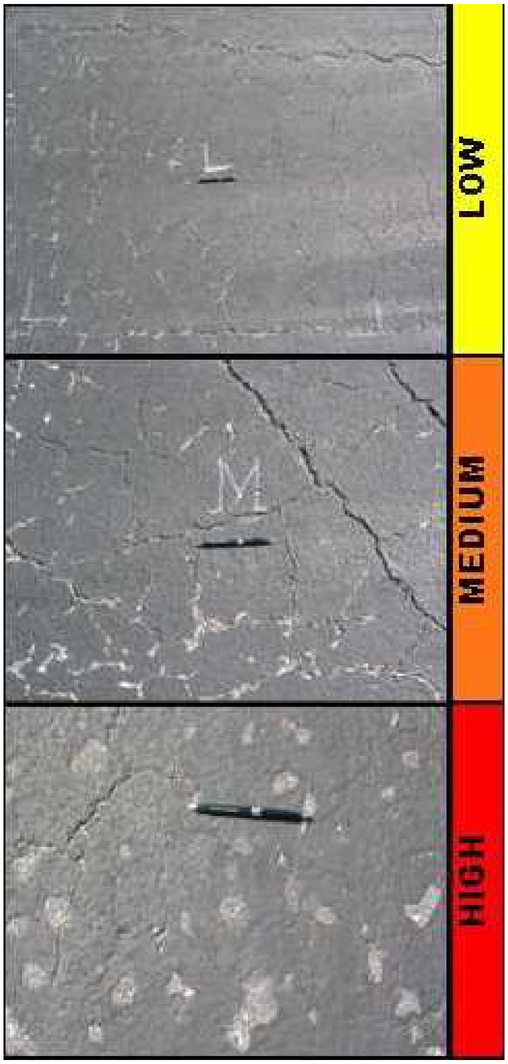
As used herein, coarse aggregate refers to predominant coarse aggregate sizes of the asphalt mix. Aggregate clusters refer to when more than one adjoining coarse aggregate piece is missing. If in doubt about a severity level, three representative areas of 1 square yard (1 square meter) each should be examined and the number of missing coarse aggregate particles counted.

L	**Low severity occurs if any one of these conditions exist: (1) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is between 5 and 20. (2) Missing aggregate clusters is less than 2 percent of the examined square yard (square meter) area. In low severity raveling, there is little or no FOD potential.**
M	**Medium severity occurs if any one of these conditions exist: (1) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is between 21 and 40. (2) Missing aggregate clusters is between 2 and 10 percent of the examined square yard (square meter) area. In medium severity raveling, there is some FOD potential.**
H	**High severity occurs if any one of these conditions exist: (1) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is over 40. (2) Missing aggregate clusters is more than 10 percent of the examined square yard (square meter) area. In high severity raveling, there is significant FOD potential.**

Note- this is a new distress since the 2007 survey


L
LOW
M
MEDIUM
H
HIGH

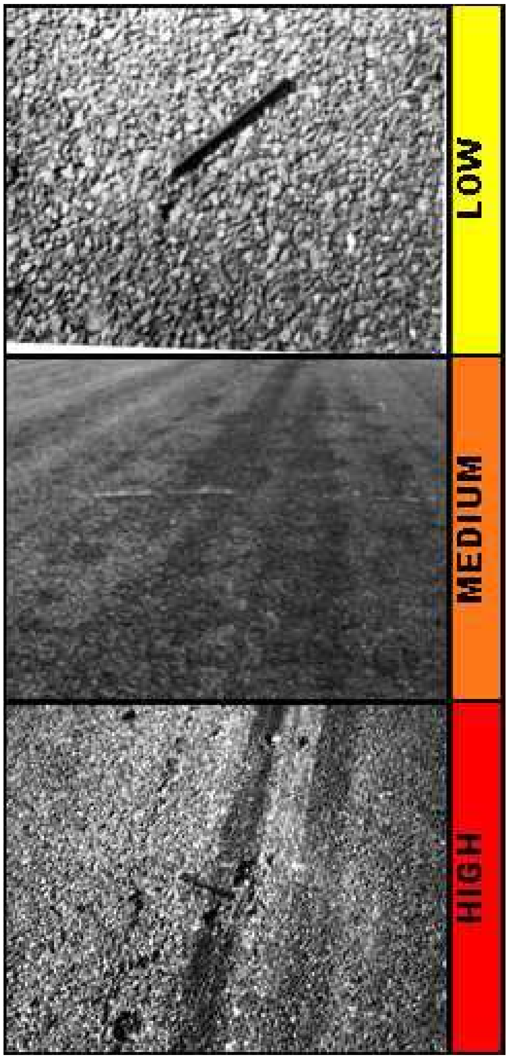
Slurry Seal/ Coal Tar Over Dense Mix Severity Levels


L
LOW
M
MEDIUM
HIGH

L	**(1) The scaled area is less than 1 percent. (2) In the case of coal tar where pattern cracking has developed, the surface cracks are less than 1/4 inch (6 mm) wide.**
M	**(1) The scaled area is between 1 and 10 percent. (2) In the case of coal tar where pattern cracking has developed, the cracks are 1/4 inch (6 mm) wide or greater.**
H	**(1) The scaled area is over 10 percent. (2) In the case of coal tar the surface is peeling off.**

Porous Friction Course Severity Levels

L	**In a 1 square foot (1/10 square meter) representative sample, the number of aggregate pieces missing is between 5 and 20 and/ or the number of missing aggregate clusters does not exceed 1.**
M	**In a 1 square foot (1/10 square meter) representative sample, the number of aggregate pieces missing is between 21 and 40 and/ or the number of missing aggregate clusters is greater than 1 but does not exceed 25 percent of the area.**
H	**In a 1 square foot (1/10 square meter) representative sample, the number of aggregate pieces missing is over 40 and/ or the number of missing aggregate clusters is greater than 25 percent of the area.**



13. Rutting (AC)

A rut is a surface depression in the wheel path; however, in many instances ruts are noticeable only after a rainfall, when the wheel paths are filled with water. Pavement uplift may occur along the sides of the rut. Rutting stems from a permanent deformation in any of the pavement layers or sub-grade, usually caused by consolidation or lateral movement of the materials due to traffic loads. Significant rutting can lead to major structural failure of the pavement.

Severities (based on rut depth):

- **Low - less than İ inch in depth;**
- **Medium - between İ and 1 inch in depth;**
- **High - exceeds 1 inch in depth.**

Repair options:

- **Low - No action;**
- **Medium - patch and/or overlay;**
- **High - patch and/or overlay.**

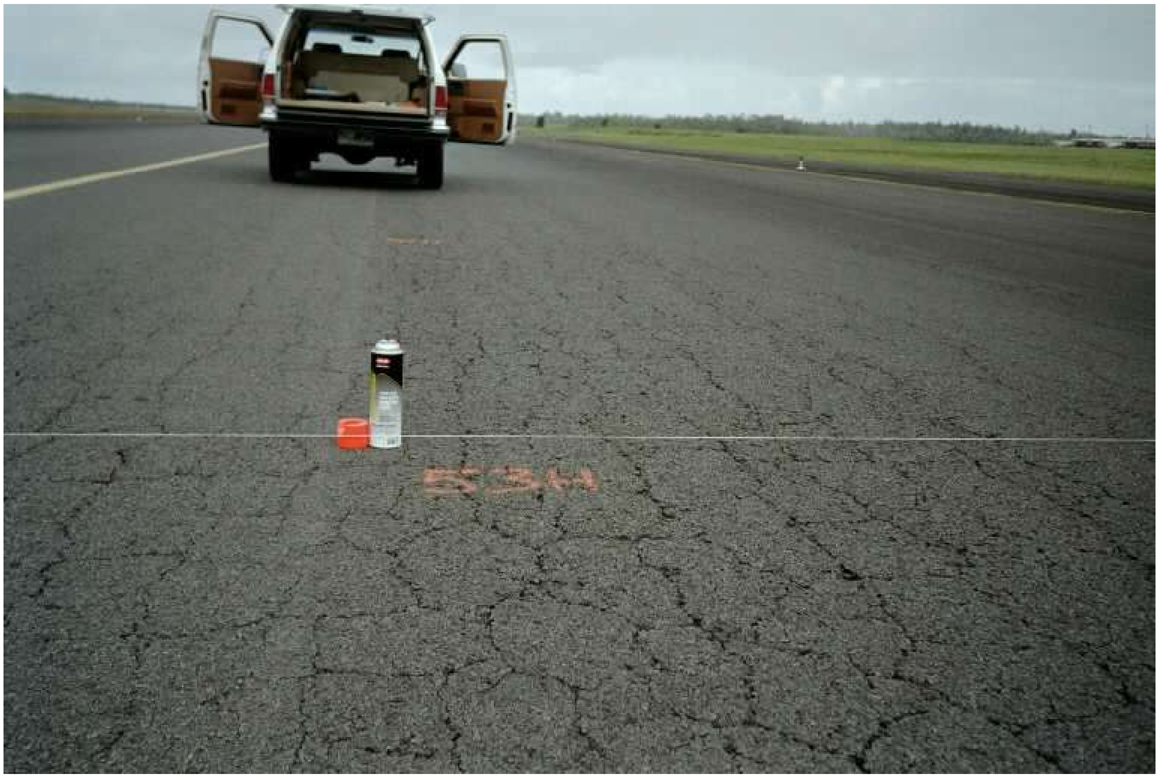


Figure C.9: AC Rutting.

14. Slippage Cracking (AC)

Slippage cracks are crescent- or half-moon shaped cracks having two ends pointed away from the direction of traffic. They are produced when braking or turning wheels cause the pavement surface to slide and deform. This usually occurs when there is a low-strength surface mix or poor bond between the surface and next layer of pavement structure.

Severities: No degrees of severity are defined. It is sufficient to indicate that a slippage crack exists.

Repair Policies:

- **Do nothing;**
- **Partial or full depth patch.**

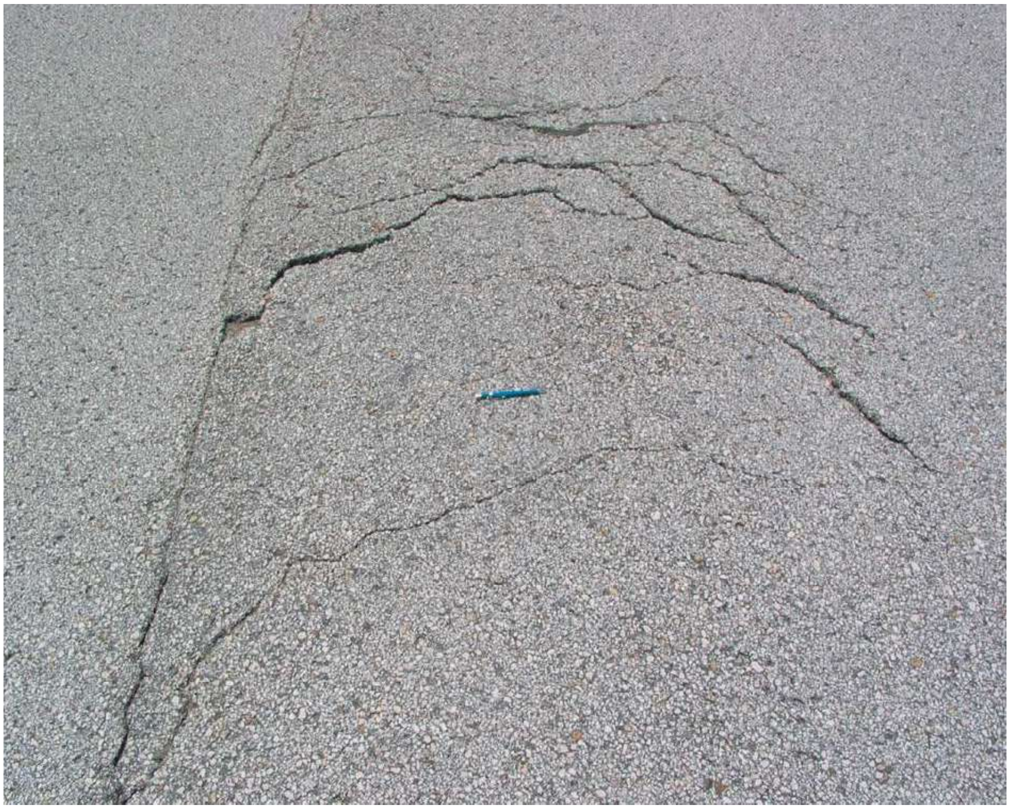


Figure C.10: Slippage Cracking.

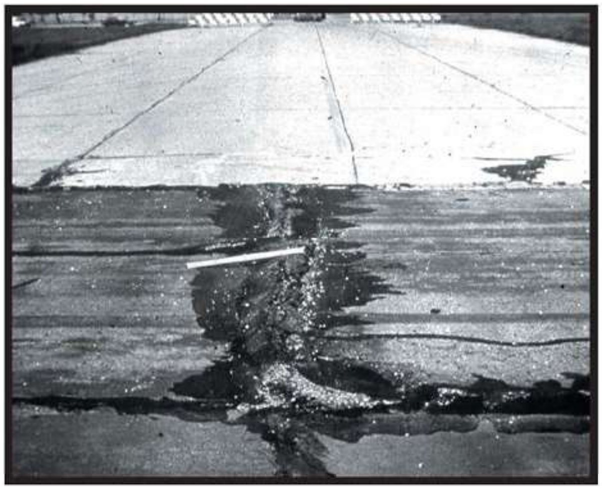
15. Swelling (AC)

Description

A swell is characterized by an upward bulge in the pavementôs surface. A swell may occur sharply over a small area or as a longer, gradual wave. Either type of swell can be accompanied by surface cracking. A swell is usually caused by frost action in the subgrade or by swelling soil, but a small swell can also occur on the surface of an asphalt overlay (over PCC) as a result of a blow- up in the PCC slab.

Severity Levels

L	**Swell is barely visible and has a minor effect on the pavementôs ride quality as determined at the normal aircraft speed for the pavement section under consideration. (Low-severity swells may not always be observable, but their existence can be confirmed by driving a vehicle over the section at the normal aircraft speed. An upward acceleration will occur if the swell is present).**
M	**Swell can be observed without difficulty and has a significant effect on the pavementôs ride quality as determined at the normal aircraft speed for the pavement section under consideration.**
H	**Swell can be readily observed and severely affects the pavementôs ride quality at the normal aircraft speed for the pavement section under consideration.**



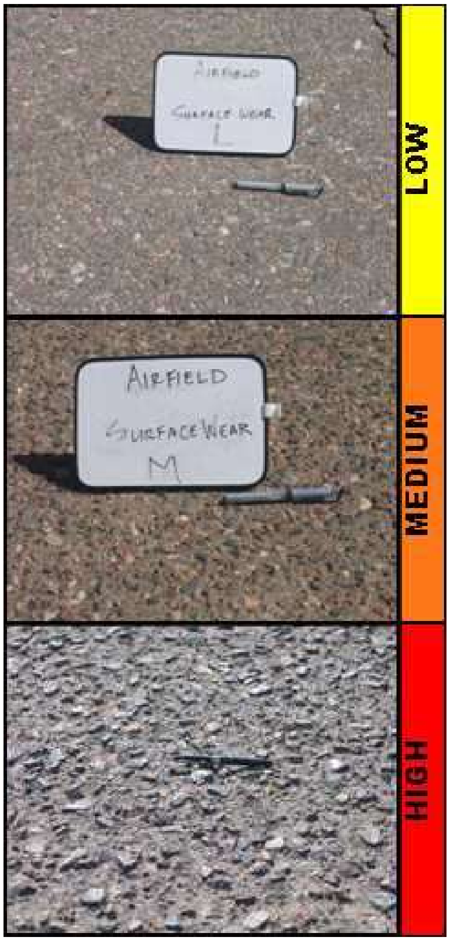
16. Weathering (AC)

Description

The wearing away of the asphalt binder and fine aggregate matrix from the pavement surface.

Severity Levels

L	**Asphalt surface beginning to show signs of aging which may be accelerated by climatic conditions. Loss is the fine aggregate matrix is noticeable and may be accompanied by fading of the asphalt color. Edges of the coarse aggregates are beginning to be exposed (less than 0.05 inches or 1 mm). Pavement may be relatively new (as new as 6 months old).**
M	**Loss of fine aggregate matrix is noticeable and edges of coarse aggregate have been exposed up to 1/4 width (of the longest side) of the coarse aggregate due to the loss of fine aggregate matrix.**
H	**Edges of coarse aggregate have been exposed greater than 1/4 width (of the longest side) of the coarse aggregate. There is considerable loss of fine aggregate matrix leading to potential or some loss of coarse aggregate.**



17. Blow-Up (PCC)

Description

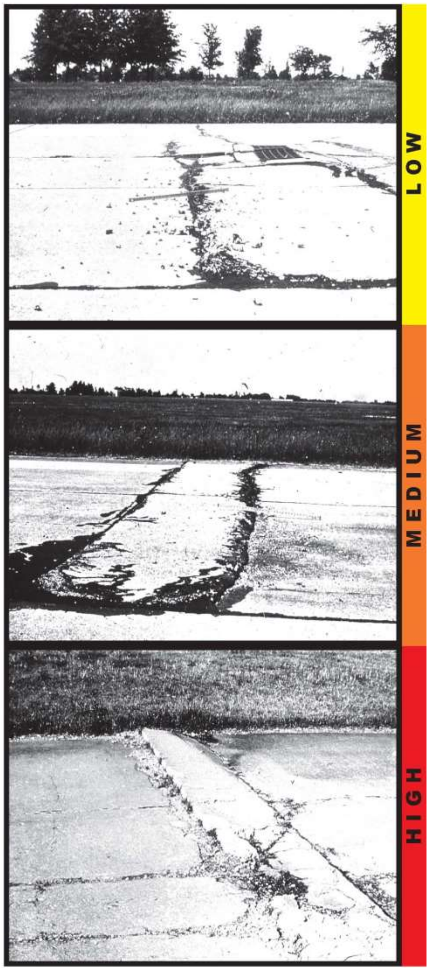
Blowups occur in hot weather, usually at a transverse crack or joint that is not wide enough to permit expansion by the concrete slabs. The insufficient width is usually caused by infiltration of incompressible materials into the joint space. When expansion cannot relieve enough pressure, a localized upward movement of the slab edges (buckling) or shattering will occur in the vicinity of the joint. Blowups can also occur at utility cuts and drainage inlets. This type of distress is almost always repaired immediately because of severe damage potential to aircraft. Blowups are included for reference when closed sections are being evaluated for reopening.

Severity Levels

L **Buckling or shattering has not rendered the pavement inoperative, and only a slight amount of roughness exists.**

M **Buckling or shattering has not rendered the pavement inoperative, but a significant amount of roughness exists.**

H **Buckling or shattering has rendered the pavement inoperative.**



18. Corner Breaks (PCC)

A corner break is a crack that intersects the joints at a distance less than or equal to one-half the slab length on both sides, measured from the corner of the slab. For example, a slab with dimensions of 25 by 25 feet that has a crack intersecting the joint 5 feet from the corner on one side and 17 feet on the other side is not considered a corner break; it is a diagonal crack. However, a crack that intersects 7 feet on one side and 10 feet on the other is considered a corner break. A corner break differs from a corner spall in that the crack extends vertically through the entire slab thickness, while a corner spall intersects the joint at an angle. Load repetition combined with loss of support and curling stresses usually causes corner breaks.

Severities:

- **Low** - Crack has either no spalling or minor spalling (no foreign object damage (FOD) potential). If non-filled, it has a mean width less than approximately 1/8 inch (3 millimeters); a filled crack can be of any width, but the filler material must be in satisfactory condition. The area between the corner break and the joints is not cracked;
- **Medium** - One of the following conditions exists: (1) filled or non-filled crack is moderately spalled (some FOD potential); (2) a non-filled crack has a mean width between 1/8 inch (3 millimeters) and 1 inch (25 millimeters); (3) a filled crack is not spalled or only lightly spalled, but the filler is in unsatisfactory condition; (4) the area between the corner break and the joints is lightly cracked with loose or missing particles;
- **High** - One of the following conditions exists: (1) filled or non-filled crack is severely spalled, causing definite FOD potential; (2) a non-filled crack has a mean width greater than approximately 1 inch (35 millimeters), creating a tire damage potential; or (3) the area between the corner break and the joints is severely cracked.

Repair options:

- **Low** - No action or seal cracks;
- **Medium** - seal cracks;
- **High** - seal cracks, apply a full depth patch or replace the slab.

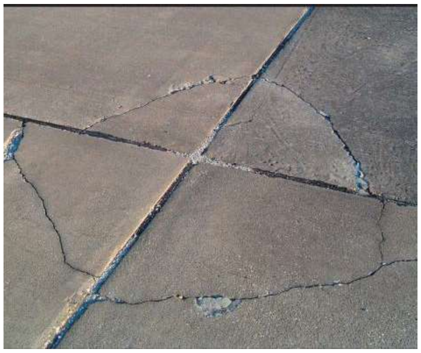


Figure C.11: PCC Corner Break.

19. Cracks: Longitudinal, Transverse and Diagonal (PCC)

These cracks divide the slab into two or three pieces, and are usually caused by a combination of load repetition, curling stresses, and shrinkage stresses. Low severity cracks are not considered major structural distresses. Medium or high severity cracks are usually working cracks and are considered major structural distresses.

Severities:

- **Low - 1) unfilled cracks 1/4 inch to 1/2 inch wide with no faulting or spalling; 2) cracks less than 1/2 inch wide with low severity spalling; or 3) filled cracks of any width, with filter performing in a satisfactory manner and no faulting or spalling;**
- **Medium - 1) un-filled cracks between 1/2 to 1 inch wide with no faulting or spalling or 2) filled cracks of any width faulting less than 1/8 inch or medium severity spalling;**
- **High - 1) un-filled cracks with a width greater than 1 inch; 2) un-filled cracks of any width with faulting greater than 1/2 inch or medium severity faulting; or 3) filled cracks of any width faulting greater than 1/2 inch or high severity faulting.**

Repair options:

- **Low - No action or seal cracks;**
- **Medium - seal cracks;**
- **High - seal cracks, apply a full depth patch or replace the slab.**

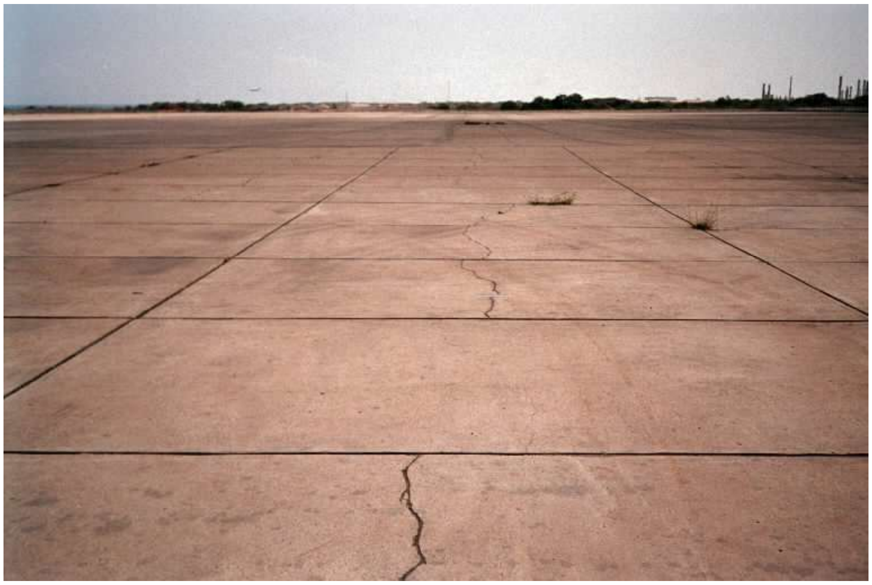


Figure C.12: PCC Transverse Cracks.

20. Durability Cracks (PCC)

Description

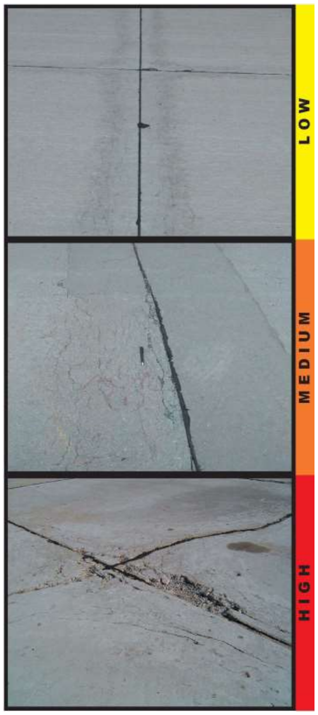
Durability cracking is caused by the inability of the concrete to withstand environmental factors such as freeze-thaw cycles. It usually appears as a pattern of cracks running parallel to a joint or linear crack. A dark coloring can usually be seen around the fine **durability cracks. This type of cracking may eventually lead to disintegration of the concrete within 1 to 2 feet (300 to 600 millimeters) of the joint or crack.**

Severity Levels

L **ñDò cracking is defined by hairline cracks occurring in a limited area of the slab, such as one or two corners or along one joint. Little or no disintegration has occurred. No FOD potential.**

M **(1) ñDò cracking has developed over a considerable amount of slab area with little or no disintegration or FOD potential; or (2) ñDò cracking has occurred in a limited area of the slab, such as in one or two corners or along one joint, but pieces are missing and disintegration has occurred. Some FOD potential.**

H **ñDò cracking has developed over a considerable amount of slab area with disintegration of FOD potential.**



21. Joint Seal Damage (PCC)

Joint seal damage is any condition, which enables soil or rocks to accumulate in the joints or allow significant infiltration of water. Accumulation of incompressible materials in the joint prevents the slab from expanding and may result in buckling, shattering, or spalling. Pliable joint filler bonded to the edges of the slabs protects joints from the accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: 1) stripping the joint sealant; 2) extrusion of joint sealant; 3) weed growth; 4) hardening of the filler; 5) loss of bond to the slab edges; and 6) lack or absence of sealant in the joint.

Severities:

- **Low - in generally good condition throughout the section. Sealant is performing well with only a minor amount of any of the above types of damage present;**
- **Medium - in generally fair condition throughout the section, with one or more of any of the above types of damage present occurring to a moderate degree. Sealant needs immediate replacement within 2 years;**
- **High - in generally poor condition throughout the section, with one or more of any of the above types of damages present, occurring to a severe degree. Sealant needs immediate replacement.**

Repair options:

- **Low - No action;**
- **Medium - seal joints;**
- **High - seal joints.**

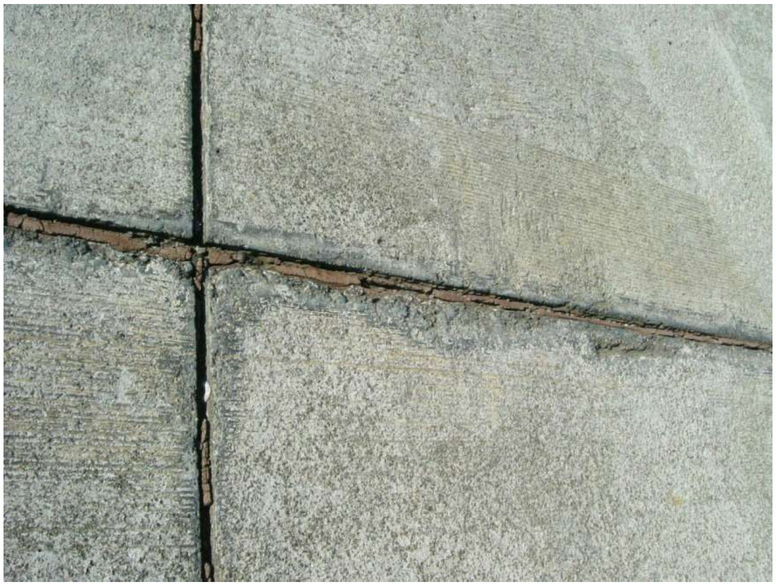


Figure C.13: PCC Joint Seal Damage.

22. Small Patch (PCC)

A patch is an area where the original pavement has been removed and replaced by a filler **material. For condition evaluation, patching is divided into two types: small (less than 5 square feet) and large (over 5 square feet). Large patches are described in the next section.**

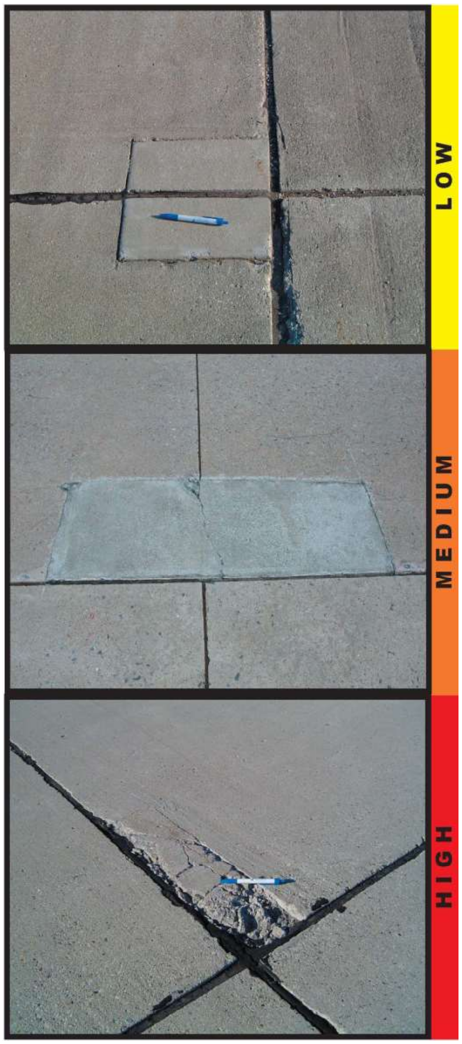


Figure C.14: PCC Small Patch.

Severities:

- **Low - Patch is functioning well, with little or no deterioration;**
- **Medium - Patch has deteriorated, and/or moderate spalling can be seen around the edges. Patch material can be dislodged, with considerable effort (minor FOD potential);**
- **High - Patch has deteriorated, either by spalling around the patch or cracking within the patch, to a state which warrants replacement.**

Repair options:

- **Low ï Do Nothing;**
- **Medium - Replace patch or replace the slab;**
- **High ï Replace patch or replace the slab.**

23. Large Patch (PCC)

Patching is the same as defined **for a small patch; however, the area of the patch is more than 5 square feet. A utility cut is a patch that has replaced the original pavement because of placement of underground utilities. The severity levels of a utility cut are the same as those for regular patching..**

Severities:

- **Low - Patch is functioning well, with little or no deterioration;**
- **Medium - Patch has deteriorated, and/or moderate spalling can be seen around the edges. Patch material can be dislodged, with considerable effort (minor FOD potential);**
- **High - Patch has deteriorated, either by spalling around the patch or cracking within the patch, to a state which warrants replacement.**

Repair options:

- **Low ï Do Nothing;**
- **Medium - Replace patch or replace the slab;**
- **High ï Replace patch or replace the slab.**

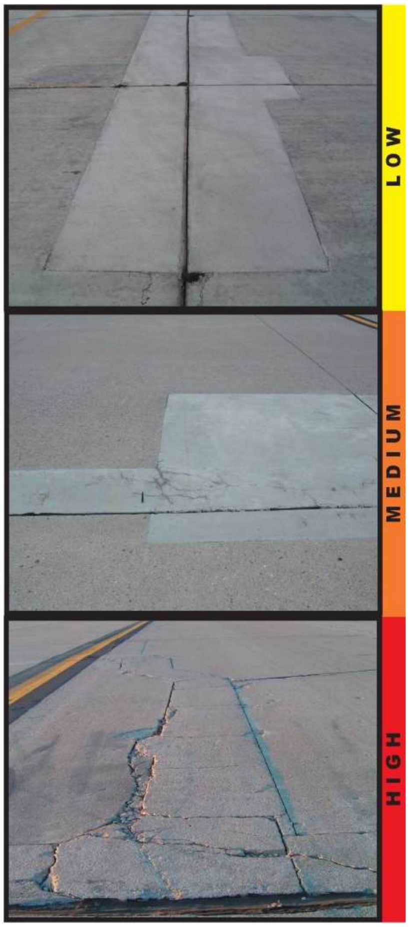


Figure C.15: PCC Large Patch.

24. Popouts (PCC)

A popout is a small piece of pavement that breaks loose from the surface due to freeze-thaw action in combination with expansive aggregates. Popouts usually range from approximately 1 inch to 4 inches in diameter and from 1/2 inch to 2 inches deep..

Severities:

No degrees of severity are defined for popouts. **However, popouts must be extensive before they are counted as a distress; i.e., average popout density must exceed approximately three popouts per square yard over the entire slab area.**

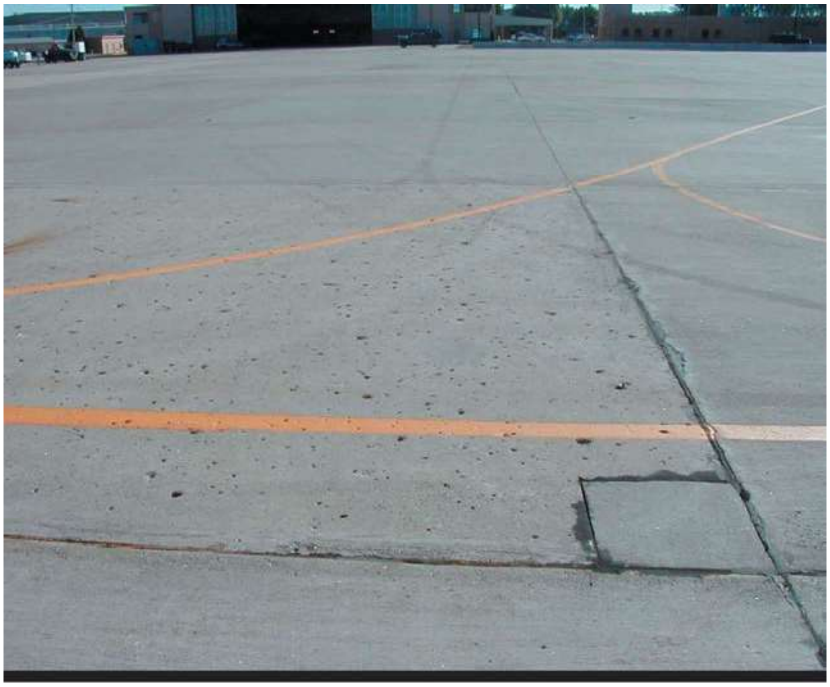


Figure C.16: Popouts.

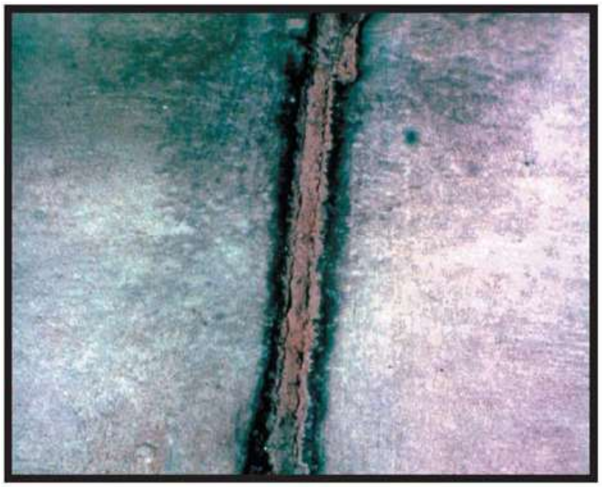
25. Pumping (PCC)

Description

Pumping is the ejection of material by water through joints or cracks caused by deflection of the slab under passing loads. As the water is ejected, it carries particles of gravel, sand, clay, or silt and results in a progressive loss of pavement support. Surface staining and base or subgrade material on the pavement close to joints or cracks are evidence of pumping. Pumping near joints indicates poor joint sealer and loss of support which will lead to cracking under repeated loads.

Severity Levels

No degrees of severity are defined. It is sufficient to indicate that pumping exists.

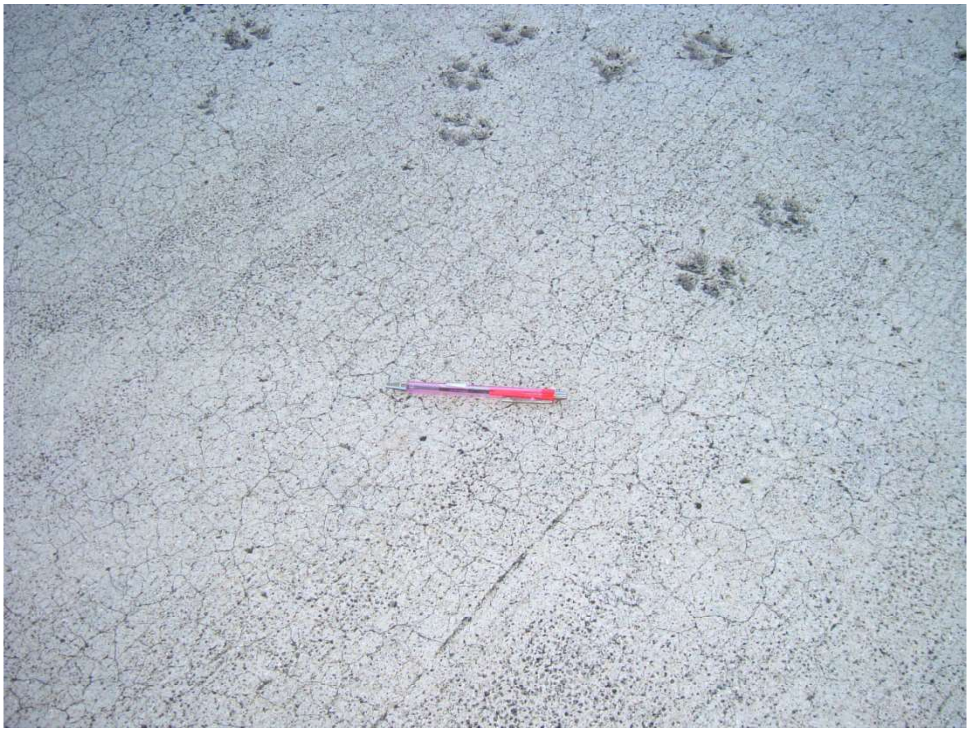


26. Scaling (PCC)

Map cracking or crazing refers to a network of shallow, fine, or hairline cracks that extend only through the upper surface of the concrete. The cracks tend to intersect at angles of 120 degrees. Map cracking or crazing is usually caused by over finishing the concrete and may lead to scaling of the surface, which is the breakdown of the slab surface to a depth of approximately 1⁄4 to 1⁄2 in**ch. Scaling may also be caused by improper construction and poor aggregate. Another recognized source of distress is the reaction between the alkalis (Na_2O and K_2O) in some cements and certain minerals in some aggregates. Products formed by the reaction between the alkalis and aggregate result in expansions that cause a breakdown in the concrete.**

Severities:

- **Low - Crazing or map cracking exists over significant slab area. The surface is in good condition with no scaling. The crack pattern must be well defined and easily recognized;**
- **Medium - Slab is scaled over approximately 5% or less of the surface with some FOD potential;**
- **High - Slab is severely scaled causing a high FOD potential. Usually, more than 5% of the surface is affected.**



27. Faulting (PCC)

Settlement or faulting is a difference of elevation at a joint or crack caused by upheaval or consolidation.

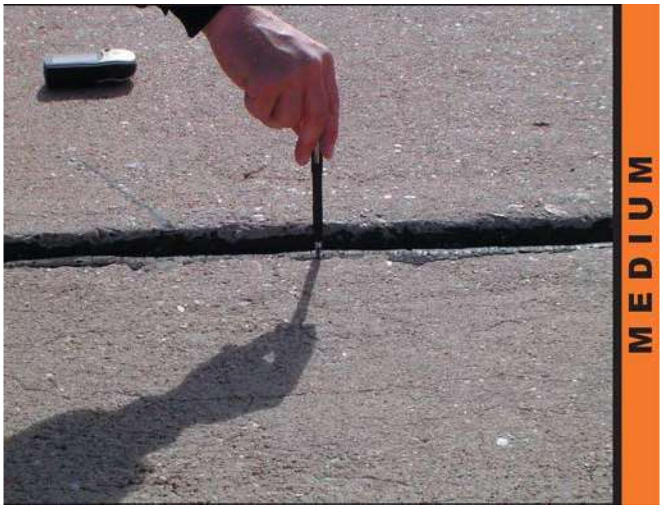
Severities:

Severity levels are defined by the difference in elevation across the fault and the **associated decrease in ride quality and safety as severity increases.**

	Runways/Taxiways	Aprons
L	< 1/4 inch	1/8 ï 1/2 inch
M	1/4 ï 1/2 inch	1/2 - 1 inch
H	> 1/2 inch	> 1 inch

Repair Options:

- **Low - No action;**
- **Medium ï Grinding along the joint;**
- **High ï Grinding or joint load transfer restoration.**



28. Shattered Slab (PCC)

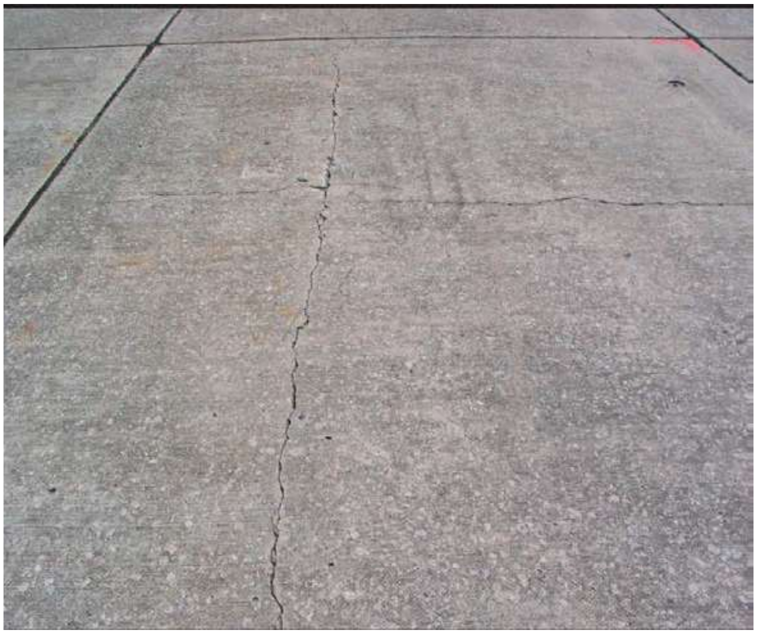
Intersecting cracks are cracks that break into four or more pieces because of overloading and/or inadequate support. The high-severity level of this distress type, as defined below, **is referred to as a shattered slab. If all pieces or cracks are contained within a corner break, the distress is categorized as a severe corner break.**

Severities:

- **Low -** Slab is broken into four or five pieces with the vast majority of the cracks **(over 85 percent) of low-severity;**
- **Medium -** (1) Slab is broken into four or five pieces with over 15 percent of the **cracks of medium severity (no high-severity cracks); or (2) slab is broken into six or more pieces with over 85 percent of the cracks of low-;**
- **High - At this level of severity, the slab is called shattered: (1) slab is broken into** four or five pieces with some or all of the cracks of high severity; (2) slab is **broken into six or more pieces with over 15 percent of the cracks of medium- or high-severity.**

Repair options:

- **Low ï Seal Cracks;**
- **Medium - Full depth patch or replace the slab;**
- **High - Full depth patch or replace the slab.**



29. Shrinkage Crack (PCC)

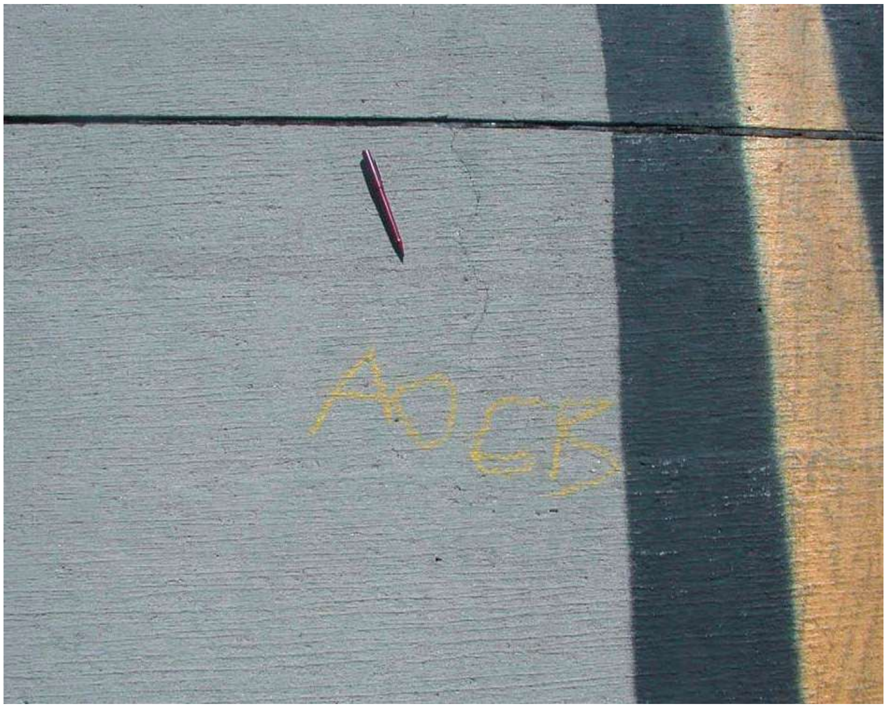
Shrinkage cracks are hairline cracks that are usually only a few feet long and do not extend across the entire slab. They are formed during the setting and curing of the concrete and usually do not extend through the depth of the slab.

Severities:

No degrees of severity are defined. It is sufficient to indicate that shrinkage cracks exist.

Repair options:

- **Do Nothing**



30. Joint Spalls (PCC)

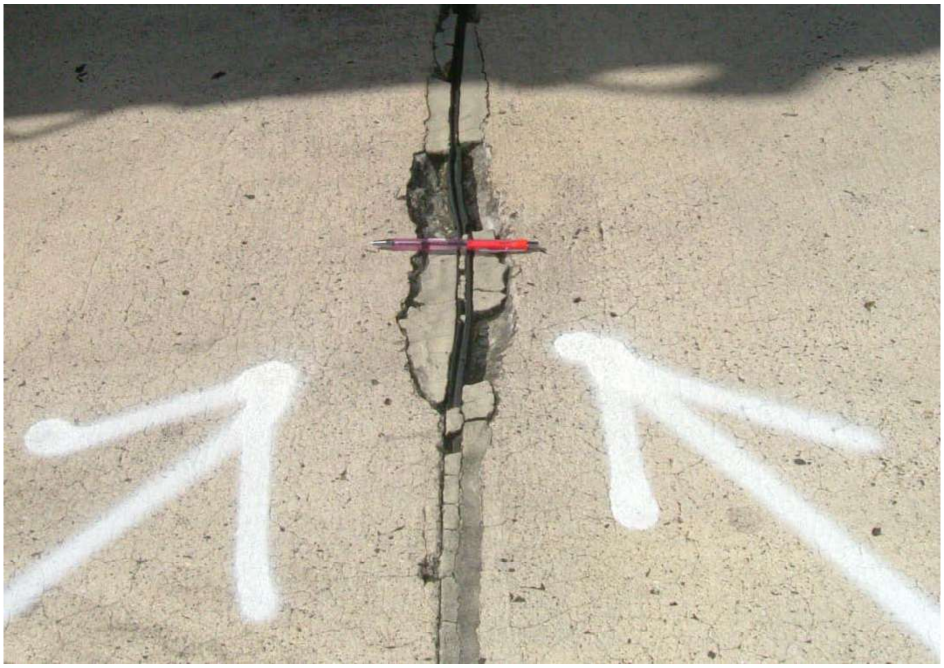
Joint spalling is the disintegration of the slab edges within 2 feet of the side of the joint. A joint spall usually does not extend vertically through the slab, but intersects the joint at an angle. Spalling results from excessive stresses at the joint crack caused by infiltration of incompressible materials or traffic loads. Weak concrete at the joint (caused by overworking) combined with traffic loads is another cause of spalling.

Severities:

- **Low - over 2 feet long and is broken into no more than three pieces defined by low or medium severity cracks, with little or no FOD potential, or is 2) less than 2 feet long and is broken into more than three pieces, with little FOD or tire damage potential;**
- **Medium - over 2 feet long and is broken into more than 3 pieces defined by light or medium cracks or some FOD potential existing, or is 2) less than 2 feet long and is broken into pieces or fragmented, with some of the pieces loose or absent, causing considerable FOD or tire damage potential;**
- **High - over 2 feet long and is broken into more than three pieces defined by one or more high severity cracks with high FOD potential.**

Repair Options:

- **Low - No action;**
- **Medium - perform a partial depth patch;**
- **High - perform a partial depth patch.**



31. Corner Spalls (PCC)

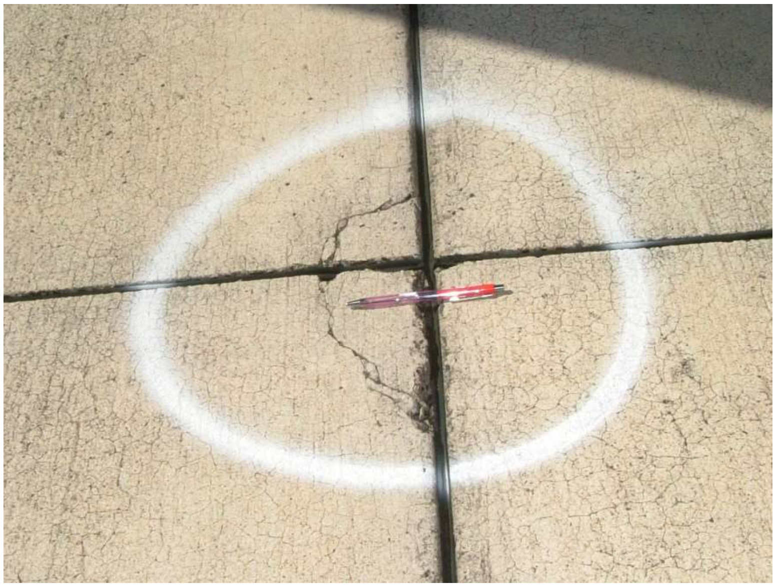
Corner spalling is the raveling or breakdown of the slab within approximately 2 feet of the corner. A corner spall differs from a corner break in that the spall angles downward to intersect the joint while the break extends vertically through the slab.

Severities:

- **Low - either 1) the spall is broken into one or two pieces defined by low severity cracks with little or no FOD potential; or 2) the spall is defined by one medium severity crack with little or no FOD potential;**
- **Medium ï 1) the spall is broken into two or more pieces defined by medium severity cracks, and a few small fragments may be absent or loose; 2) the spall is defined by one severe, fragmented crack that may be accompanied by a few hairline cracks or 3) the spall has deteriorated to the point where loose material is causing FOD potential;**
- **High ï 1) the spall has broken into two or more pieces defined by high severity fragmented cracks, with loose or absent fragments; 2) pieces of the spall have been displaced to the extent that tire damage hazard exists, or 3) the spall has deteriorated to the point where loose material is causing high FOD potential.**

Repair Options:

- **Low - No action;**
- **Medium - partial depth patch;**
- **High - partial depth patch.**



32. ASR (PCC)

ASR is caused by chemical reaction between alkalis and certain reactive silica minerals which form a gel. The gel absorbs water, causing expansion which may damage the concrete and adjacent structures. Alkalis are most often introduced by the portland cement within the pavement. ASR cracking may be accelerated by chemical pavement deicers.

Visual indicators that ASR may be present include:

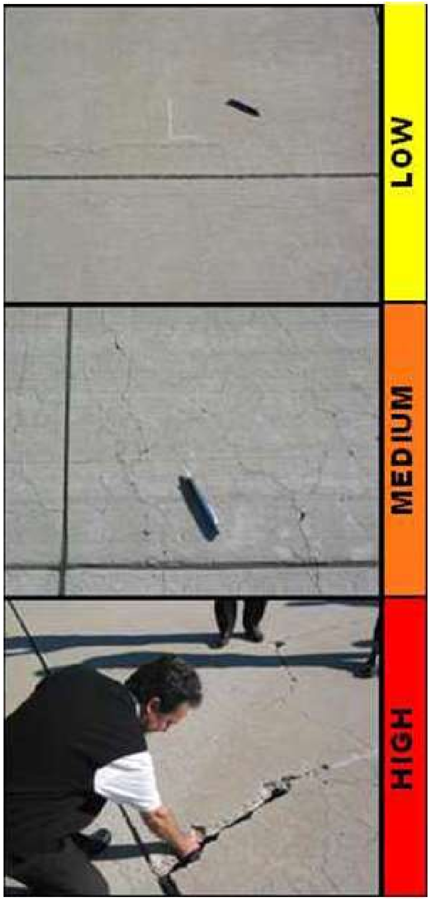
1. **Cracking of the concrete pavement (often in a map pattern)**
2. **White, brown, gray or other colored gel or staining may be present at the crack surface**
3. **Aggregate popouts**
4. **Increase in concrete volume (expansion) that may result in distortion of adjacent or integral structures or physical elements. Examples of expansion include shoving of asphalt pavements, light can tilting, slab faulting, joint misalignment, and extrusion of joint seals or expansion joint fillers.**

Because ASR is material-dependent, ASR is generally present throughout the pavement section. Coring and concrete petrographic analysis is the only definitive method to confirm the presence of ASR. The following should be kept in mind when identifying the presence of ASR through visual inspection:

1. **Generally ASR distresses are not observed in the first few years after construction. In contrast, plastic shrinkage cracking can occur the day of construction and is apparent within the first year.**
2. **ASR is differentiated from D-Cracking by the presence of cracking perpendicular to the joint face. D-Cracking predominantly develops as a series of parallel cracks to joint faces and linear cracking within the slab.**
3. **ASR is differentiated from Map Cracking/ Scaling by the presence of visual signs of expansion.**

Severity Levels

L	**Minimal to no Foreign Object Damage (FOD) potential from cracks, joints or ASR related popouts; cracks at the surface are tight (predominantly 1 mm or less). Little to no evidence of movement in pavement or surrounding structures or elements.**
M	**Some FOD potential; increased sweeping or other FOD removal methods may be required. May be evidence of slab movement and/ or some damage to adjacent structures or elements.** **Medium ASR distress is differentiated from low by having one or more of the following: increased FOD potential, increased cracking of the slab, some fragments along cracks or at crack intersections present, surface popouts of concrete may occur, pattern of wider cracks (predominantly 1 mm or wider) that may be subdivided by tighter cracks.**
H	**One or both of the following exist: 1) Loose or missing concrete fragments which pose high FOD potential, 2) Slab surface integrity and function significantly degraded and pavement requires immediate repair; may also require repairs to adjacent structures or elements.**



APPENDIX D

DETAILED PAVEMENT CONDITION DATA

Re-Inspection Report

APPENDIX E

DISTRESS SUMMARY REPORT

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! лм	лм	! /	мро⅀рпт	пр	59tw9{{Ŀhb	hűKŜǋ	[ƻ ø	орр	{ljCű	лɸн
! лм	лм	! /	мро⅀рпт	пу	[hbDĿ¢ ¦ 5Ŀb ! [κ¢w ! b{±9w{9 /w ! /YĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	IλƎK	нус	Cű	лɸн
! лм	лм	! /	мро⅀рпт	пу	[hbDĿ¢ ¦ 5Ŀb ! [κ¢w ! b{±9w{9 /w ! /YĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	[ƻ ø	мл⅀тпо	Cű	тɸл
! лм	лм	! /	мро⅀рпт	пу	[hbDĿ¢ ¦ 5Ŀb ! [κ¢w ! b{±9w{9 /w ! /YĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	a ŜŘλǳY	н⅀сту	Cű	мɸт
! лм	лм	! /	мро⅀рпт	рн	w ! ±9[ĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	[ƻ ø	рто	{ljCű	лɸн
! лм	лм	! /	мро⅀рпт	рн	w ! ±9[ĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	a ŜŘλǳY	млл	{ljCű	лɸм
! лм	лм	! /	мро⅀рпт	ро	w ¦ ¢¢ĿbD	[ƻl·Ř	[ƻ ø	олл	{ljCű	лɸн
! лн	лм	! /	мус⅀уол	по	. [h/Y /w ! /YĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	a ŜŘλǳY	мм⅀нну	{ljCű	сɸл
! лн	лм	! /	мус⅀уол	пу	[hbDĿ¢ ¦ 5Ŀb ! [κ¢w ! b{±9w{9 /w ! /YĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	a ŜŘλǳY	нт⅀моф	Cű	мпɸр
! лн	лн	! /	нс⅀плт	пм	! [[ĿD ! ¢hw /w ! /YĿbD	[ƻl·Ř	IλƎK	н⅀нро	{ljCű	уɸр
! лн	лн	! /	нс⅀плт	пм	! [[ĿD ! ¢hw /w ! /YĿbD	[ƻl·Ř	a ŜŘλǳY	т⅀муо	{ljCű	нтɸн
! лн	лн	! /	нс⅀плт	пу	[hbDĿ¢ ¦ 5Ŀb ! [κ¢w ! b{±9w{9 /w ! /YĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	a ŜŘλǳY	рмм	Cű	мɸф
! лн	лн	! /	нс⅀плт	рл	t ! ¢/ IĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	IλƎK	сту	{ljCű	нɸс
! лн	лн	! /	нс⅀плт	рл	t ! ¢/ IĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	[ƻ ø	мно	{ljCű	лɸр
! лн	лн	! /	нс⅀плт	рл	t ! ¢/ IĿbD	/ŧλYl·űŜκ5ǳǋl·ōλŧλűȅ	a ŜŘλǳY	ур	{ljCű	лɸо
! ло	лм	! /	ум⅀ллл	пм	! [[ĿD ! ¢hw /w ! /YĿbD	[ƻl·Ř	IλƎK	м⅀орн	{ljCű	мɸт
! ло	лм	! /	ум⅀ллл	пм	! [[ĿD ! ¢hw /w ! /YĿbD	[ƻl·Ř	a ŜŘλǳY	мм⅀урл	{ljCű	мпɸс
! ло	лм	! /	ум⅀ллл	пр	59tw9{{Ŀhb	hűKŜǋ	[ƻ ø	смо	{ljCű	лɸу
! ло	лм	! /	ум⅀ллл	пр	59tw9{{Ŀhb	hűKŜǋ	a ŜŘλǳY	нрн	{ljCű	лɸо

!ǈǈĴyŘǽÈ 9
5ƛăǘŊŜăă {ǳƳƳlŊè wŜǈ2Ŋǘ
¢Ǩ2ƳIă / wǳăăŜff CǺŜfŘ ó![·ó

.ŊlyǑK L5	{ŜǑǘƛ2ɏ L5	{ǳŊŦlŎŜ	!ŊŜl óăŦó	5ƛăǘŊŜăă bǳƳōŜŊ	5ŜăǑŊǈǘƛ2ɏ	5ƛăǘŊŜăă a ŜǑKlyƛăƳ	{ŜǿŜŊƛǘè	vǳlyǘƛǘè	vǳlyǘƛǘè ¦yǘă	5ƛăǘŊŜăă 5ŜyăƛǘèǍ
!ло	лм	!/	умĽллл	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	IƛƎK	ммл	Cǘ	лфм̤
!ло	лм	!/	умĽллл	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	птн	Cǘ	лф¢̤
!ло	лм	!/	умĽллл	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	сĽсфф	Cǘ	уфо̤
!ло	лм	!/	умĽллл	рл	t!¢/IĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	нĽфлф	{ljCǘ	оф¢̤
!ло	лм	!/	умĽллл	рл	t!¢/IĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	мĽлнн	{ljCǘ	мфо̤
!ло	лм	!/	умĽллл	рн	w!±9[ĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	тф	{ljCǘ	лфм̤
!ло	лм	!/	умĽллл	ро	w¦¢¢ĽbD	[2lŘ	[2ǿ	ннл	{ljCǘ	лфо̤
!ло	лм	!/	умĽллл	рт	²9!¢I9wĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	тсĽффл	{ljCǘ	фрфа̤
!ло	лн	!/	осĽпто	пм	![[ĽD!¢hw /w!/ƳĽbD	[2lŘ	a ŜŘǳƳ	опм	{ljCǘ	лфф̤
!ло	лн	!/	осĽпто	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	ннм	Cǘ	лф¢̤
!ло	лн	!/	осĽпто	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	оĽсфм	Cǘ	млфм̤
!ло	лн	!/	осĽпто	рт	²9!¢I9wĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	осĽпто	{ljCǘ	млфа̤
!лп	лм	!/	срĽсон	пм	![[ĽD!¢hw /w!/ƳĽbD	[2lŘ	IƛƎK	онĽумс	{ljCǘ	рлфа̤
!лп	лм	!/	срĽсон	рт	²9!¢I9wĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	срĽсон	{ljCǘ	млфа̤
!лп	лн	!/	соĽуру	пм	![[ĽD!¢hw /w!/ƳĽbD	[2lŘ	IƛƎK	роĽслр	{ljCǘ	уофф̤
!лп	лн	!/	соĽуру	рл	t!¢/IĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	фĽсму	{ljCǘ	мрфм̤
!лп	ло	!/	усĽофт	пм	![[ĽD!¢hw /w!/ƳĽbD	[2lŘ	IƛƎK	урĽуон	{ljCǘ	фффо̤
!лп	лп	!/	псĽлмт	по	.[h/Ƴ /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	млĽулп	{ljCǘ	нофр̤
!лп	лп	!/	псĽлмт	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	ммр	Cǘ	лфо̤
!лп	лп	!/	псĽлмт	пу	[hbDĽ¢¦ 5Ľb![ĸ¢w!b{±9w{9 /w!/ƳĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	a ŜŘǳƳ	пĽфтл	Cǘ	млфу̤
!лп	лп	!/	псĽлмт	рл	t!¢/IĽbD	/ƒƳlǘŜĸ5ǳŊlōƛƒǘè	[2ǿ	сно	{ljCǘ	мфп̤

!LLJŜyŘĿÈ 9
5ĂǎǘŊŜǎǎ {ďzŸŸŀŊè wŜLJ2Ŋǘ
¢Ķ2Ÿŀǎ / wďzǎǎŜff CĂŜťŘ ó![·ó

.Ŋŀyǒ K L5	{ŜǑǘĂ2yƴL5	{ďzŊŦŀǑŜ	!ŊŜŀ óǎŦó	5ĂǎǘŊŜǎǎ bďzŸōŜŊ	5ŜǎǑŊĂLJǘĂ2yƴ	5ĂǎǘŊŜǎǎ a ŜǑĶŀyĂǎŸ	{ŜøŜŊĂǘè	vďzŀyǘĂǘè	vďzŀyǘĂǘè ¦yĂǘǎ	5ĂǎǘŊŜǎǎ 5ŜyǎĂǘè
!лп	лп	!/	псΣлмт	рт	² 9!¢I9wLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	[2ǿ	прΣофп	{ljCǘ	фу¢ç
!лп	лр	!/	нпуΣнмр					л		л¢ǎ
!лп	лс	!t/	плΣслл					л		л¢ǎ
!лр	лм	!/	пуΣпфо	пм	![[LD!¢hw /w!/YLbD	[2ŀŘ	a ŜŘĂďzŸ	тмн	{ljCǘ	м¢р
!лр	лм	!/	пуΣпфо	по	.[h/Y /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	a ŜŘĂďzŸ	мΣпно	{ljCǘ	н¢ф
!лр	лм	!/	пуΣпфо	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	[2ǿ	оΣнтн	Cǘ	с¢т
!лр	лм	!/	пуΣпфо	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	a ŜŘĂďzŸ	тпт	Cǘ	м¢р
!лр	лн	!/	онΣлпу	пр	59tw9{{Lhb	hǘĶŜŊ	[2ǿ	рл	{ljCǘ	л¢н
!лр	лн	!/	онΣлпу	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	[2ǿ	мΣмор	Cǘ	о¢р
!лр	лн	!/	онΣлпу	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	a ŜŘĂďzŸ	нл	Cǘ	л¢м
!лр	лн	!/	онΣлпу	пф	hL[{tL[[!D9	hǘĶŜŊ	bк!	ул	{ljCǘ	л¢о
!лр	лн	!/	онΣлпу	рт	² 9!¢I9wLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	a ŜŘĂďzŸ	олΣлфн	{ljCǘ	фо¢ф
!лс	лм	!/	суΣпсп	пм	![[LD!¢hw /w!/YLbD	[2ŀŘ	a ŜŘĂďzŸ	мпм	{ljCǘ	л¢н
!лс	лм	!/	суΣпсп	пр	59tw9{{Lhb	hǘĶŜŊ	[2ǿ	рпф	{ljCǘ	л¢ç
!лс	лм	!/	суΣпсп	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	[2ǿ	мΣусу	Cǘ	н¢м
!лс	лм	!/	суΣпсп	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	a ŜŘĂďzŸ	тΣуон	Cǘ	у¢у
!лс	лм	!/	суΣпсп	рл	t!¢/ILbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	[2ǿ	рΣмул	{ljCǘ	р¢у
!лс	лм	!/	суΣпсп	рп	{Ih±LbD	hǘĶŜŊ	a ŜŘĂďzŸ	оу	{ljCǘ	л¢ǎ
!лс	лм	!/	суΣпсп	рт	² 9!¢I9wLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	a ŜŘĂďzŸ	тлΣфтф	{ljCǘ	ул¢м
wлпнн	лм	!/	фтпΣурл	пм	![[LD!¢hw /w!/YLbD	[2ŀŘ	[2ǿ	оΣмфл	{ljCǘ	л¢о
wлпнн	лм	!/	фтпΣурл	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ťĂŸŀǘŜк5ďzŊŀōĂťĂǘè	IĂĦĶ	нп	Cǘ	л¢ǎ

! ǇǇŜyŘƛȄ 9

5ƛǎǳƴŜǎǎ {ǳYYƭƛŜǎ wŜǇƻǊǘ

¢ƘƛYYƭǎ / wǳǎǎŜƭƭ CƛŜƭŘ ό! [·ό

.ƛƭƭƛƴƎ L5	{ŜǊǾƛŎŜ L5	{ǳƴƛƭƻŜ	!ƛŜƭ ǘǊǇǘ	5ƛǎǳƴŜǎǎ bǳYōŜƴ	5ŜǎŎǊƛǇǘƛƻƴ	5ƛǎǳƴŜǎǎ a ŜǘƘƻŘǎǳƭY	{ŜǾŜǊƛǘȅ	vǳƭƛǘƛȅ	vǳƭƛǘƛȅ ¦ ƴƛǘǎ	5ƛǎǳƴŜǎǎ 5Ŝǎǘƛƴȅ
wлпнн	лм	! /	фтпΣурл	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	фтΣсло	Cǘ	млфΦнΣ
wлпнн	лм	! /	фтпΣурл	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	срΣррм	Cǘ	сΦтΣ
wлпнн	лм	! /	фтпΣурл	рл	t ! ¢/ ILbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	мн	{ljCǘ	лΦнΣ
wлпнн	лм	! /	фтпΣурл	рн	w! ±9[LbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	оΣнрл	{ljCǘ	лΦоΣ
wлпнн	лм	! /	фтпΣурл	рт	² 9! ¢I9wLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	фтмΣруф	{ljCǘ	ффΦтΣ
wмнол	лм	! ! /	пллΣмлл	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	фΣрфс	Cǘ	нΦпΣ
wмнол	лм	! ! /	пллΣмлл	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	оо	Cǘ	лΦнΣ
¢!	лм	! /	пуоΣпуп	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	IƛƎƘ	мср	Cǘ	лΦнΣ
¢!	лм	! /	пуоΣпуп	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	мтΣфтн	Cǘ	оΦтΣ
¢!	лм	! /	пуоΣпуп	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	прΣуут	Cǘ	фΦрΣ
¢!	лм	! /	пуоΣпуп	рт	² 9! ¢I9wLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	пуоΣпуп	{ljCǘ	мллΦлΣ
¢!м	лм	! /	рнΣпрп	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	мнн	Cǘ	лΦнΣ
¢!м	лм	! /	рнΣпрп	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	рΣнмт	Cǘ	фΦфΣ
¢!м	лм	! /	рнΣпрп	рн	w! ±9[LbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	мΣлут	{ljCǘ	нΦмΣ
¢!м	лм	! /	рнΣпрп	рт	² 9! ¢I9wLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	рмΣост	{ljCǘ	фтΦфΣ
¢!н	лм	! /	олΣрмф	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	[ƻǿ	осу	Cǘ	мΦнΣ
¢!н	лм	! /	олΣрмф	пу	[hbDL¢¦ 5Lb ! [κ¢w! b{±9w{9 /w! /YLbD	/ƘYƭƛƴŜκ5ǳƴƭƛōƛƭƛǘȅ	a ŜŘƛǳY	оΣмфс	Cǘ	млΦрΣ

! ǈǈŜyŘǛ 9
5ǖǎǘǋŜǎǎ {ǳYYǀǋǜ wŜǈƵǋǘ
¢ĸƵYǀǎ / wǳǎǎŜff CǖŜfŘ ó ! [· ú

. ǋǀyŎĸ ǈ5	{ŜŎǘǖƵy ǈ5	{ǳǋŦǀŎŜ	! ǋŜǀ óǎŦú	5ǖǎǘǋŜǎǎ bǳYōŜǋ	5ŜǎŎǋǈǘǖƵy	5ǖǎǘǋŜǎǎ a ŜŎĸǀyǖǎY	{ŜǿŜǋǖǘǜ	vǳǀyǘǖǘǜ	vǳǀyǘǖǘǜ ¦ yǖǘǎ	5ǖǎǘǋŜǎǎ 5Ŝyǎǖǘǜ
¢!н	лм	! /	олΊрмф	рн	w!±9[ǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	моф	{ljCǘ	л͸р̂
¢!н	лм	! /	олΊрмф	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	олΊоул	{ljCǘ	фф͸р̂
¢!н	лн	! /	мнΊлтф	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	мΊлмм	Cǘ	у͸ŧ̂
¢!н	лн	! /	мнΊлтф	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	мнΊлтф	{ljCǘ	млл͸ǟ̂
¢!н	ло	! /	млΊопу	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	опл	Cǘ	о͸о̂
¢!н	ло	! /	млΊопу	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	мΊллр	Cǘ	ф͸ŧ̂
¢!о	лм	! /	ооΊннс	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	олр	Cǘ	л͸ф̂
¢!о	лм	! /	ооΊннс	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	ооΊннс	{ljCǘ	млл͸ǟ̂
¢!п	лм	! /	нфΊупр	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	нΊфун	Cǘ	мл͸ǟ̂
¢!п	лм	! /	нфΊупр	рн	w!±9[ǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	ост	{ljCǘ	м͸ŧ̂
¢!п	лм	! /	нфΊупр	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	нфΊпту	{ljCǘ	фу͸у̂
¢!р	лм	! /	нфΊтфо	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	мнм	Cǘ	л͸ŧ̂
¢!р	лм	! /	нфΊтфо	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	оΊмлл	Cǘ	мл͸ŧ̂
¢!р	лм	! /	нфΊтфо	рн	w!±9[ǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	онн	{ljCǘ	м͸м̂
¢!р	лм	! /	нфΊтфо	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	нфΊптм	{ljCǘ	фу͸ф̂
¢.	лм	! /	нрук тло	пу	[hbDǈ¢¦5ǈb![ĸ¢w!b{±9w{9 /w!/YǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	нΊпоф	Cǘ	л͸ф̂
¢.	лм	! /	нрук тло	рн	w!±9[ǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	нту	{ljCǘ	л͸м̂
¢.	лм	! /	нрук тло	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	[Ƶǿ	нррΊофр	{ljCǘ	фу͸т̂
¢.	лм	! /	нрук тло	рт	² 9!¢I9wǈbD	/ǖYǀǘŜĸ5ǳǋǀōǖǖǘǜ	a ŜŘǖǳY	фсф	{ljCǘ	л͸ŧ̂

!LLJŜyŘÈ 9
5ǐăǘNJŜăă {dzYYl·Nè wŜLJƧNǘ
¢KƧYl·ă / wdzăăŜff CǐŜfŘ ó![·ú

.Nl·yǑK L5	{ŜǒǘǐƧyℒ5	{dzNFl·ǑŜ	!NŜl· óăFó	5ǐăǘNJŜăă bdzYōŜN	5ŜăǑNLJǘǐƧy	5ǐăǘNJŜăă a ŜǒKl·yǐăY	{ŜǿŜNǐǘè	vdzl·yǘǐǘè	vdzl·yǘǐǘè ¦yǐǘă	5ǐăǘNJŜăă 5Ŝyăǐǘè
¢.	лн	!/	тфΣорл	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	оΣсмп	Cǘ	пɸс
¢.	лн	!/	тфΣорл	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	a ŜŘǐdzY	нΣссф	Cǘ	оɸп
¢.	лн	!/	тфΣорл	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	тфΣорл	{ljCǘ	мллɸл
¢.м	лм	!/	нлΣору	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	мрн	Cǘ	лɸт
¢.м	лм	!/	нлΣору	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	a ŜŘǐdzY	мΣспл	Cǘ	уɸм
¢.м	лм	!/	нлΣору	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	муΣуфф	{ljCǘ	фнɸу
¢.м	лм	!/	нлΣору	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	a ŜŘǐdzY	мΣпрф	{ljCǘ	тɸн
¢.н	лм	!/	муΣрло	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	тп	Cǘ	лɸп
¢.н	лм	!/	муΣрло	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	a ŜŘǐdzY	мрф	Cǘ	лɸф
¢.н	лм	!/	муΣрло	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	мтΣфто	{ljCǘ	фтɸм
¢.н	лм	!/	муΣрло	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	a ŜŘǐdzY	рол	{ljCǘ	нɸф
¢.н	лн	!/	мпΣтмм	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	му	Cǘ	лɸм
¢.н	лн	!/	мпΣтмм	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	мпΣтмм	{ljCǘ	мллɸл
¢.о	лм	!/	опΣтсп	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	пмр	Cǘ	мɸн
¢.о	лм	!/	опΣтсп	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	опΣтсп	{ljCǘ	мллɸл
¢.п	лм	!/	опΣтсф	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	поо	Cǘ	мɸн
¢.п	лм	!/	опΣтсф	рт	²9!¢I9wLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	опΣтсф	{ljCǘ	мллɸл
¢.р	лм	!/	орΣфпс	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/fǐYl·ǘŜк5dzNl·ōǐfǘè	[Ƨǿ	нуф	Cǘ	лɸу

!ĿĿĴŜyŘǆÈ 9
5ǆǎűŊŜǎǎ {dzYYŀŊè wŜĿĴƻŊű
¢KƻYŀǎ / wdzǎǎŜff CǆŜfŘ ó![·ó

.ŊŀyŎK Ŀ5	{ŜŎűǆƻyƒĿ5	{dzŊŦŀŎŜ	!ŊŜŀ óǎŦó	5ǆǎűŊŜǎǎ bdzYōŜŊ	5ŜǎŎŊǆĿǇűǆƻyƒ	5ǆǎűŊŜǎǎ aŜŎKŀyǆǎY	{ŜǿŜŊǆűè	vdzŀyűǆűè	vdzŀyűǆűè ¦yǆűǎ	5ǆǎűŊŜǎǎ 5Ŝyǎǆűè
¢.p	лм	!/	орΣфпс	рт	²9!¢I9wĿbD	/ßYŀűŜк5dzŊŀōǆßűè	[ƻǿ	орΣфпс	{ljCű	мллɸã
¢/	лм	!/	мсрΣлсф	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	[ƻǿ	оΣусл	Cű	нɸо
¢/	лм	!/	мсрΣлсф	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	муΣнос	Cű	ммɸã
¢/	лм	!/	мсрΣлсф	рт	²9!¢I9wĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	мсрΣлсф	{ljCű	мллɸã
¢/м	лм	!/	млΣнмт	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	[ƻǿ	ср	Cű	лɸс
¢/м	лм	!/	млΣнмт	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	мΣмнл	Cű	ммɸã
¢/м	лм	!/	млΣнмт	рт	²9!¢I9wĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	млΣнмт	{ljCű	мллɸã
¢/н	лм	!/	ммΣнос	по	.[h/Y /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	млΣнмс	{ljCű	флɸф
¢/н	лм	!/	ммΣнос	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	тр	Cű	лɸт
¢/н	лм	!/	ммΣнос	рн	w!±9[ĿbD	/ßYŀűŜк5dzŊŀōǆßűè	[ƻǿ	рлл	{ljCű	пɸр
¢/н	лм	!/	ммΣнос	рт	²9!¢I9wĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	млΣтос	{ljCű	фрɸр
¢/н	лн	!/	ммΣуон	пм	![[ĿD!¢hw /w!/YĿbD	[ƻŀŘ	[ƻǿ	ол	{ljCű	лɸо
¢/н	лн	!/	ммΣуон	пр	59tw9{{Ŀhb	hűKŜŊ	[ƻǿ	нл	{ljCű	лɸн
¢/н	лн	!/	ммΣуон	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	[ƻǿ	рнл	Cű	пɸп
¢/н	лн	!/	ммΣуон	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	прп	Cű	оɸу
¢/н	лн	!/	ммΣуон	рт	²9!¢I9wĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	ммΣуон	{ljCű	мллɸã
¢/о	лм	!/	ммΣнуп	по	.[h/Y /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	aŜŘǆdzY	оΣллл	{ljCű	нсɸс
¢/о	лм	!/	ммΣнуп	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	IǆƎK	мр	Cű	лɸм
¢/о	лм	!/	ммΣнуп	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/YĿbD	/ßYŀűŜк5dzŊŀōǆßűè	[ƻǿ	фл	Cű	лɸу

!ĿĿĴŜyŘĳÈ 9

5ĳăűŊŜăă {ǳŸŸŀŊѐ wŜĿ2Ŋű

¢Ķ2Ÿŀă / wǳăăŜff CĳŜfŘ ó![·ú

.ŊŀyǑ́K Ŀ5	{ŜǑűĳ2yĿ5	{ǳŊŦŀǑŜ	!ŊŜŀ óăŦó	5ĳăűŊŜăă bǳŸōŜŊ	5ŜăǑŊĿĴűĳ2y	5ĳăűŊŜăă a ŜǑKŀyĳăŸ	{ŜǿŜŊĳűѐ	vǳŀyűĳűѐ	vǳŀyűĳűѐ ¦ yĳűă	5ĳăűŊŜăă 5Ŝyăĳűѐ
¢/o	лм	!/	ммΣнуп	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	уор	Cű	т¢ñ̥
¢/o	лм	!/	ммΣнуп	рт	²9!¢I9wĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	ммΣнуп	{ljCű	млл¢ḁ̆
¢/o	лн	!/	мнΣмфф	по	.[h/Ÿ /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	мΣнмп	{ljCű	мл¢ḁ̆
¢/o	лн	!/	мнΣмфф	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	[2ǿ	мпт	Cű	м¢ñ̥
¢/o	лн	!/	мнΣмфф	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	фсм	Cű	т¢ф̥
¢/o	лн	!/	мнΣмфф	рт	²9!¢I9wĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	мнΣмфф	{ljCű	млл¢ḁ̆
¢/п	лм	!/	ммΣлтл	пм	![[ĿD!¢hw /w!/ŸĿbD	[2ŀŘ	[2ǿ	пр	{ljCű	л¢ñ̥
¢/п	лм	!/	ммΣлтл	по	.[h/Ÿ /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	сΣмтл	{ljCű	рр¢т̥
¢/п	лм	!/	ммΣлтл	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	плл	Cű	о¢ç̥
¢/п	лм	!/	ммΣлтл	рн	w!±9[ĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	[2ǿ	пл	{ljCű	л¢ñ̥
¢/п	лн	!/	тΣтмр	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	[2ǿ	млр	Cű	м¢ñ̥
¢/п	лн	!/	тΣтмр	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	тто	Cű	мл¢ḁ̆
¢/п	лн	!/	тΣтмр	рт	²9!¢I9wĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	тΣтмр	{ljCű	млл¢ḁ̆
¢/р	лм	!/	ммΣуфр	по	.[h/Ÿ /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	мΣплл	{ljCű	мм¢ў̥
¢/р	лм	!/	ммΣуфр	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	мΣмпр	Cű	ф¢ç̥
¢/р	лм	!/	ммΣуфр	рт	²9!¢I9wĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	ммΣуфр	{ljCű	млл¢ḁ̆
¢5	лм	!/	мотΣфмр	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	[2ǿ	мΣумт	Cű	м¢ô̥
¢5	лм	!/	мотΣфмр	пу	[hbDĿ¢¦5Ŀb![к¢w!b{±9w{9 /w!/ŸĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	a ŜŘĳǳŸ	рΣнун	Cű	о¢ў̥
¢5	лм	!/	мотΣфмр	рт	²9!¢I9wĿbD	/ſŸŀűŜк5ǳŊŀōĳſűѐ	[2ǿ	моΣтпн	{ljCű	мл¢ḁ̆

! ǈǇŜyŘλȄ 9
5λăűŊŜăă {ǳYYŀŊѐ wŜǇƻŊű
¢ĸƻYŀă / wǳăăŜff CλŜfŘ ό ! [· ύ

.ŊŀyŎĸ ǈ5	{ŜŎűλƻyƴǈ5	{ǳŊŦŀŎŜ	! ŊŜŀ όăŦύ	5λăűŊŜăă bǳYōŜŊ	5ŜăŎŊλǇűλƻyƴ	5λăűŊŜăă aŜŎĸŀyλăY	{ŜøŜŊλűѐ	vǳŀyƴűλűѐ	vǳŀyƴűλűѐ ¦ yλűă	5λăűŊŜăă 5Ŝyăλűѐ
¢5	лм	! /	мотΣфмр	рт	² 9 ! ¢ I 9wǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	мнпΣмто	{ljCű	фл¢ǟ
¢5м	лм	! /	сΣснм	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	[ƻ ǿ	фф	Cű	м¢р̑
¢5м	лм	! /	сΣснм	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	ноу	Cű	о¢ȼ̑
¢5м	лм	! /	сΣснм	рт	² 9 ! ¢ I 9wǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	сΣснм	{ljCű	мл¢ǟ
¢5н	лм	! /	фΣррт	по	. [h / Y /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	мΣолл	{ljCű	мо¢ȼ̑
¢5н	лм	! /	фΣррт	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	[ƻ ǿ	ст	Cű	л¢ī̑
¢5н	лм	! /	фΣррт	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	пмм	Cű	п¢ȍ̑
¢5н	лм	! /	фΣррт	пф	hǈ[{tǈ[[! D9	hűĸŜŊ	bк !	н	{ljCű	л¢ǟ
¢5н	лм	! /	фΣррт	рн	w ! ±9[ǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	[ƻ ǿ	слл	{ljCű	с¢ȍ̑
¢5н	лм	! /	фΣррт	рт	² 9 ! ¢ I 9wǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	тΣррт	{ljCű	тф¢м̑
¢5о	лм	! /	фΣсфн	пм	! [[ǈD ! ¢hw /w ! / YǈbD	[ƻŀŘ	a ŜŘλǳY	му	{ljCű	л¢ȁ̑
¢5о	лм	! /	фΣсфн	пр	59tw9{{ǈhb	hűĸŜŊ	[ƻ ǿ	ол	{ljCű	л¢ȍ̑
¢5о	лм	! /	фΣсфн	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	[ƻ ǿ	мтт	Cű	м¢ȳ̑
¢5о	лм	! /	фΣсфн	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	ссл	Cű	с¢ȳ̑
¢5о	лм	! /	фΣсфн	рл	t ! ¢ / I ǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	[ƻ ǿ	мнл	{ljCű	м¢ȁ̑
¢5о	лм	! /	фΣсфн	рт	² 9 ! ¢ I 9wǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	a ŜŘλǳY	фΣртн	{ljCű	фу¢ȳ̑
¢5о	лн	! /	уΣнур	пм	! [[ǈD ! ¢hw /w ! / YǈbD	[ƻŀŘ	I λƎĸ	трл	{ljCű	ф¢м̑
¢5о	лн	! /	уΣнур	пм	! [[ǈD ! ¢hw /w ! / YǈbD	[ƻŀŘ	[ƻ ǿ	му	{ljCű	л¢ȁ̑
¢5о	лн	! /	уΣнур	пм	! [[ǈD ! ¢hw /w ! / YǈbD	[ƻŀŘ	a ŜŘλǳY	мΣтрт	{ljCű	нм¢ȁ̑
¢5о	лн	! /	уΣнур	пу	[hbDǈ¢ ¦ 5ǈb ! [к¢w ! b{±9w{9 /w ! / YǈbD	/ ƒλYŀűŜк5ǳŊŀōλƒλűѐ	I λƎĸ	нр	Cű	л¢ȍ̑

! LJLJŜyŘÀÈ 9
5ǈăŭǊŜăă {ǳYYl·Ǌè wŜLJƨǊŭ
¢ĸƨYl·ă / wǳăăŜff CǈŜfŘ ό ! [·ύ

. Ǌl·yŎK L5	{ŜŎŭǈƨyƳ L5	{ǳǊŦl·ŎŜ	! ǊŜl· όăŦό	5ǈăŭǊŜăă bǳYōŜǊ	5ŜăŎǊLJŭǈƨyƳ	5ǈăŭǊŜăă a ŜŎĸl·yǈăY	{ŜøŜǊǈŭè	v ǳl·yŭǈŭè	v ǳl·yŭǈŭè ¦ yǈŭă	5ǈăŭǊŜăă 5ŜyăǈŭÈ
¢5о	лн	! /	yǀнур	пу	[hbDL¢ ¦ 5Lb ! [к¢w ! b{±9w{9 /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	[ƨ ǿ	рлф	Cŭ	сфм
¢5о	лн	! /	yǀнур	пу	[hbDL¢ ¦ 5Lb ! [к¢w ! b{±9w{9 /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	a ŜŘǈǳY	мул	Cŭ	нфн
¢5п	лм	! /	оǀофп	пм	! [[LD ! ¢hw /w ! / YLbD	[ƨl·Ř	I ǈЗK	нп	{ljCŭ	лфт
¢5п	лм	! /	оǀофп	рп	{ I h±LbD	hŭKŜǊ	a ŜŘǈǳY	мл	{ljCŭ	лфо
¢5п	лн	t / /	пǀопс	тн	{ I ! ¢¢9w95 {[! .	[ƨl·Ř	a ŜŘǈǳY	р	{fl·ōă	млл фа
¢5п	ло	! /	пǀмлм	по	. [h / Y /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	a ŜŘǈǳY	мǀттм	{ljCŭ	по фн
¢5п	ло	! /	пǀмлм	пу	[hbDL¢ ¦ 5Lb ! [к¢w ! b{±9w{9 /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	[ƨ ǿ	с	Cŭ	лфн
¢5п	ло	! /	пǀмлм	пу	[hbDL¢ ¦ 5Lb ! [к¢w ! b{±9w{9 /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	a ŜŘǈǳY	по	Cŭ	мфм
¢5п	ло	! /	пǀмлм	рл	t ! ¢ / ILbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	[ƨ ǿ	нпр	{ljCŭ	сфа
¢5п	ло	! /	пǀмлм	рт	² 9 ! ¢ I 9wLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	[ƨ ǿ	мǀттм	{ljCŭ	по фн
¢5п	ло	! /	пǀмлм	рт	² 9 ! ¢ I 9wLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	a ŜŘǈǳY	нǀлур	{ljCŭ	рл фф
¢5п	лп	t / /	мтǀрнп	со	[Lb9 ! w /w ! / YLbD	[ƨl·Ř	I ǈЗK	л	{fl·ōă	рфа
¢5п	лп	t / /	мтǀрнп	ср	Wh Lb¢ {9 ! [5 ! a ! D9	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	I ǈЗK	р	{fl·ōă	млл фа
¢5п	лп	t / /	мтǀрнп	ст	[! wD9 t ! ¢ / Iк ¦ ¢L[L¢¸	hŭKŜǊ	[ƨ ǿ	л	{fl·ōă	рфа
¢5п	лп	t / /	мтǀрнп	ст	[! wD9 t ! ¢ / Iк ¦ ¢L[L¢¸	hŭKŜǊ	a ŜŘǈǳY	л	{fl·ōă	мфт
¢5п	лп	t / /	мтǀрнп	тн	{ I ! ¢¢9w95 {[! .	[ƨl·Ř	I ǈЗK	м	{fl·ōă	нл фа
¢5п	лп	t / /	мтǀрнп	то	{ IwLbY ! D9 /w ! / YLbD	hŭKŜǊ	bк !	л	{fl·ōă	офо
¢5п	лп	t / /	мтǀрнп	тп	Wh Lb¢ {t ! [[LbD	hŭKŜǊ	I ǈЗK	м	{fl·ōă	мм фт
¢5п	лп	t / /	мтǀрнп	тр	/ hwb9w {t ! [[LbD	hŭKŜǊ	a ŜŘǈǳY	л	{fl·ōă	мфт
¢5п	лр	! /	нǀтом	пу	[hbDL¢ ¦ 5Lb ! [к¢w ! b{±9w{9 /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	[ƨ ǿ	нл	Cŭ	лфт
¢5п	лр	! /	нǀтом	пу	[hbDL¢ ¦ 5Lb ! [к¢w ! b{±9w{9 /w ! / YLbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	a ŜŘǈǳY	млр	Cŭ	офу
¢5п	лр	! /	нǀтом	рл	t ! ¢ / ILbD	/ ŧǈYl·ŭŜк5ǳǊl·ōǈŧǈŭè	[ƨ ǿ	фс	{ljCŭ	офр

!LLJŜyŘĽ 9
5ƛăűNJŜăă {ďzYYŀNJè wŜLJƻNJű
¢KƻYŀă / wďzăăŜff CƛŜfŘ ó![·ύ

.NJŀyǑK L5	{ŜǑűƛƻyL5	{ďzNJŦŀǑŜ	!NJŜŀ όăŦύ	5ƛăűNJŜăă bďzYōŜNJ	5ŜăǑNJƛLJűƛƻy	5ƛăűNJŜăă aŜǑKŀyƛăY	{ŜøŜNJƛűè	vďzŀyűƛűè	vďzŀyűƛűè ¦yƛűă	5ƛăűNJŜăă 5Ŝyăƛűè
¢5п	лр	!/	нΣтом	рн	w!±9[LbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	IƛƎK	о	{ljCű	лФм
¢5п	лр	!/	нΣтом	рт	²9!¢I9wLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	нΣсну	{ljCű	фсФн
¢5р	лм	!/	фΣсро	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	[ƻó	млн	Cű	мФм
¢5р	лм	!/	фΣсро	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	сун	Cű	тФм
¢5р	лм	!/	фΣсро	рт	²9!¢I9wLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	фΣсро	{ljCű	мллФд
¢5с	лм	!/	уΣмнл	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	[ƻó	оо	Cű	лФп
¢5с	лм	!/	уΣмнл	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	олн	Cű	оФт
¢5с	лм	!/	уΣмнл	рт	²9!¢I9wLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	уΣмнл	{ljCű	мллФд
¢C	лм	!/	мсΣнфм	пр	59tw9{{Lhb	hűKŜNJ	[ƻó	пл	{ljCű	лФн
¢C	лм	!/	мсΣнфм	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	[ƻó	поо	Cű	нФт
¢C	лм	!/	мсΣнфм	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	уфо	Cű	рФр
¢C	лм	!/	мсΣнфм	рт	²9!¢I9wLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	мсΣнфм	{ljCű	мллФд
¢D	лм	!/	ммΣпул	пм	![[LD!¢hw /w!/YLbD	[ƻŀŘ	[ƻó	нп	{ljCű	лФн
¢D	лм	!/	ммΣпул	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	[ƻó	онл	Cű	нФс
¢D	лм	!/	ммΣпул	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	тлр	Cű	рФс
¢D	лн	!/	млΣфпу	пу	[hbDL¢¦5Lb![κ¢w!b{±9w{9 /w!/YLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	мΣнос	Cű	ммФо
¢D	лн	!/	млΣфпу	рт	²9!¢I9wLbD	/ŕƛYŀűŜκ5ďzNJŀōƛŕƛűè	aŜŘƛďzY	млΣфпу	{ljCű	мллФд
¢I!bDлм	лм	!/	мнΣопс	пм	![[LD!¢hw /w!/YLbD	[ƻŀŘ	[ƻó	ммр	{ljCű	лФф
¢I!bDлм	лм	!/	мнΣопс	пм	![[LD!¢hw /w!/YLbD	[ƻŀŘ	aŜŘƛďzY	мпл	{ljCű	мФм

!ǈǈŜyŘʎȄ 9
5ʎǎǘƝŜǎǎ {ǳYYlƝȅ wŜǈƧƝǘ
¢ĶƧYlǎ / wǳǎǎŜff CʎŜfŘ ό![·ύ

.Ɲl·yŎĶ L5	{ŜŎǘʎƧyΈL5	{ǳƝŦl·ŎŜ	!ƝŜl· όǎŦύ	5ʎǎǘƝŜǎǎ bǳYōŜƝ	5ŜǎŎƝʎǈǘʎƧy	5ʎǎǘƝŜǎǎ aŜŎĶl·yʎǎY	{ŜǿŜƝʎǘȅ	vǳl·yǘʎǘȅ	vǳl·yǘʎǘȅ ¦yʎǘǎ	5ʎǎǘƝŜǎǎ 5Ŝyǎʎǘȅ
¢I!bDлм	лм	!/	мнΣопс	пр	59tw9{{Lhb	hǘĶŜƝ	[Ƨǿ	ну	{ljCǘ	лɸн
¢I!bDлм	лм	!/	мнΣопс	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	[Ƨǿ	пул	Cǘ	оɸф
¢I!bDлм	лм	!/	мнΣопс	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	aŜŘʎǳY	рфр	Cǘ	пɸу
¢I!bDлм	лм	!/	мнΣопс	рн	w!±9[LbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	[Ƨǿ	фл	{ljCǘ	лɸт
¢I!bDлм	лн	!/	нлΣпфу	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	[Ƨǿ	мпн	Cǘ	лɸт
¢I!bDлм	лн	!/	нлΣпфу	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	aŜŘʎǳY	мΣрус	Cǘ	тɸт
¢I!bDлм	ло	!/	мпΣрно	пм	![[LD!¢hw /w!/YLbD	[Ƨl·Ř	IʎƎĶ	рл	{ljCǘ	лɸо
¢I!bDлм	ло	!/	мпΣрно	пм	![[LD!¢hw /w!/YLbD	[Ƨl·Ř	aŜŘʎǳY	птр	{ljCǘ	оɸо
¢I!bDлм	ло	!/	мпΣрно	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	[Ƨǿ	нтл	Cǘ	мɸф
¢I!bDлм	ло	!/	мпΣрно	пу	[hbDL¢¦5Lb![к¢w!b{±9w{9 /w!/YLbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	aŜŘʎǳY	улл	Cǘ	рɸр
¢I!bDлм	ло	!/	мпΣрно	рн	w!±9[LbD	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	aŜŘʎǳY	мнл	{ljCǘ	лɸу
¢I!bDлн	лм	t//	мсΣмнп	сн	/hwb9w .w9!Y	[Ƨl·Ř	IʎƎĶ	мо	{ƒl·ōǎ	оɸо
¢I!bDлн	лм	t//	мсΣмнп	сн	/hwb9w .w9!Y	[Ƨl·Ř	[Ƨǿ	рн	{ƒl·ōǎ	моɸо
¢I!bDлн	лм	t//	мсΣмнп	сн	/hwb9w .w9!Y	[Ƨl·Ř	aŜŘʎǳY	пр	{ƒl·ōǎ	ммɸт
¢I!bDлн	лм	t//	мсΣмнп	со	[Lb9!w /w!/YLbD	[Ƨl·Ř	IʎƎĶ	с	{ƒl·ōǎ	мɸт
¢I!bDлн	лм	t//	мсΣмнп	со	[Lb9!w /w!/YLbD	[Ƨl·Ř	[Ƨǿ	мос	{ƒl·ōǎ	орɸа
¢I!bDлн	лм	t//	мсΣмнп	со	[Lb9!w /w!/YLbD	[Ƨl·Ř	aŜŘʎǳY	нс	{ƒl·ōǎ	сɸт
¢I!bDлн	лм	t//	мсΣмнп	ср	WhLb¢ {9![5! a!D9	/ƒʎYl·ǘŜк5ǳƝl·ōʎƒʎǘȅ	aŜŘʎǳY	оуу	{ƒl·ōǎ	мллɸа
¢I!bDлн	лм	t//	мсΣмнп	ст	[!wD9 t!¢/Iк¦¢L[L¢¸	hǘĶŜƝ	[Ƨǿ	мо	{ƒl·ōǎ	оɸо
¢I!bDлн	лм	t//	мсΣмнп	тн	{I!¢¢9w95 {[!.	[Ƨl·Ř	IʎƎĶ	с	{ƒl·ōǎ	мɸт
¢I!bDлн	лм	t//	мсΣмнп	тн	{I!¢¢9w95 {[!.	[Ƨl·Ř	[Ƨǿ	мф	{ƒl·ōǎ	рɸа
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APPENDIX F

INVENTORY

F1: Section Forecasted Pavement Condition Rating
F2: Branch PCI Rating
F3: Branch FOD Rating

Appendix F1

Forecasted Section PCI

Thomas C Russell Field (ALX)

Branch ID	Section ID	Forecasted PCI						
		2021	2022	2023	2024	2025	2026	2027
A01	01	51	49	47	45	43	40	38
R1836	01	72	70	70	70	69	64	55
R1836	02	73	71	70	70	70	67	60
TC01	01	99	98	96	94	92	89	86
TC01	02	40	36	33	29	26	22	19
TC01	03	26	22	19	15	12	8	5
TC01	04	88	85	83	81	79	77	75
TC02	01	99	98	96	94	92	89	86
THANG01	01	89	86	84	81	79	77	75
THANG02	01	41	37	34	30	27	23	20
THANG02	02	18	14	11	7	4	0	0
THANG03	01	66	62	57	52	48	45	43
TP01	01	94	91	88	86	83	81	79
TP01	02	98	96	94	92	89	86	84

2/3/2021

Branch Condition Report

Page 1 of 2

Pavement Database: ALDOT_Combined_201201

A01	1	216.00	246.00	52,041.00	APRON	54.00	0.00	54.00
R1836	2	5,422.00	96.00	520,512.00	RUNWAY	76.00	1.00	76.77
TC01	4	1,476.00	40.50	61,418.00	TAXIWAY	66.25	29.84	81.21
TC02	1	235.00	50.00	21,573.00	TAXIWAY	100.00	0.00	100.00
THANG01	1	560.00	50.00	42,003.00	TAXIWAY	92.00	0.00	92.00
THANG02	2	1,915.00	27.50	54,965.00	TAXIWAY	33.50	11.50	30.28
THANG03	1	285.00	30.00	11,314.00	TAXIWAY	70.00	0.00	70.00
TP01	2	4,550.00	35.00	181,041.00	TAXIWAY	97.50	1.50	97.60

8/27/2021

Branch Condition Report

Pavement Database: ALDOT_210811

A01	1	216.00	246.00	52,041.00	APRON	53.00	0.00	53.00
R1836	2	5,422.00	96.00	520,512.00	RUNWAY	36.50	1.50	35.34
TC01	4	1,476.00	40.50	61,418.00	TAXIWAY	37.50	28.97	24.01
TC02	1	235.00	50.00	21,573.00	TAXIWAY	0.00	0.00	0.00
THANG01	1	560.00	50.00	42,003.00	TAXIWAY	18.00	0.00	18.00
THANG02	2	1,915.00	27.50	54,965.00	TAXIWAY	68.50	10.50	71.44
THANG03	1	285.00	30.00	11,314.00	TAXIWAY	43.00	0.00	43.00
TP01	2	4,550.00	35.00	181,041.00	TAXIWAY	11.50	1.50	11.40

APPENDIX G

SAFETY AND PREVENTIVE MAINTENANCE POLICIES

Appendix G1
Localized Safety (Stopgap) Repair Policy

Distress	Distress Severity	Description	Code	Work Type	Work Unit
41	High	ALLIGATOR CR	PA-FD	Patching - AC Full-Depth	SqFt
43	High	BLOCK CR	CS-AC	Crack Sealing - AC	Ft
45	High	DEPRESSION	PA-FD	Patching - AC Full-Depth	SqFt
47	High	JT REF. CR	CS-AC	Crack Sealing - AC	Ft
48	High	L & T CR	CS-AC	Crack Sealing - AC	Ft
50	High	PATCHING	PA-FD	Patching - AC Full-Depth	SqFt
53	High	RUTTING	PA-FD	Patching - AC Full-Depth	SqFt
54	High	SHOVING	PA-PD	Patching - AC Partial-Depth	SqFt
55	NA	SLIPPAGE CR	PA-PD	Patching - AC Partial-Depth	SqFt
56	High	SWELLING	PA-FD	Patching - AC Full-Depth	SqFt
61	High	BLOW-UP	SL-PC	Slab Replacement - PCC	SqFt
61	Medium	BLOW-UP	PA-PF	Patching - PCC Full Depth	SqFt
62	High	CORNER BREAK	PA-PF	Patching - PCC Full Depth	SqFt
63	High	LINEAR CR	PA-PF	Patching - PCC Full Depth	SqFt
63	Medium	LINEAR CR	CS-PC	Crack Sealing - PCC	Ft
64	High	DURABIL. CR	SL-PC	Slab Replacement - PCC	SqFt
64	Medium	DURABIL. CR	PA-PF	Patching - PCC Full Depth	SqFt
66	High	SMALL PATCH	PA-PP	Patching - PCC Partial Depth	SqFt
67	High	LARGE PATCH	PA-PF	Patching - PCC Full Depth	SqFt
70	High	SCALING	SL-PC	Slab Replacement - PCC	SqFt
71	High	FAULTING	GR-PP	Grinding (Localized)	Ft
72	High	SHAT. SLAB	SL-PC	Slab Replacement - PCC	SqFt
74	High	JOINT SPALL	PA-PP	Patching - PCC Partial Depth	SqFt
75	High	CORNER SPALL	PA-PP	Patching - PCC Partial Depth	SqFt
76	High	ASR	SL-PC	Slab Replacement - PCC	SqFt

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Distress	Distress Severity	Description	Code	Work Type	Work Unit
41	Medium	ALLIGATOR CR	PA-AD	Patching - AC Full-Depth	SqFt
41	High	ALLIGATOR CR	PA-AD	Patching - AC Full-Depth	SqFt
42	N/A	BLEEDING	PA-AS	Patching - AC Partial-Depth	SqFt
43	High	BLOCK CR	PA-AD	Patching - AC Full-Depth	SqFt
43	Medium	BLOCK CR	CS-AC	Crack Sealing - AC	Ft
44	Low	CORRUGATION	PA-AS	Patching - AC Partial-Depth	SqFt
44	High	CORRUGATION	PA-AS	Patching - AC Partial-Depth	SqFt
44	Medium	CORRUGATION	PA-AS	Patching - AC Partial-Depth	SqFt
45	Medium	DEPRESSION	PA-AD	Patching - AC Full-Depth	SqFt
45	Low	DEPRESSION	PA-AD	Patching - AC Full-Depth	SqFt
45	High	DEPRESSION	PA-AD	Patching - AC Full-Depth	SqFt
47	High	JT REF. CR	CS-AC	Crack Sealing - AC	Ft
47	Medium	JT REF. CR	CS-AC	Crack Sealing - AC	Ft
48	High	L & T CR	CS-AC	Crack Sealing - AC	Ft
48	Medium	L & T CR	CS-AC	Crack Sealing - AC	Ft
49	N/A	OIL SPILLAGE	PA-AD	Patching - AC Full-Depth	SqFt
50	High	PATCHING	PA-AD	Patching - AC Full-Depth	SqFt
50	Medium	PATCHING	PA-AD	Patching - AC Full-Depth	SqFt
52	High	RAVELING	PA-AS	Patching - AC Partial-Depth	SqFt
53	High	RUTTING	PA-AD	Patching - AC Full-Depth	SqFt
53	Low	RUTTING	PA-AD	Patching - AC Full-Depth	SqFt
53	Medium	RUTTING	PA-AD	Patching - AC Full-Depth	SqFt
55	N/A	SLIPPAGE CR	PA-AD	Patching - AC Full-Depth	SqFt
56	Low	SWELLING	PA-AD	Patching - AC Full-Depth	SqFt
56	Medium	SWELLING	PA-AD	Patching - AC Full-Depth	SqFt
61	Low	BLOW-UP	PA-PF	Patching - PCC Full Depth	SqFt
61	Medium	BLOW-UP	PA-PF	Patching - PCC Full Depth	SqFt
61	High	BLOW-UP	PA-PF	Patching - PCC Full Depth	SqFt
62	Medium	CORNER BREAK	PA-PF	Patching - PCC Full Depth	SqFt
62	High	CORNER BREAK	PA-PF	Patching - PCC Full Depth	SqFt
62	Low	CORNER BREAK	CS-PC	Crack Sealing - PCC	Ft
63	Medium	LINEAR CR	CS-PC	Crack Sealing - PCC	Ft
63	High	LINEAR CR	PA-PP	Patching - PCC Partial Depth	SqFt
64	Medium	DURABIL. CR	PA-PF	Patching - PCC Full Depth	SqFt
64	High	DURABIL. CR	SL-PC	Slab Replacement - PCC	SqFt
65	High	JT SEAL DMG	JS-LC	Joint Seal (Localized)	Ft
65	Medium	JT SEAL DMG	JS-LC	Joint Seal (Localized)	Ft
66	High	SMALL PATCH	PA-PP	Patching - PCC Partial Depth	SqFt
66	Medium	SMALL PATCH	PA-PP	Patching - PCC Partial Depth	SqFt
67	Medium	LARGE PATCH	PA-PF	Patching - PCC Full Depth	SqFt

Appendix G2
Localized Preventive Repair Policy

Distress	Distress Severity	Description	Code	Work Type	Work Unit
67	High	LARGE PATCH	PA-PF	Patching - PCC Full Depth	SqFt
69	N/A	PUMPING	JS-LC	Joint Seal (Localized)	Ft
70	Medium	SCALING	PA-PP	Patching - PCC Partial Depth	SqFt
70	High	SCALING	SL-PC	Slab Replacement - PCC	SqFt
71	High	FAULTING	GR-PP	Grinding (Localized)	Ft
71	Medium	FAULTING	GR-PP	Grinding (Localized)	Ft
72	Medium	SHAT. SLAB	SL-PC	Slab Replacement - PCC	SqFt
72	High	SHAT. SLAB	SL-PC	Slab Replacement - PCC	SqFt
74	High	JOINT SPALL	PA-PP	Patching - PCC Partial Depth	SqFt
74	Medium	JOINT SPALL	PA-PP	Patching - PCC Partial Depth	SqFt
75	Medium	CORNER SPALL	PA-PP	Patching - PCC Partial Depth	SqFt
75	High	CORNER SPALL	PA-PP	Patching - PCC Partial Depth	SqFt
76	Medium	ASR	SL-PC	Slab Replacement - PCC	SqFt
76	High	ASR	SL-PC	Slab Replacement - PCC	SqFt

APPENDIX H

M&R UNIT COSTS

H1: M&R Unit Costs
H2: Component Costs for Repair
H3: Airport Category

Maintenance and Repair (M&R) Unit Costs

The M&R costs developed for the ALDOT PMP include costs for maintenance, preservation, and repair activities and are described below.

Unit Costs Source Data

The source for the M&R costs data is RSMeans, which has data for 14 locations throughout Alabama, as identified by the yellow highlighted boxes in Figure 1. The cost data is presented in terms of individual line items like asphalt wearing course, aggregate base etc., which were consolidated to develop the activity costs described below.

The cost data show a distinct difference in costs between locations north and south of Birmingham, especially for the higher value items like the asphalt layers. Therefore, the unit costs were developed accordingly for the airports north and south of Birmingham, as identified in Figure 1. Appendix H2 presents the component costs used in developing the M&R costs.

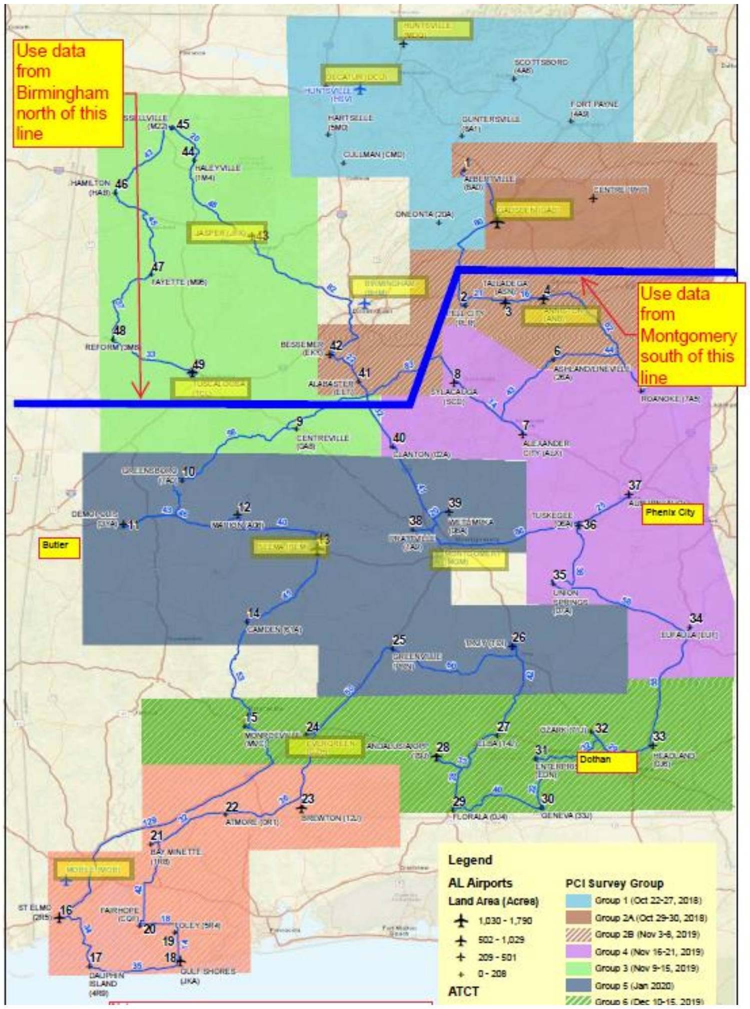
Use data from Birmingham north of this line
Use data from Montgomery south of this line
Butler
Phenix City
Dothan
HUNTSVILLE
DECATUR
JASPER
BIRMINGHAM
GADSDEN
ANNISTON
TUSCALOOSA
SELMA
MONTGOMERY
EVERGREEN
MOBILE
Legend
AL Airports
Land Area (Acres)
1,030 - 1,790
502 - 1,029
209 - 501
0 - 208
ATCT
PCI Survey Group
Group 1 (Oct 22-27, 2018)
Group 2A (Oct 29-30, 2018)
Group 2B (Nov 3-8, 2019)
Group 4 (Nov 16-21, 2019)
Group 3 (Nov 9-15, 2019)
Group 5 (Jan 2020)
Group 6 (Dec 10-15, 2019)

Figure 1: RSMeans Unit Costs Locations.

Maintenance & Repair (M&R) Activities

Maintenance activities are localized activities which are typically assigned in the first year of the M&R plan based on the observed distresses.

Repair activities are further subdivided into preservation, rehabilitation, and reconstruction. Repair activities are conducted for larger areas, typically at the section level and are assigned based on the Critical Pavement Condition Index, denoted as CP in Table 1. The CP is based on the section's rank or importance within the overall network and typically ranges from 55 to 70. The CP was set at 70 for the ALDOT runway pavements and 65 for the other pavements.

Table 1: Repair Activities.

Activity Type	PCI	Activity
Preservation	> CP	Runway Surface Treatment
		Taxiway and Apron Surface Treatment
Rehabilitation	> CP	2" AC OL[1]
	55 - CP	Mill 2" & 2" AC OL
	45 - 55	Mill 2" & 2" AC OLP (With Pre-Overlay Repairs)
Reconstruction	0 - 45	Reconstruct with AC

[1]For Sections with Structural Distress and PCI greater than Critical PCI

The depths for the milling and overlay (AC OL) in Table 1 were established by creating a balance between removal of surficial distress and providing additional pavement structural capacity. All overlay options include full-depth patching to repair localized distresses.

From the FAA 5010 records, the Alabama airport network includes a wide range of allowable aircraft loads. The airports were divided into three categories of allowable aircraft loads based on requirements for minimum pavement thickness and the use of a P-401 surface layer. The categories are based on the aircraft maximum gross takeoff weight (MGTOW) and include: less than 12,500 lbs, 12,500 to 30,000 lbs, and 30,000 to 100,000 lbs. Appendix H3 presents the category for each airport.

For any sections requiring reconstruction, the pavement sections were established primarily in accordance with the requirements in Table 3 of the FAA's Advisory Circular 150/5320-6F. The pavement sections used for developing the cost estimates are:

≤ 12,500 lbs	4" P-403 (State HMA Mix) + 6" P-209 Base
12,500 – 30,000 lbs	4" P-403 (State HMA Mix) + 8" P-209 Base
30,000 – 100,000 lbs	5" P-401 + 10" P-209 Base

It is important to note that while the FAA requires a stabilized base for those pavements that support aircraft operations with MGTOWs that are greater than 100,000 lbs, the number of such operations is minimal for those airports shown in Appendix H3. As a result, the cost of a stabilized base is excluded in the development of the unit costs for ALDOT's PMP update. However, based on the Engineer's future design and aircraft fleet mix development, project-level construction work could include the use of a stabilized base at that time.

M&R Unit Costs

Paving projects typically include additional project costs like mobilization, design, construction administration and inspections, and drainage improvements. A summary of non-direct pavement construction line items has been included in the unit costs in Tables 5 and 6 as described below. These non-direct items are expressed as a percentage of the total component costs for each activity.

These non-direct pavement construction items were developed from API's extensive experience with APMP project cost estimation. These percentages may vary for Alabama airport construction projects; however, since the direct pavement scope of work is estimated in a network-level evaluation, these conservative estimates serve as a good starting point for the development of realistic total project costs and annual APMP budgets for ALDOT. For repair activities such as Mill & Overlay, which typically do not include significant drainage work, the corresponding multiplier was reduced by 50 percent. The non-direct cost factors are presented in Table 2.

Table 2: Cost Factors.

Factor	Function of	Estimate		
		Preservation	Rehabilitation	Reconstruction
Mobilization	All costs, less design	10%	10%	10%
Drainage Improvements	Paving costs	-	4%	8%
Contingency	All costs, less mobilization and design	10%	20%	20%
Design & CM	All costs, less mobilization and design	15%	20%	20%

The M&R unit costs for maintenance, preservation, and repair activities were developed from the RSMeans cost data and are presented in the following section.

Maintenance

The maintenance activities include crack seal, and full and partial-depth patching. The unit costs are presented in Table 3.

Table 3: Unit Costs for Maintenance.

Activity	Unit Cost	Unit
Seal Cracks - AC	$3.95	lf
AC Full-Depth Patching	$25.05	sf
AC Partial-Dept Patching	$16.28	sf
Seal Cracks – PCC	$8.35	lf
PCC Full-Depth Patching	$48.70	sf
PCC Partial-Depth Patching	$243.51	sf
Jt. Seal	$11.13	lf
Slab Replacement	$27.83	sf
Grinding	$6.96	lf

Preservation

The unit costs for the surface treatments are presented in Table 4. They include sealing of cracks and application of pavement markings.

Table 4: Unit Costs for Preservation Activities.

Activity	Unit Cost	Unit
Runway Surface Treatment	$0.57	sf
Taxiway and Apron Surface Treatment	$0.88	sf

Rehabilitation and Reconstruction

As discussed previously, repair activities are also divided into rehabilitation and reconstruction. The unit costs for airport repair for the Northern Region (Birmingham Area) and Southern Region (Montgomery Area) are shown in Tables 5 and 6, respectively.

Table 5: Unit Costs for Repair Activities, Northern Region.

Activity Type	Activity	MGTOW, thousand lbs		
		≤ 12.5	12.5-30	30-100
Rehabilitation	2" AC OL	$3.78		$4.19
	Mill 2" & 2" AC OL	$4.15		$4.56
	Mill 2" & 2" AC OLP	$5.18		$5.79
Reconstruction	AC Reconstruction	$8.40	$9.10	$10.91

Table 6: Unit Costs for Repair Activities, Southern Region.

Activity Type	Activity	MGTOW, thousand lbs		
		≤ 12.5	12.5-30	30-100
Rehabilitation	2" AC OL	$3.54		$3.91
	Mill 2" & 2" AC OL	$3.90		$4.27
	Mill 2" & 2" AC OLP	$4.82		$5.37
Reconstruction	AC Reconstruction	$7.63	$8.25	$9.87

Appendix H2
Component Costs for Repair

Activity Type	Unit	Birmingham (Northern)	Montgomery (Southern)	Comments
Milling 1" to 3"	SY	$2.08	$2.01	
Pavement Demolition	SY	$6.34	$6.12	
Haulage - For Demolition & AC	CY	$6.08	$5.87	
Haulage for 12" Thick Demolition	SY	$2.03	$1.96	
Haulage for 2" Thick AC Paving	SY	$0.34	$0.33	
Haulage for 3" Thick AC Paving	SY	$0.51	$0.49	
Haulage for 4" Thick AC Paving	SY	$0.68	$0.65	
AC Wearing Course	Ton	$97.42	$86.90	
AC Binder Course	Ton	$87.80	$78.17	
P401 - For airports with >60 kip aircraft	Ton	$116.90	$104.28	Assumed P401 cost to be 20% greater than AC Wearing Course
6" Aggregate Base (P208)	SY	$10.17	$9.12	
8" Aggregate Base (P208)	SY	$13.29	$11.89	
6" P209 Aggregate Base	SY	$12.20	$10.94	Assumed P209 cost to be 20% greater than P208
8" P209 Aggregate Base	SY	$15.95	$14.27	Assumed P209 cost to be 20% greater than P208
10" P209 Aggregate Base	SY	$19.94	$17.84	Direct multiplier for 10" from 8"
4" P154 Aggregate Base	SY	$5.42	$4.86	Assumed P154 cost to be 20% lower than P208
6" P154 Aggregate Base	SY	$8.14	$7.30	Assumed P154 cost to be 20% lower than P208
Pavement Markings	sf	$1.48	$1.39	

Appendix H3
Airport Category

Region	City	FAA ID	Max Gross Weight (Thousand lbs)			Max GW	Category
			S	D	2D		
Birmingham	Reform	3M8	12.5	-	-	12.5	<= 12,500
	Fayette	M95	15.0	-	-	15.0	12,500-30,000
	Hamilton	HAB	15.0	-	-	15.0	12,500-30,000
	Scottsboro	4A6	15.0	-	-	15.0	12,500-30,000
	Alabaster	EET	16.0	-	-	16.0	12,500-30,000
	Centre-Piedmont	PYP	16.0	-	-	16.0	12,500-30,000
	Fort Payne	4A9	16.0	-	-	16.0	12,500-30,000
	Haleyville	1M4	20.0	-	-	20.0	12,500-30,000
	Hartselle	5M0	20.0	-	-	20.0	12,500-30,000
	Guntersville	8A1	24.0	-	-	24.0	12,500-30,000
	Cullman	CMD	30.0	-	-	30.0	12,500-30,000
	Russellville	M22	30.0	-	-	30.0	12,500-30,000
	Jasper	JFX	50.0	-	-	50.0	> 30,000
	Oneonta	20A	20.0	35.0	55.0	55.0	> 30,000
	Bessemer	EKY	60.0	60.0	-	60.0	> 30,000
	Albertville	8A0	60.0	90.0	130.0	130.0	> 30,000
	Madison	MDQ	60.0	75.0	140.0	140.0	> 30,000
	Decatur	DCU	75.0	125.0	150.0	150.0	> 30,000
	Tuscaloosa	TCL	61.0	87.0	168.0	168.0	> 30,000
	Gadsen	GAD	90.0	115.0	195.0	195.0	> 30,000
Montgomery	Florala	0J4	-	-	-	-	<= 12,500
	Elba	14J	4.0	-	-	4.0	<= 12,500
	Headland	0J6	12.0	-	-	12.0	<= 12,500
	Roanoke	7A5	12.0	-	-	12.0	<= 12,500
	Greenville	PRN	15.0	-	-	15.0	12,500-30,000
	Union Springs	07A	15.0	-	-	15.0	12,500-30,000
	Wetumpka	08A	15.0	-	-	15.0	12,500-30,000
	Atmore	0R1	16.0	-	-	16.0	12,500-30,000
	Clanton	02A	16.0	-	-	16.0	12,500-30,000
	Eufaula	EUF	16.0	-	-	16.0	12,500-30,000
	Geneva	33J	16.0	-	-	16.0	12,500-30,000
	Greensboro	7A0	16.0	-	-	16.0	12,500-30,000
	Centreville	0A8	18.0	-	-	18.0	12,500-30,000
	Ashland-Lineville	26A	20.0	-	-	20.0	12,500-30,000
	Sylacauga	SCD	20.0	-	-	20.0	12,500-30,000
	St. Elmo	2R5	23.0	-	-	23.0	12,500-30,000
	Ozark	71J	-	25.0	-	25.0	12,500-30,000
	Camden	61A	27.0	-	-	27.0	12,500-30,000
	Bay Minette	1R8	28.0	-	-	28.0	12,500-30,000
	Foley	5R4	28.0	-	-	28.0	12,500-30,000
	Tuskegee	06A	28.5	-	-	28.5	12,500-30,000

Appendix H3
Airport Category

Region	City	FAA ID	Max Gross Weight (Thousand lbs)			Max GW	Category
			S	D	2D		
Montgomery	Alexander City	ALX	30.0	-	-	30.0	12,500-30,000
	Dauphin Island	4R9	30.0	-	-	30.0	12,500-30,000
	Pell City	PLR	30.0	-	-	30.0	12,500-30,000
	Prattville	1A9	30.0	-	-	30.0	12,500-30,000
	Enterprise	EDN	-	-	-	-	> 30,000
	Evergreen	GZH	30.0	50.0	-	50.0	> 30,000
	Marion	A08	30.0	50.0	-	50.0	> 30,000
	Selma	SEM	33.0	54.0	-	54.0	> 30,000
	Fairhope	CQF	36.0	58.0	-	58.0	> 30,000
	Brewton	12J	40.0	60.0	-	60.0	> 30,000
	Demopolis	DYA	30.0	38.0	60.0	60.0	> 30,000
	Monroeville	MVC	70.0	-	-	70.0	> 30,000
	Auburn-Opelika	AUO	45.0	75.0	-	75.0	> 30,000
	Talladega	ASN	30.0	65.0	95.0	95.0	> 30,000
	Gulf Shores	JKA	80.0	100.0	-	100.0	> 30,000
	Troy	TOI	24.0	80.0	140.0	140.0	> 30,000
	Anniston	ANB	28.0	43.5	260.0	260.0	> 30,000
	Andalusia-OPP	79J	98.0	160.0	275.0	275.0	> 30,000

APPENDIX I

PAVEMENT CAPITAL IMPROVEMENT PROGRAM

I1: PCIP Summary
I2: Year 1 Maintenance Plan

Appendix I1
PCIP Summary
Thomas C Russell Field (ALX)

Branch & Section	2021	2022	2023	2024	2025	2026	2027
A01-01	Required Project Major Below Critical $258123.36 Before:51.24 After:100	Preventive $121.01 Before:97.79 After:97.79	Preventive $249.28 Before:95.58 After:95.58	Preventive + Required Project Global MR $33691.38 Before:93.37 After:97.79	Preventive $265 Before:95.57 After:95.57	Preventive $409.15 Before:93.36 After:93.36	Preventive $561.71 Before:91.15 After:91.15
R1836-01	Preventive $1687.46 Before:71.63 After:71.63	Preventive $1819.93 Before:70.2 After:70.2	Required Project Major Below Critical $255380.16 Before:69.8 After:100	Preventive $86.82 Before:98.7 After:98.7	Preventive $173.85 Before:97.47 After:97.47	Preventive + Required Project Global MR $40920.65 Before:96.45 After:98.7	Preventive $183.78 Before:97.48 After:97.48
R1836-02	Preventive $12425.07 Before:72.97 After:72.97	Preventive $13723.61 Before:70.87 After:70.87	Required Project Major Below Critical $1967206.08 Before:69.93 After:100	Preventive $668.81 Before:98.7 After:98.7	Preventive $1339.2 Before:97.47 After:97.47	Preventive + Required Project Global MR $315213.82 Before:96.45 After:98.7	Preventive $1415.65 Before:97.48 After:97.48
TC01-01	Preventive $24.84 Before:98.72 After:98.72	Preventive $49.53 Before:97.52 After:97.52	Preventive $84.66 Before:95.88 After:95.88	Preventive $131.28 Before:93.8 After:93.8	Preventive + Required Project Global MR $18959.74 Before:91.36 After:97.51	Preventive $92.51 Before:95.88 After:95.88	Preventive $143.66 Before:93.79 After:93.79

Appendix I1
PCIP Summary
Thomas C Russell Field (ALX)

Branch & Section	2021	2022	2023	2024	2025	2026	2027
TC01-02	Required Project Major Below Critical $70414 Before:39.57 After:100	Preventive $8.88 Before:98.98 After:98.98	Preventive $19.35 Before:97.85 After:97.85	Preventive + Required Project Global MR $5335.74 Before:96.33 After:98.98	Preventive $20.53 Before:97.85 After:97.85	Preventive $35.96 Before:96.34 After:96.34	Preventive $56.98 Before:94.36 After:94.36
TC01-03	Required Project Major Below Critical $53295 Before:25.57 After:100	Preventive $6.72 Before:98.98 After:98.98	Preventive $14.65 Before:97.85 After:97.85	Preventive + Required Project Global MR $4038.52 Before:96.33 After:98.98	Preventive $15.54 Before:97.85 After:97.85	Preventive $27.21 Before:96.34 After:96.34	Preventive $43.12 Before:94.36 After:94.36
TC01-04	Preventive + Required Project Global MR $24905.37 Before:87.7 After:95.13	Preventive $208.8 Before:92.89 After:92.89	Preventive $291.52 Before:90.36 After:90.36	Preventive $382.97 Before:87.71 After:87.71	Preventive $478.2 Before:85.1 After:85.1	Preventive $572.78 Before:82.67 After:82.67	Preventive $666.11 Before:80.44 After:80.44
TC02-01	Preventive $28.26 Before:98.72 After:98.72	Preventive $56.36 Before:97.52 After:97.52	Preventive $96.32 Before:95.88 After:95.88	Preventive $149.36 Before:93.8 After:93.8	Preventive + Required Project Global MR $21571.57 Before:91.36 After:97.51	Preventive $105.25 Before:95.88 After:95.88	Preventive $163.45 Before:93.79 After:93.79

Appendix I1
PCIP Summary
Thomas C Russell Field (ALX)

Branch & Section	2021	2022	2023	2024	2025	2026	2027
THANG01-01	Preventive + Required Project Global MR $37445.73 Before:88.75 After:95.89	Preventive $274.11 Before:93.8 After:93.8	Preventive $392.87 Before:91.37 After:91.37	Preventive $527.89 Before:88.75 After:88.75	Preventive $671.53 Before:86.1 After:86.1	Preventive $816.53 Before:83.59 After:83.59	Preventive $959.38 Before:81.28 After:81.28
THANG02-01	StopGap $779.07 Before:40.57 After:40.57	Required Project Major Below Critical $173377.92 Before:37.03 After:100	Preventive $21.85 Before:98.98 After:98.98	Preventive $47.62 Before:97.85 After:97.85	Preventive $83.61 Before:96.33 After:96.33	Preventive $132.59 Before:94.35 After:94.35	Preventive $193.43 Before:91.99 After:91.99
THANG02-02	StopGap $10759.16 Before:17.57 After:17.57	Required Project Major Below Critical $308115.48 Before:14.03 After:100	Preventive $38.83 Before:98.98 After:98.98	Preventive $84.63 Before:97.85 After:97.85	Preventive $148.58 Before:96.33 After:96.33	Preventive $235.62 Before:94.35 After:94.35	Preventive $343.75 Before:91.99 After:91.99
THANG03-01	Preventive $578.74 Before:65.73 After:65.73	StopGap $220.1 Before:61.52 After:61.52	Required Project Major Below Critical $50400.51 Before:56.75 After:100	Preventive $12.86 Before:98.98 After:98.98	Preventive $28.04 Before:97.85 After:97.85	Preventive $49.23 Before:96.33 After:96.33	Preventive $78.07 Before:94.35 After:94.35

Appendix I1
PCIP Summary
Thomas C Russell Field (ALX)

Branch & Section	2021	2022	2023	2024	2025	2026	2027
TP01-01	Preventive $571.03 Before:93.37 After:93.37	Preventive $809.22 Before:90.88 After:90.88	Preventive $1075.32 Before:88.24 After:88.24	Preventive $1354.09 Before:85.62 After:85.62	Preventive + Required Project Global MR $85106.25 Before:83.14 After:90.88	Preventive $1175.03 Before:88.24 After:88.24	Preventive $1479.65 Before:85.62 After:85.62
TP01-02	Preventive $242.63 Before:97.55 After:97.55	Preventive $414.66 Before:95.93 After:95.93	Preventive $645.42 Before:93.85 After:93.85	Preventive $926.96 Before:91.42 After:91.42	Preventive + Required Project Global MR $97005.79 Before:88.8 After:95.93	Preventive $705.27 Before:93.85 After:93.85	Preventive $1012.91 Before:91.42 After:91.42

Appendix I2
Localized Maintenance Plan
Thomas C Russell Field (ALX)

Branch ID	Section ID	Policy	Distress Code	Description	Severity	Distress Qty	Distress Unit	Percent Distress	Work Description	Work Qty	Work Unit	Unit Cost	Work Cost
A01	01	ALDOT_Safe	48	L & T CR	Medium	1,726	Ft	3.32	No Localized M & R	0		$0.00	$0
A01	01	ALDOT_Safe	41	ALLIGATOR CR	Medium	462	SqFt	0.89	No Localized M & R	0		$0.00	$0
A01	01	ALDOT_Safe	43	BLOCK CR	Medium	3,173	SqFt	6.1	No Localized M & R	0		$0.00	$0
A01	01	ALDOT_Safe	48	L & T CR	High	25	Ft	0.05	Crack Sealing - AC	25	Ft	$3.95	$100
A01	01	ALDOT_Safe	43	BLOCK CR	Low	3,173	SqFt	6.1	No Localized M & R	0		$0.00	$0
A01	01	ALDOT_Safe	41	ALLIGATOR CR	High	190	SqFt	0.37	Patching - AC Full-Depth	250	SqFt	$25.05	$6,261
A01	01	ALDOT_Safe	48	L & T CR	Low	2,203	Ft	4.23	No Localized M & R	0		$0.00	$0
R1836	01	ALDOT_Prev	52	RAVELING	Medium	16	SqFt	0.03	No Localized M & R	0		$0.00	$0
R1836	01	ALDOT_Prev	48	L & T CR	Medium	1,713	Ft	2.86	Crack Sealing - AC	1,713	Ft	$3.95	$6,767
R1836	01	ALDOT_Prev	48	L & T CR	Low	2,062	Ft	3.45	No Localized M & R	0		$0.00	$0
R1836	02	ALDOT_Prev	48	L & T CR	Low	12,402	Ft	2.69	No Localized M & R	0		$0.00	$0
R1836	02	ALDOT_Prev	57	WEATHERING	Medium	514	SqFt	0.11	No Localized M & R	0		$0.00	$0
R1836	02	ALDOT_Prev	50	PATCHING	Low	823	SqFt	0.18	No Localized M & R	0		$0.00	$0
R1836	02	ALDOT_Prev	48	L & T CR	Medium	11,305	Ft	2.45	Crack Sealing - AC	11,305	Ft	$3.95	$44,655
TC01	02	ALDOT_Safe	43	BLOCK CR	Low	606	SqFt	7.32	No Localized M & R	0		$0.00	$0
TC01	02	ALDOT_Safe	48	L & T CR	Low	298	Ft	3.6	No Localized M & R	0		$0.00	$0
TC01	02	ALDOT_Safe	52	RAVELING	Low	136	SqFt	1.65	No Localized M & R	0		$0.00	$0
TC01	02	ALDOT_Safe	41	ALLIGATOR CR	Medium	333	SqFt	4.02	No Localized M & R	0		$0.00	$0
TC01	02	ALDOT_Safe	48	L & T CR	Medium	505	Ft	6.1	No Localized M & R	0		$0.00	$0
TC01	02	ALDOT_Safe	45	DEPRESSION	Low	15	SqFt	0.18	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	48	L & T CR	Low	150	Ft	2.39	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	50	PATCHING	Low	1,734	SqFt	27.66	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	41	ALLIGATOR CR	Low	52	SqFt	0.83	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	41	ALLIGATOR CR	Medium	78	SqFt	1.24	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	57	WEATHERING	Medium	4,501	SqFt	71.79	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	50	PATCHING	Medium	35	SqFt	0.56	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	48	L & T CR	Medium	330	Ft	5.26	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	45	DEPRESSION	Low	12	SqFt	0.19	No Localized M & R	0		$0.00	$0
TC01	03	ALDOT_Safe	45	DEPRESSION	Medium	64	SqFt	1.02	No Localized M & R	0		$0.00	$0

Appendix I2
Localized Maintenance Plan
Thomas C Russell Field (ALX)

Branch ID	Section ID	Policy	Distress Code	Description	Severity	Distress Qty	Distress Unit	Percent Distress	Work Description	Work Qty	Work Unit	Unit Cost	Work Cost
TC01	04	ALDOT_Prev	52	RAVELING	Low	98	SqFt	0.35	No Localized M & R	0		$0.00	$0
TC01	04	ALDOT_Prev	48	L & T CR	Medium	19	Ft	0.07	Crack Sealing - AC	19	Ft	$3.95	$77
TC01	04	ALDOT_Prev	48	L & T CR	Low	447	Ft	1.6	No Localized M & R	0		$0.00	$0
THANG01	01	ALDOT_Prev	48	L & T CR	Low	368	Ft	0.88	No Localized M & R	0		$0.00	$0
THANG01	01	ALDOT_Prev	48	L & T CR	Medium	160	Ft	0.38	Crack Sealing - AC	160	Ft	$3.95	$634
THANG02	01	ALDOT_Safe	50	PATCHING	Low	1,080	SqFt	5.46	No Localized M & R	0		$0.00	$0
THANG02	01	ALDOT_Safe	48	L & T CR	Low	144	Ft	0.73	No Localized M & R	0		$0.00	$0
THANG02	01	ALDOT_Safe	43	BLOCK CR	Medium	1,712	SqFt	8.65	No Localized M & R	0		$0.00	$0
THANG02	01	ALDOT_Safe	41	ALLIGATOR CR	Medium	588	SqFt	2.97	No Localized M & R	0		$0.00	$0
THANG02	01	ALDOT_Safe	41	ALLIGATOR CR	High	300	SqFt	1.52	Patching - AC Full-Depth	374	SqFt	$25.05	$9,362
THANG02	01	ALDOT_Safe	48	L & T CR	Medium	573	Ft	2.9	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	57	WEATHERING	Low	7,970	SqFt	22.66	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	41	ALLIGATOR CR	High	423	SqFt	1.2	Patching - AC Full-Depth	510	SqFt	$25.05	$12,780
THANG02	02	ALDOT_Safe	43	BLOCK CR	Medium	11,289	SqFt	32.1	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	48	L & T CR	Medium	1,973	Ft	5.61	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	48	L & T CR	Low	234	Ft	0.67	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	52	RAVELING	Medium	45	SqFt	0.13	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	41	ALLIGATOR CR	Medium	3,599	SqFt	10.23	No Localized M & R	0		$0.00	$0
THANG02	02	ALDOT_Safe	48	L & T CR	High	45	Ft	0.13	Crack Sealing - AC	45	Ft	$3.95	$179
THANG02	02	ALDOT_Safe	57	WEATHERING	Medium	21,253	SqFt	60.42	No Localized M & R	0		$0.00	$0
TP01	01	ALDOT_Prev	49	OIL SPILLAGE	N/A	16	SqFt	0.02	Patching - AC Full-Depth	37	SqFt	$25.05	$903
TP01	01	ALDOT_Prev	48	L & T CR	Low	335	Ft	0.4	No Localized M & R	0		$0.00	$0
TP01	01	ALDOT_Prev	52	RAVELING	High	16	SqFt	0.02	Patching - AC Partial-Dep	16	SqFt	$16.28	$260
TP01	02	ALDOT_Prev	49	OIL SPILLAGE	N/A	25	SqFt	0.03	Patching - AC Full-Depth	48	SqFt	$25.05	$1,215