

Alabama Statewide Airport Pavement Management Program Update



**Troy Municipal Airport at N
Kenneth Campbell Field (TOI)**

Final Report

February 2022



Submitted to

Alabama Aeronautics Bureau

Submitted by



All About Pavements, Inc (API)
www.allaboutpavements.com

Pavement Management – Evaluation – Testing – Design

ALABAMA STATEWIDE AIRPORT PAVEMENT MANAGEMENT
PROGRAM UPDATE

Troy Municipal Airport at N Kenneth Campbell Field, Troy (TOI)

FINAL REPORT

Prepared For:

Alabama Aeronautics Bureau
1409 Coliseum Blvd.
Montgomery, AL 36110

Prepared By:

ALL ABOUT PAVEMENTS, INC.
205 Ramblewood Drive
Chatham, Illinois 62629

February 2022

This Page Intentionally Left Blank

Executive Summary

The Aviation Inc. team, which included All About Pavements, Inc., (API) was awarded a contract by the Alabama Department of Transportation (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 Troy Municipal Airport (TOI).

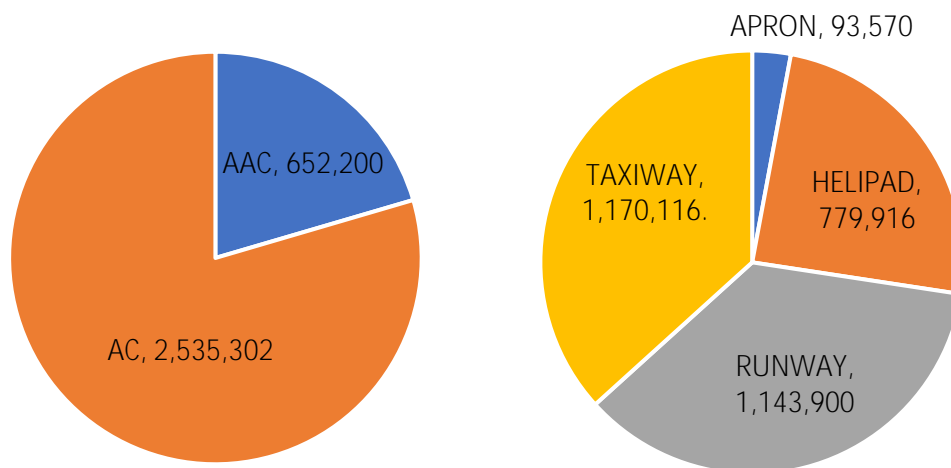
The following APMP tasks were completed to achieve the project objectives at TOI:

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

ES.1 Pavement Inventory

There are 15 branches and 25 sections within TOI with a total pavement area of approximately 3.2 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 from 0 to 100 representing functional surface condition. The overall area-weighted network PCI (AW PCI) for the TOI pavement network is 62, which is considered Fair.

condition. The network area-weighted pavement age (AW Age) is greater than 20 years. ALDOT wanted the condition of the heliport to be not included in the overall PCI computations, and it and Runway 14-32 were not considered for the PCIP.

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

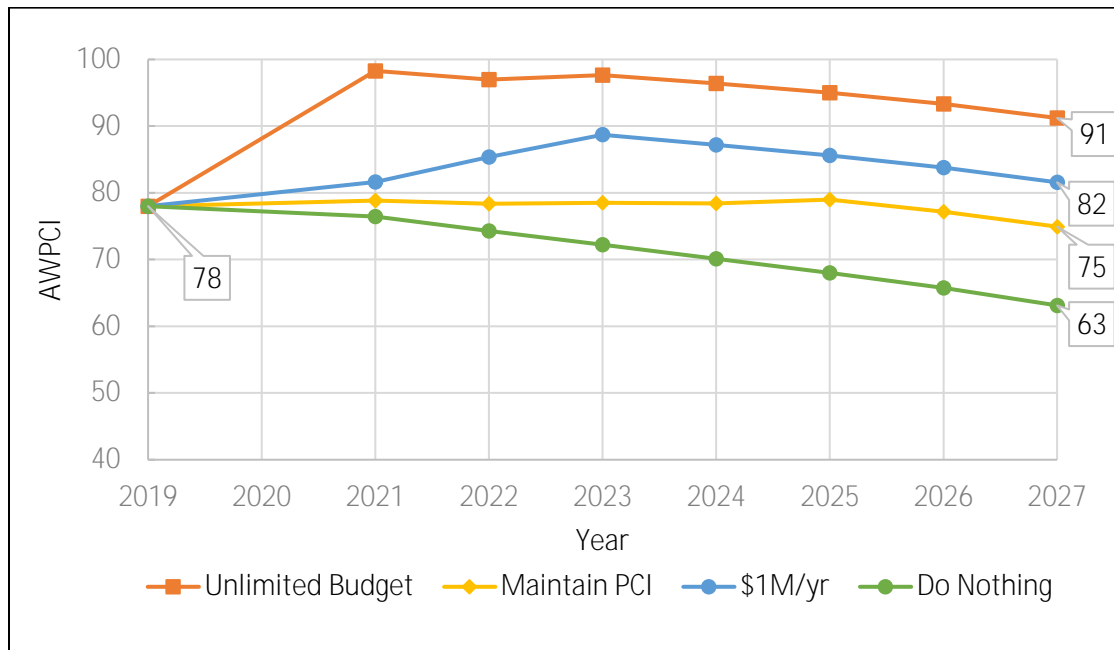
Table ES-1: TOI Section PCI Values and Ratings.

Branch ID	Name	Section ID	Surface	Area, sf	PCI	PCI Category
A01	Apron 01	01	AC	63,985	53	Poor
A02	Apron 02	01	AC	29,585	39	Very Poor
R0725	Runway 07-25	01	AC	151,200	100	Good
R0725	Runway 07-25	02	AC	468,500	100	Good
R0725	Runway 07-25	03	AC	32,500	100	Good
R1432	Runway 14-32	01	AC	143,000	39	Very Poor
R1432	Runway 14-32	02	AC	348,700	37	Very Poor
TA1	Taxiway A1	01	AC	11,705	70	Fair
TA2	Taxiway A2	01	AC	13,825	51	Poor
TA3	Taxiway A3	01	AC	15,912	44	Poor
TC01	Taxiway Connector 01	01	AC	20,968	39	Very Poor
TC02	Taxiway Connector 02	01	AC	26,871	42	Poor
THANG01	Taxiway Hangar 01	01	AC	41,800	55	Poor
TP01	Taxiway Parallel 01	01	AC	78,188	77	Satisfactory
TP01	Taxiway Parallel 01	02	AC	165,974	44	Poor
TP01	Taxiway Parallel 01	03	AC	37,379	40	Very Poor
TP01	Taxiway Parallel 01	04	AC	63,260	42	Poor
TP02	Taxiway Parallel 02	01	AC	90,858	38	Very Poor
TP02	Taxiway Parallel 02	02	AC	13,469	39	Very Poor
TP02	Taxiway Parallel 02	03	AC	147,866	42	Poor

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 TOI network PCI values for each funding level.

Figure ES-2: M&R Funding Levels.



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 \$5.2 million. These recommendations are based on a network-level evaluation. Project-level evaluations should be conducted prior to developing design and bid package documents.

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

Project Year	CIP Project	Total Project Cost	Total Project Area, sf	AWPCI Before	AWPCI After
2022	TOI_22-01_Apron 01 Rehabilitation	\$602,254	105,785	46	100
2023	TOI_23-01_Taxiway Parallel 01 Rehabilitation	\$3,838,675	413,114	38	100
2024	TOI_24-01_Runway 07-25 Surface Treatment	\$415,081	652,200	96	98
2025	TOI_25-01_Apron 01 Surface Treatment	\$41,944	63,985	93	98
2026	TOI_26-01_Taxiway Parallel 01 Surface Treatment	\$278,930	413,114	96	99
	Total	\$5,176,884			

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 \$4,028 as summarized in Table ES-3.

Table ES-3: Summary of Localized Maintenance Plan.

Policy	Work Description	Work Quantity	Work Unit	Work Cost
Preventive	Crack Sealing - AC	1,020	Ft	\$4,028
Total				\$4,028

TABLE OF CONTENTS

1	INTRODUCTION	1-1
1.1.	OVERVIEW	1-1
1.2.	WORK SCOPE	1-1
1.3.	PAVEMENT MANAGEMENT CONCEPT	1-2
2	AIRFIELD PAVEMENT INVENTORY	2-1
2.1.	INTRODUCTION	2-1
2.2.	PAVEMENT INVENTORY	2-1
2.3.	CLIMATIC CONDITIONS	2-2
2.4.	PAVEMENT NETWORK DEFINITION	2-2
2.5.	INVENTORY SUMMARY	2-3
3	PAVEMENT CONDITION	3-1
3.1.	INTRODUCTION	3-1
3.2.	PAVEMENT CONDITION RATING METHODOLOGY	3-1
3.3.	DISTRESS TYPES	3-2
3.4.	ADDITIONAL PCI-BASED INDICES	3-3
3.5.	PCI SURVEY RESULTS	3-4
3.6.	PCC PAVEMENTS	3-5
4	PAVEMENT CAPITAL IMPROVEMENT PROGRAM	4-1
4.1.	INTRODUCTION	4-1
4.2.	PERFORMANCE MODELING	4-1
4.3.	CRITICAL PCI VALUES	4-3
4.4.	M&R POLICIES AND UNIT COSTS	4-3
4.5.	PAVEMENT CIP DEVELOPMENT	4-4
4.6.	PAVEMENT CAPITAL IMPROVEMENT PROGRAM	4-6

LIST OF TABLES

Table 2.1: Average Annual Temperatures and Rainfall for TOI.	2-2
Table 2.2: PCI Sampling Rate for AC Surfaces.	2-3
Table 2.3: TOI Pavement Branches.	2-3
Table 2.4: TOI Pavement Age.	2-4
Table 3.1: Pavement Condition Index Rating Scale.	3-2
Table 3.2: Section PCI.	3-5
Table 4.1: M&R Activities and Unit Costs.	4-4
Table 4.2: Summary of M&R Funding Level Analyses.	4-6
Table 4.3: Summary of 7-Year PCIP by Project.	4-7
Table 4.4: Summary of 7-Year PCIP by Project and Section.	4-7
Table 4.5: Summary of Year-1 Maintenance Plan.	4-8

LIST OF FIGURES

Figure 1.1: Pavement Management Concept.	1-2
Figure 2.1: Troy Municipal Airport.	2-1
Figure 2.2: TOI Pavement Area by Surface Type.	2-4
Figure 2.3: TOI Pavement Area by Branch Use.	2-5
Figure 3.1: FOD Potential Rating Scale.	3-3
Figure 3.2: Pavement Condition by Branch Use.	3-4
Figure 3.3: Pavement Condition by Percent of Area.	3-4
Figure 3.4: PCC Apron Condition Rating.	3-6
Figure 4.1: PCI Forecasting.	4-2
Figure 4.2: Family Curves.	4-2
Figure 4.3: Budget Analysis Process.	4-5
Figure 4.4: M&R Funding Levels.	4-5

APPENDICES

- Appendix A: Pavement Inventory Report
- 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 Program (PCIP) Maps
 - B3A: 2027 Forecasted PCI without PCIP
 - B3B: Repair Type
 - B3C: PCIP Recommendations
- Appendix C: Overview of Pavement Distresses
- Appendix D: Detailed Pavement Condition Data (electronic version only)
- Appendix E: Distress Summary Report
- Appendix F: Pavement Condition Reports
 - F1: Section Forecasted Pavement Condition Rating
 - F2: Branch PCI Rating
 - F3: Branch FOD Rating
- Appendix G: Safety and Preventive Maintenance Policies
- Appendix H: M&R Unit Costs
- Appendix I: Pavement Capital Improvement Program (PCIP)
 - I1: CIP Summary
 - I2: Year 1 Maintenance Plan
- Appendix J: USB Thumb Drive FINAL ONLY
 - Final Report in PDF format
 - Geo-referenced Field Photos

This Page Intentionally Left Blank

1 Introduction

1.1 Overview

Alabama 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 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 Troy Municipal Airport (TOI), 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:

- Ø Conduct a visual pavement inspection of the asphalt surfaced pavements for 59 of the 72 public use airports in Alabama.
- Ø Based on the visual inspection analysis results, develop a 7-year PCIP for each airport.

The scope of work is as shown below:

- Ø Conduct a Records Review
- Ø Update Pavement Network Definition
- Ø Conduct Pavement Condition Surveys
- Ø Update and customize existing APMP PAVER database
- Ø Develop PCIP and associated project cost estimates
- Ø Prepare Draft and Final Reports
- Ø 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

The deliverable products include a PAVER 7.0 database, individual airport evaluation reports, a statewide summary report, and the web viewer. The TOI report will be one of the 59 individual airport reports that will be

1.3. Pavement Management Concept

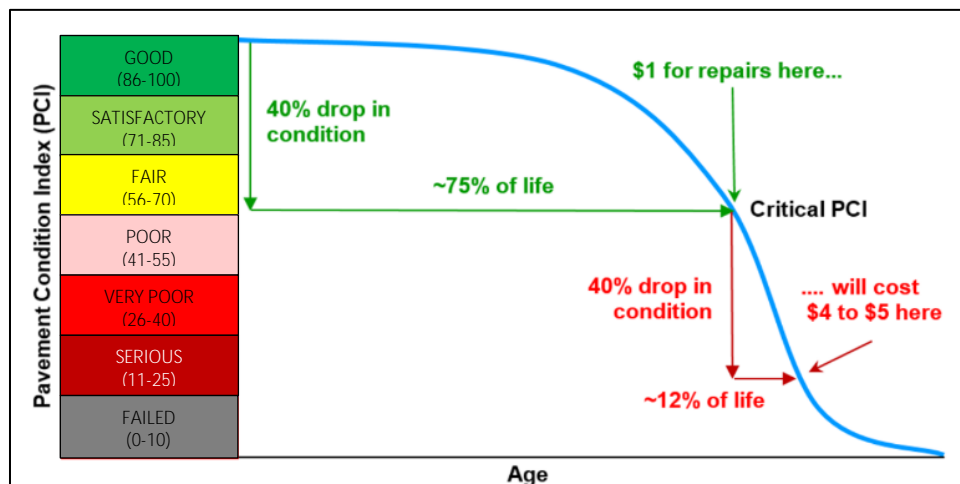
An APMP provides an integrated framework for comprehensive evaluation and decision making for managing airfield pavements. The essential components of an effective APMP provide for an objective evaluation of the condition of existing pavements, identification of short-term and long-range major rehabilitation 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 20-15 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

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

TOI is a General Aviation (GA) airport located approximately 4 miles north west of Troy. The airport was activated in December 1944 and is owned and operated by the City of Troy. Figure 2.1 shows an aerial image of the airport.

Figure 2.1: Troy Municipal Airport.



(Source: Google Earth)

2.2. Pavement Inventory

TOI consists of two runways, parallel taxiways, multiple connector taxiways, a helipad, and an apron. The total pavement area is approximately 3.2 million square feet. All pavements at TOI are Asphalt Concrete (AC) surfaced. A complete listing of the pavement sections is included in Appendix A. Runway 07-25 is 6,197 ft. long and 100 ft. wide. Runway 14-32 is 5,024 ft. long and 100 ft. wide.

A records search was undertaken to identify any preservation or rehabilitation work that has occurred at Troy Municipal Airport since the last APMP update in 2009. The records for the Runway 07-25 extension in 2012 that were provided by ALDOT were reviewed, and the PAVER database was updated with work history information.

2.3. Climatic Conditions

Table 3.1 provides a summary of the climatic data for the geographic region that includes TOI. As the table shows, the pavements at TOI are not exposed to any freeze-thaw cycles. The mean air temperature for January ranges from an average low of 36 degrees °F to an average high of 57 degrees °F. The average annual rainfall at TOI is near 54 inches.

Table 2.1: Average Annual Temperatures and Rainfall for TOI.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Temp (°F)	57	62	69	76	83	88	90	90	86	77	68	60
Low Temp (°F)	36	39	45	51	60	67	71	70	66	54	45	39
Precip. (in)	5.1	4.8	6.6	4.2	3.7	4.8	5.8	3.6	3.5	2.8	4.4	4.4

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

The TOI 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 TOI.

Once branches have been defined, pavement evaluation and analysis techniques require the airfield 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 ($\pm 2,000$).

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

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 TOI.

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 15 branches (facilities) at TOI that include 25 pavement sections and a total area of approximately 3.2 million square feet of paved surfaces, as shown in Table 2.3.

Table 2.3: TOI Pavement Branches.

Branch ID	Branch Name	Branch Use	Area, sf	Number of Sections
A01	Apron 01	APRON	63,985	1
A02	Apron 02	APRON	29,585	1
AHELO01	Helipad 01	HELIPAD	779,916	2
R0725	Runway 07-25	RUNWAY	652,200	3
R1432	Runway 14-32	RUNWAY	491,700	2
TA1	Taxiway A1	TAXIWAY	11,705	1
TA2	Taxiway A2	TAXIWAY	13,825	1
TA3	Taxiway A3	TAXIWAY	15,912	1
TC01	Taxiway Connector 01	TAXIWAY	20,968	1
TC02	Taxiway Connector 02	TAXIWAY	26,871	1
TC04	Taxiway Connector 04	TAXIWAY	9,597	1
THANG01	Taxiway Hangar 01	TAXIWAY	41,800	1
TP01	Taxiway Parallel 01	TAXIWAY	344,801	4
TP02	Taxiway Parallel 02	TAXIWAY	252,193	3
TP03	Taxiway Parallel 03	TAXIWAY	432,444	2
Total			3,187,502	25

Table 2.4 shows the distribution of airfield pavement by age with the area-weighted age being greater than 20 years for all airside pavements at TOI.

Table 2.4: TOI Pavement Age.

Age (Years)	Number of Sections	Percent of Area	Area, sf
0 5	3	20	652,200
6 10	2	3	89,893
11 15	0	0	0
16 20	0	0	0
> 20	20	77	2,445,409

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: TOI Pavement Area by Surface Type.

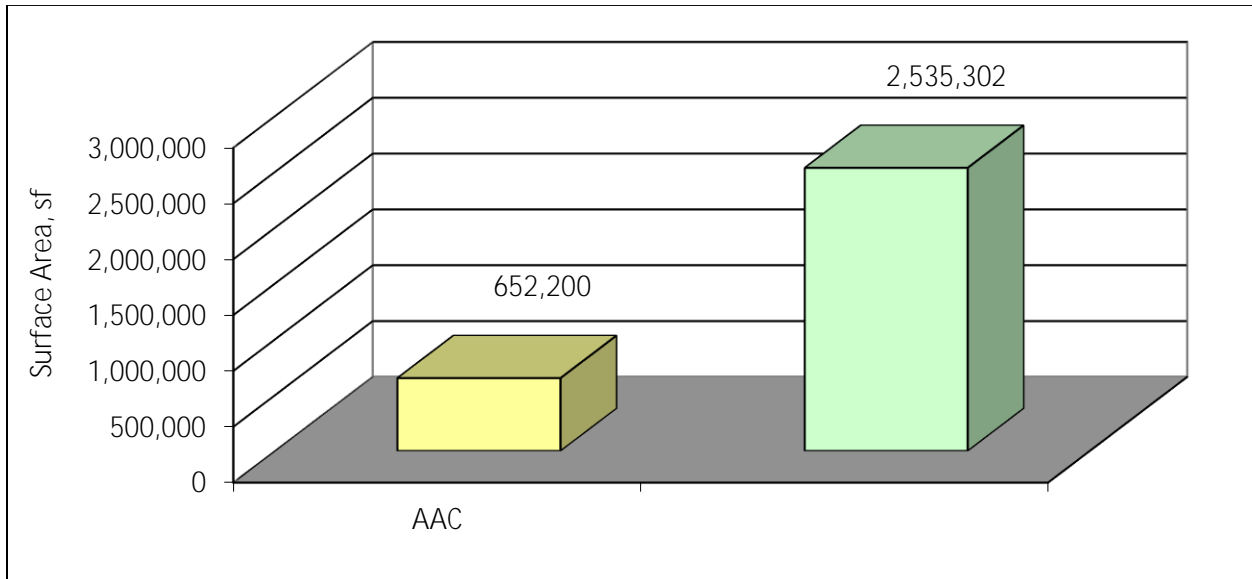
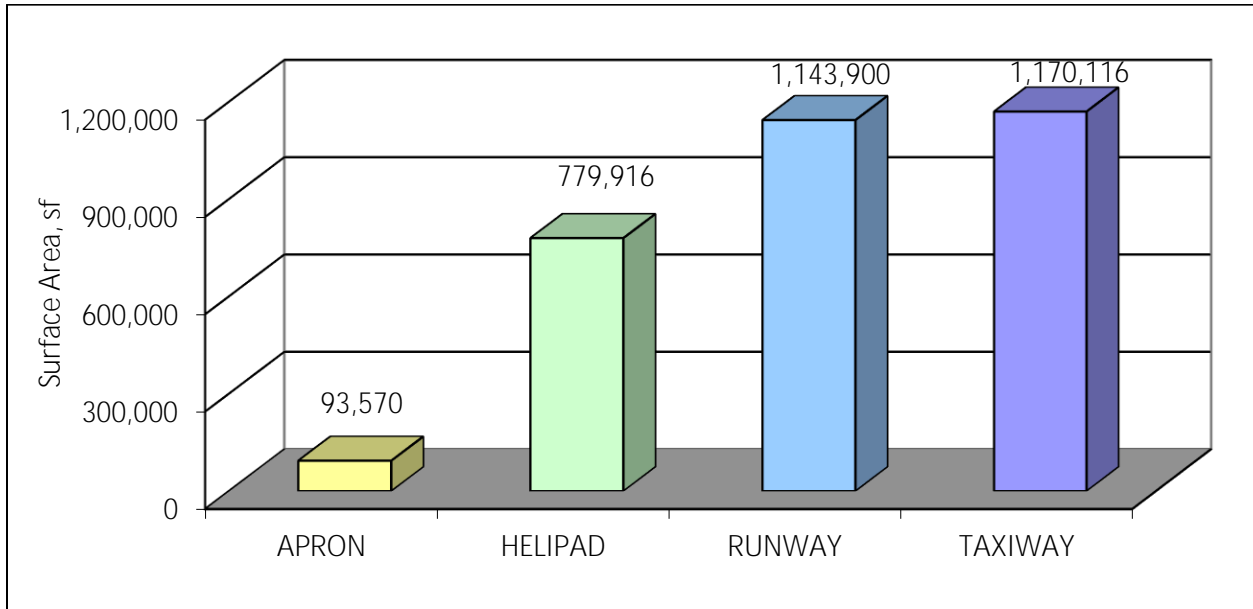


Figure 2.3: TOI Pavement Area by Branch Use.



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

This Page Intentionally Left Blank

3 Pavement Condition

3.1. Introduction

A visual PCI survey of the airside pavements at TOI 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:

- Ø 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.
- Ø 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 overall condition of a pavement section based on the type, severity, and quantity of each distress that is found in an inspected sample unit. 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	[Green]	[Green]	86-100	<u>GOOD</u> : Pavement has minor or no distresses and should require only routine maintenance.
		[Light Green]	71-85	<u>SATISFACTORY</u> : Pavement has scattered low-severity distresses that should require only routine maintenance.
FAIR	[Yellow]	[Yellow]	56-70	<u>FAIR</u> : Pavement has a combination of generally low- and medium-severity distresses. Near-term maintenance and repair needs may range from routine to major.
POOR	[Red]	[Light Pink]	41-55	<u>POOR</u> : 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
		[Red]	26-40	<u>VERY POOR</u> : Pavement has predominantly medium- and high-severity distresses that cause considerable maintenance & operational problems. Near-term M&R needs will be major.
		[Dark Red]	11-25	<u>SERIOUS</u> : Pavement has mainly high-severity distresses that cause operational restrictions; immediate repairs are needed.
		[Grey]	0-10	<u>FAILED</u> : 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:

- Ø 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.
- Ø 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,) -outs, pumping, scaling, shrinkage cracks, and joint and corner spalling.
- Ø Moisture & Drainage related: AC distresses include alligator cracking, depressions, potholes and swelling; PCC distresses include corner breaks, divided slabs and pumping.
- Ø 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.

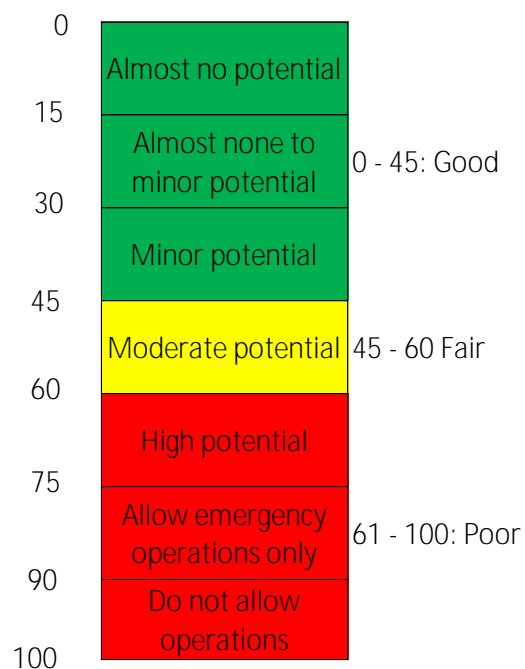
) # h#@7 U e
 U.S. Army Construction Engineering Research Lab (CERL), latest edition. Appendix C provides a detailed explanation of each type of AC and PCC surface distress.

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.



3.5. PCI Survey Results

ALDOT wanted the condition of the helipad to be not included in the overall PCI computations, and it and Runway 14-32 were not considered for the PCIP. The airside pavements at TOI include 20 sections with 391 sample units. The sample number of sample units that were surveyed in the field is 95, which is 24 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.

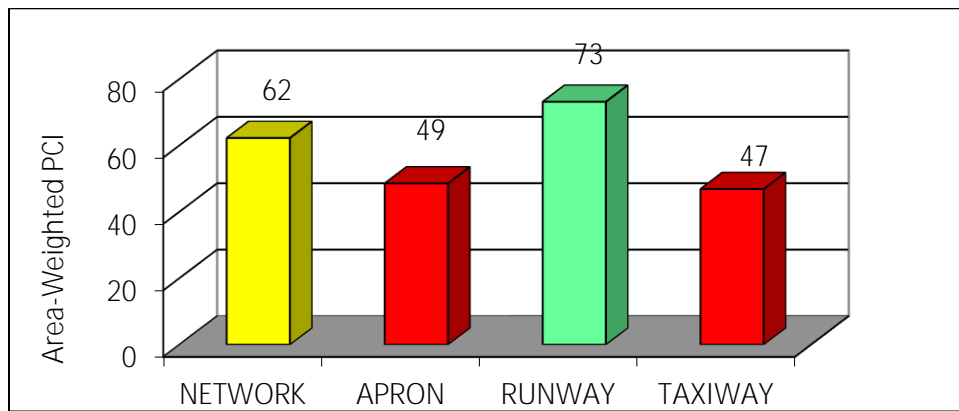


Figure 3.3 shows the distribution of the TOI pavement network by condition. Approximately 62 percent

Figure 3.3: Pavement Condition by Percent of Area.

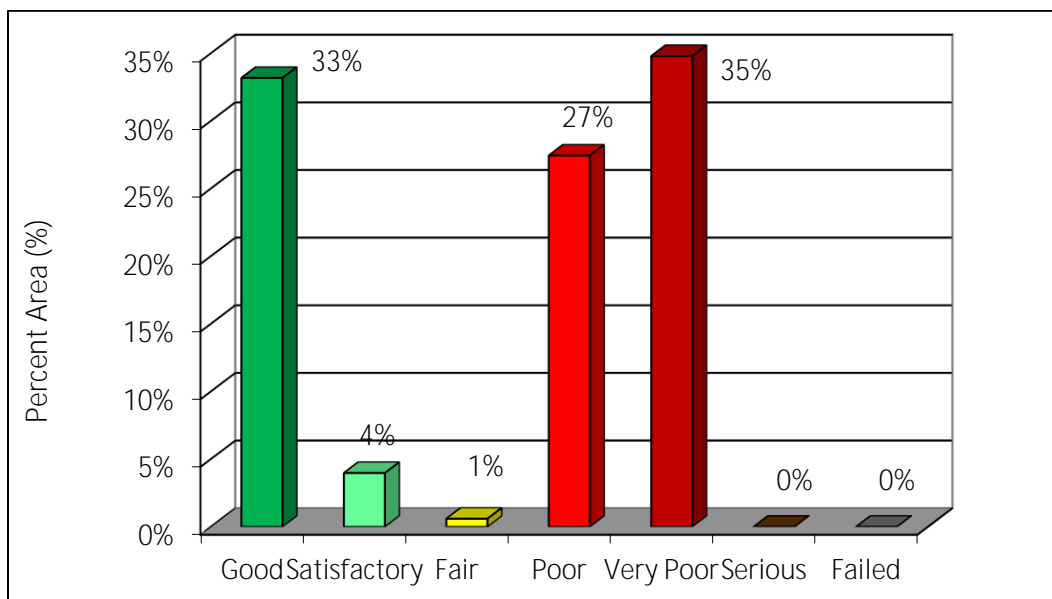


Table 3.2 is a listing of the section PCI.

Table 3.2: Section PCI.

Branch ID	Name	Section ID	Surface	Area, sf	PCI	PCI Category	FOD
A01	Apron 01	01	AC	63,985	53	Poor	60
A02	Apron 02	01	AC	29,585	39	Very Poor	71
R0725	Runway 07-25	01	AC	151,200	100	Good	0
R0725	Runway 07-25	02	AC	468,500	100	Good	0
R0725	Runway 07-25	03	AC	32,500	100	Good	0
R1432	Runway 14-32	01	AC	143,000	39	Very Poor	75
R1432	Runway 14-32	02	AC	348,700	37	Very Poor	77
TA1	Taxiway A1	01	AC	11,705	70	Fair	43
TA2	Taxiway A2	01	AC	13,825	51	Poor	60
TA3	Taxiway A3	01	AC	15,912	44	Poor	70
TC01	Taxiway Connector 01	01	AC	20,968	39	Very Poor	73
TC02	Taxiway Connector 02	01	AC	26,871	42	Poor	72
THANG01	Taxiway Hangar 01	01	AC	41,800	55	Poor	57
TP01	Taxiway Parallel 01	01	AC	78,188	77	Satisfactory	35
TP01	Taxiway Parallel 01	02	AC	165,974	44	Poor	70
TP01	Taxiway Parallel 01	03	AC	37,379	40	Very Poor	74
TP01	Taxiway Parallel 01	04	AC	63,260	42	Poor	72
TP02	Taxiway Parallel 02	01	AC	90,858	38	Very Poor	75
TP02	Taxiway Parallel 02	02	AC	13,469	39	Very Poor	75
TP02	Taxiway Parallel 02	03	AC	147,866	42	Poor	72

Figure B2A and B2B in Appendix B are maps of the section PCI in 7- and 3-scale categories, respectively. Figure 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 h # # h## 7 8 7 h assigned based on the overall pavement condition. Figure 3.4 shows the condition of the PCC aprons at TOI.

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

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.

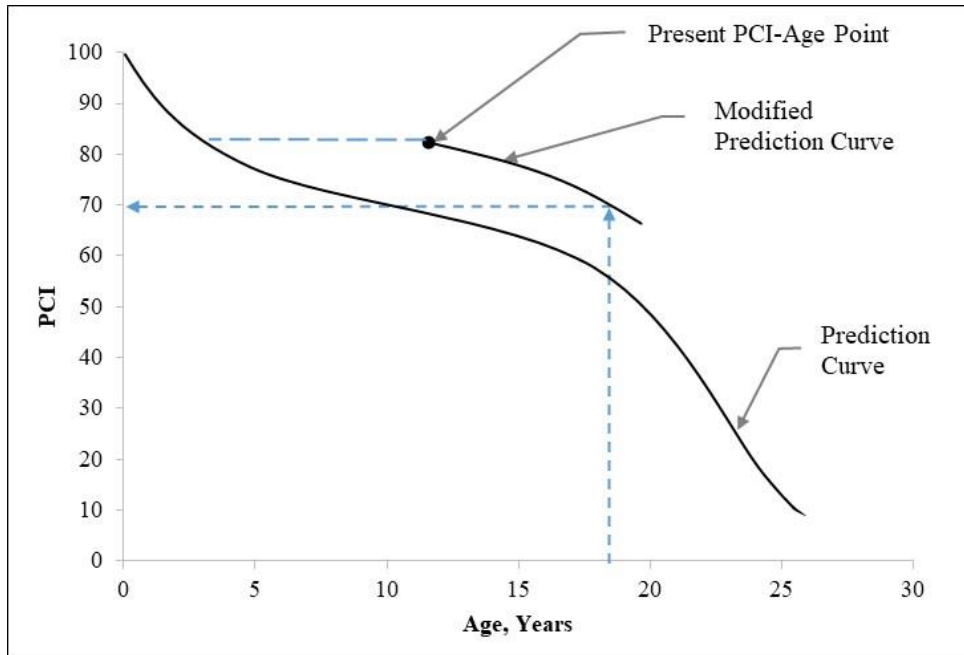
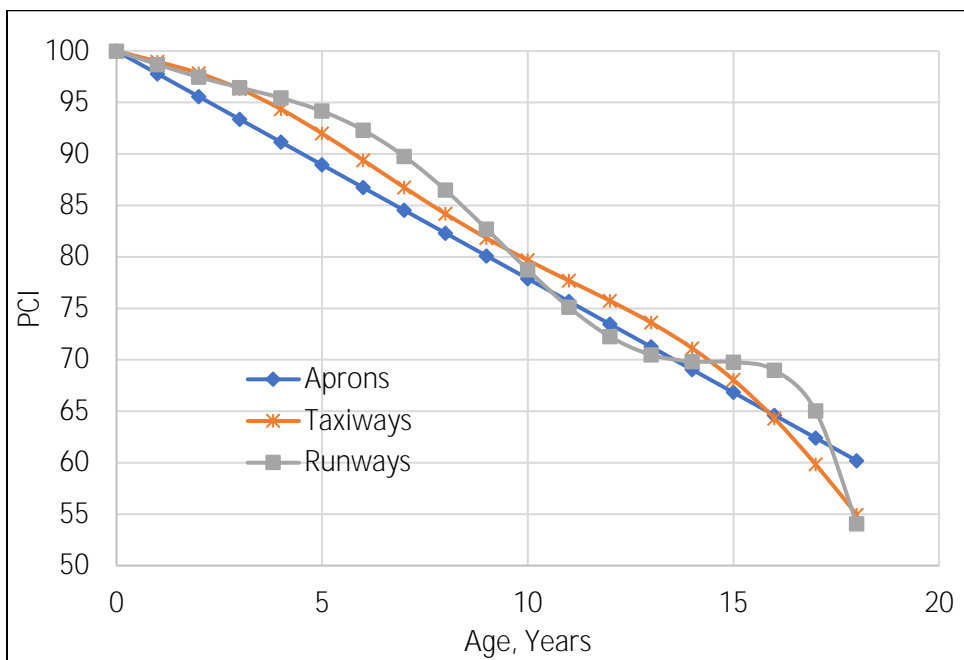


Figure 4.2: Family Curves.



4.3. Critical PCI Values

the PCI value at which the rate of PCI loss increases with time, or the cost of applying localized preventive maintenance increases significantly 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.

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	\$3.91
	55 - CP	Mill 2" & 2" AC OL	\$4.27
	45 - 55	Mill 2" & 2" AC OLP (With Pre-Overlay Repairs)	\$5.37
Reconstruction	0 - 45	AC Reconstruction	\$9.87

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 TOI 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:

- Ø Unlimited Funding: Unlimited funding is available for all pavement needs. The PCI increases to 91 by 2027.
- Ø Maintain PCI: Maintain existing PCI of 78.
- Ø Constrained Funding: This scenario constrains the funding to \$1 million each year (total of \$7 million). The PCI increases to 82 in 2027.
- Ø Do Nothing: Performing no M&R would reduce the network PCI from 78 to 63 by 2027.

Figure 4.3: Budget Analysis Process.

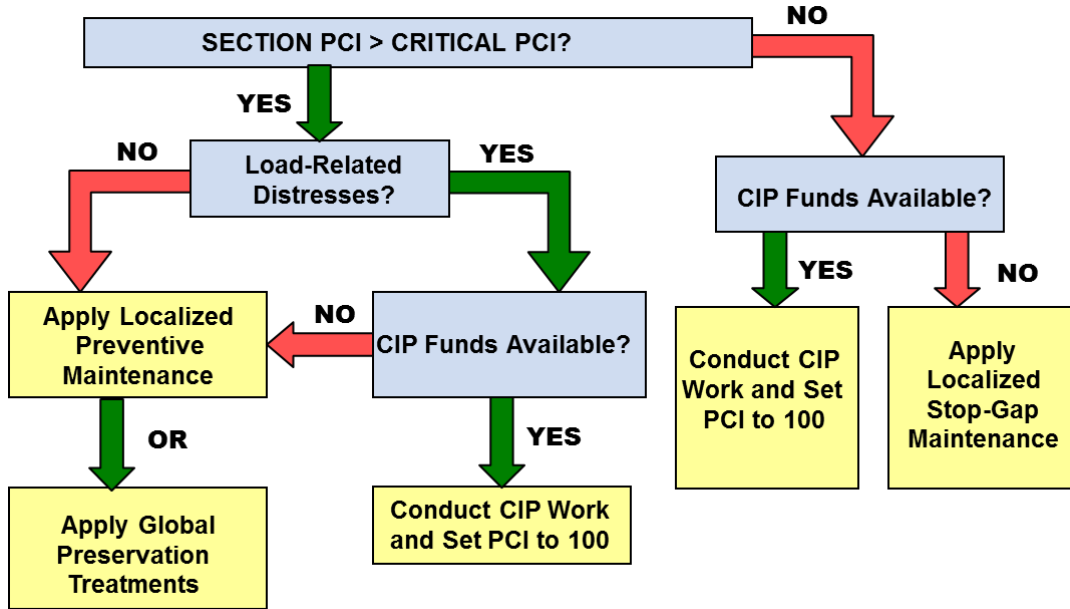


Figure 4.4: M&R Funding Levels.

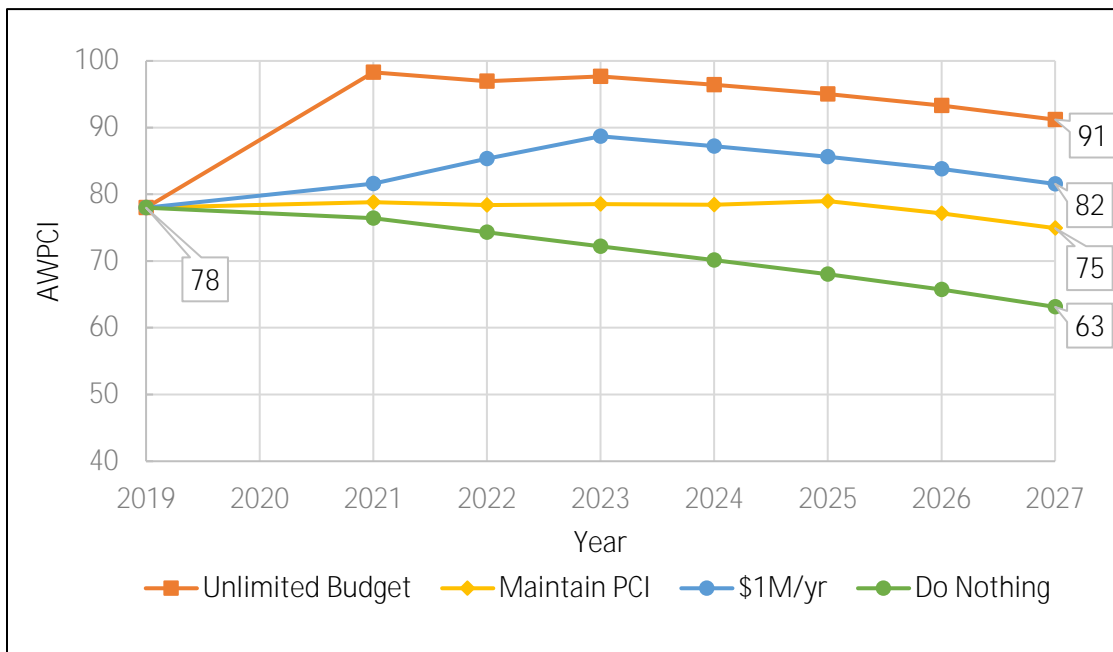


Table 4.2 summarizes the annual funding required for the above analyses. For the unlimited analysis, all pavement needs are funded in the year they are required. Therefore, the unfunded costs are zero. The total funded amount over the 7-year period is approximately \$4.2 million. For the annual funding 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

The 2027 for this funding level is approximately \$2 million.

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

Year	Unlimited	Maintain PCI	Constrained \$1M/year	Do Nothing
2021	\$3,795,000	\$442,000	\$951,000	\$0
2022	\$4,000	\$316,000	\$994,000	\$0
2023	\$357,000	\$410,000	\$884,000	\$0
2024	\$5,000	\$352,000	\$43,000	\$0
2025	\$7,000	\$531,000	\$48,000	\$0
2026	\$9,000	\$76,000	\$54,000	\$0
2027	\$13,000	\$99,000	\$68,000	\$0
Total	\$4,189,000	\$2,225,000	\$3,041,000	\$0
2027 Backlog	-	\$3,456,000	\$1,956,000	\$5,815,000

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 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 \$5.2 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 TOI.

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
2022	TOI_22-01_Apron 01 Rehabilitation	\$602,254	105,785	46	100
2023	TOI_23-01_Taxiway Parallel 01 Rehabilitation	\$3,838,675	413,114	38	100
2024	TOI_24-01_Runway 07-25 Surface Treatment	\$415,081	652,200	96	98
2025	TOI_25-01_Apron 01 Surface Treatment	\$41,944	63,985	93	98
2026	TOI_26-01_Taxiway Parallel 01 Surface Treatment	\$278,930	413,114	96	99
Total		\$5,176,884			

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

Branch	Section	Area, sf	PCI Before Rehab	Activity	Activity Type	Cost
TOI_22-01_Apron 01 Rehabilitation						\$602,254
A01	01	63,985	48	Mill 2" & 2" AC OLP	Rehabilitation	\$364,279
THANG01	01	41,800	46	Mill 2" & 2" AC OLP	Rehabilitation	\$237,975
TOI_23-01_Taxiway Parallel 01 Rehabilitation						\$3,838,675
TA1	01	11,705	57	Mill 2" & 2" AC OL	Rehabilitation	\$54,597
TA2	01	13,825	41	Mill 2" & 2" AC OLP	Rehabilitation	\$81,070
TA3	01	15,912	33	AC Reconstruction	Reconstruction	\$171,687
TC02	01	26,871	31	AC Reconstruction	Reconstruction	\$289,931
TP01	01	78,188	70	Mill 2" & 2" AC OL	Rehabilitation	\$364,702
TP01	02	165,974	33	AC Reconstruction	Reconstruction	\$1,790,818
TP01	03	37,379	29	AC Reconstruction	Reconstruction	\$403,310
TP01	04	63,260	31	AC Reconstruction	Reconstruction	\$682,560
TOI_24-01_Runway 07-25 Surface Treatment						\$415,081
R0725	01	151,200	-	Surface Treatment	Preservation	\$96,228
R0725	02	468,500	-	Surface Treatment	Preservation	\$298,168
R0725	03	32,500	-	Surface Treatment	Preservation	\$20,684
TOI_25-01_Apron 01 Surface Treatment						\$41,944
A01	01	63,985	-	Surface Treatment	Preservation	\$41,944
TOI_26-01_Taxiway Parallel 01 Surface Treatment						\$278,930
TA1	01	11,705	-	Surface Treatment	Preservation	\$7,903
TA2	01	13,825	-	Surface Treatment	Preservation	\$9,335
TA3	01	15,912	-	Surface Treatment	Preservation	\$10,744
TC02	01	26,871	-	Surface Treatment	Preservation	\$18,143
TP01	01	78,188	-	Surface Treatment	Preservation	\$52,792
TP01	02	165,974	-	Surface Treatment	Preservation	\$112,064
TP01	03	37,379	-	Surface Treatment	Preservation	\$25,238
TP01	04	63,260	-	Surface Treatment	Preservation	\$42,713
Total						\$5,176,884

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 \$5.2 million for TOI:

- Ø FAA (90%): \$4.6 million
- Ø ALDOT (5%): \$0.3 million
- Ø Airport Sponsor (5%): \$0.3 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 \$4,028. 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 TOI pavements.

Table 4.5: Summary of Year-1 Maintenance Plan.

Policy	Work Description	Work Quantity	Work Unit	Work Cost
Preventive	Crack Sealing - AC	1,020	Ft	\$4,028
			Total	\$4,028

APPENDIX A
INVENTORY



Appendix A
Pavement Inventory Report
Troy Municipal Airport At N Kenneth Campbell Field (TOI)

Branch ID	Name	Branch Use	Section ID	Rank ¹	Length (ft)	Width (ft)	Area (sf)	LCD ²	Surface ³
A01	Apron 01 Troy	APRON	01	S	315	150	63,985	1/1/1944	AC
A02	Apron 02 Troy	APRON	01	S	140	140	29,585	1/1/1944	AC
AHELO01	Helipad 01 Troy	HELIPAD	01	S	2,670	150	389,958	1/1/1944	AC
AHELO01	Helipad 01 Troy	HELIPAD	02	S	2,670	150	389,958	1/1/1944	AC
R0725	Runway 07-25 Troy	RUNWAY	01	P	1,512	100	151,200	3/1/2021	AAC
R0725	Runway 07-25 Troy	RUNWAY	02	P	4,685	100	468,500	3/1/2021	AAC
R0725	Runway 07-25 Troy	RUNWAY	03	P	325	100	32,500	3/1/2021	AAC
R1432	Runway 14-32 Troy	RUNWAY	01	P	1,430	100	143,000	1/1/1944	AC
R1432	Runway 14-32 Troy	RUNWAY	02	P	3,487	100	348,700	1/1/1944	AC
TA1	Taxiway A1 Troy	TAXIWAY	01	S	200	50	11,705	1/1/2012	AC
TA2	Taxiway A2 Troy	TAXIWAY	01	S	225	50	13,825	1/1/1944	AC
TA3	Taxiway A3 Troy	TAXIWAY	01	S	225	50	15,912	1/1/1944	AC
TC01	Taxiway Connector 01 Troy	TAXIWAY	01	S	360	50	20,968	1/1/1944	AC
TC02	Taxiway Connector 02 Troy	TAXIWAY	01	S	393	50	26,871	1/1/1944	AC
TC04	Taxiway Connector 04 Troy	TAXIWAY	01	S	200	35	9,597	1/1/1944	AC
THANG01	Taxiway Hangar 01 Troy	TAXIWAY	01	T	780	50	41,800	1/1/1944	AC
TP01	Taxiway Parallel 01 Troy	TAXIWAY	01	P	1,527	50	78,188	1/1/2012	AC
TP01	Taxiway Parallel 01 Troy	TAXIWAY	02	P	3,289	50	165,974	1/1/1944	AC
TP01	Taxiway Parallel 01 Troy	TAXIWAY	03	P	635	50	37,379	1/1/1944	AC
TP01	Taxiway Parallel 01 Troy	TAXIWAY	04	P	1,223	50	63,260	1/1/1944	AC
TP02	Taxiway Parallel 02 Troy	TAXIWAY	01	P	1,715	50	90,858	1/1/1944	AC
TP02	Taxiway Parallel 02 Troy	TAXIWAY	02	P	250	50	13,469	4/14/1997	AC
TP02	Taxiway Parallel 02 Troy	TAXIWAY	03	P	2,895	50	147,866	1/1/1944	AC
TP03	Taxiway Parallel 03 Troy	TAXIWAY	01	P	4,420	50	216,222	1/1/1944	AC
TP03	Taxiway Parallel 03 Troy	TAXIWAY	02	P	4,420	50	216,222	1/1/1944	AC

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 = Asphalt 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 Troy
-  Apron 02 Troy
-  Runway 07-25 Troy
-  Runway 14-32 Troy
-  Taxiway A1 Troy
-  Taxiway A2 Troy
-  Taxiway A3 Troy
-  Taxiway Connector 01 Troy
-  Taxiway Connector 02 Troy
-  Taxiway Hangar 01 Troy
-  Taxiway Parallel 01 Troy
-  Taxiway Parallel 02 Troy

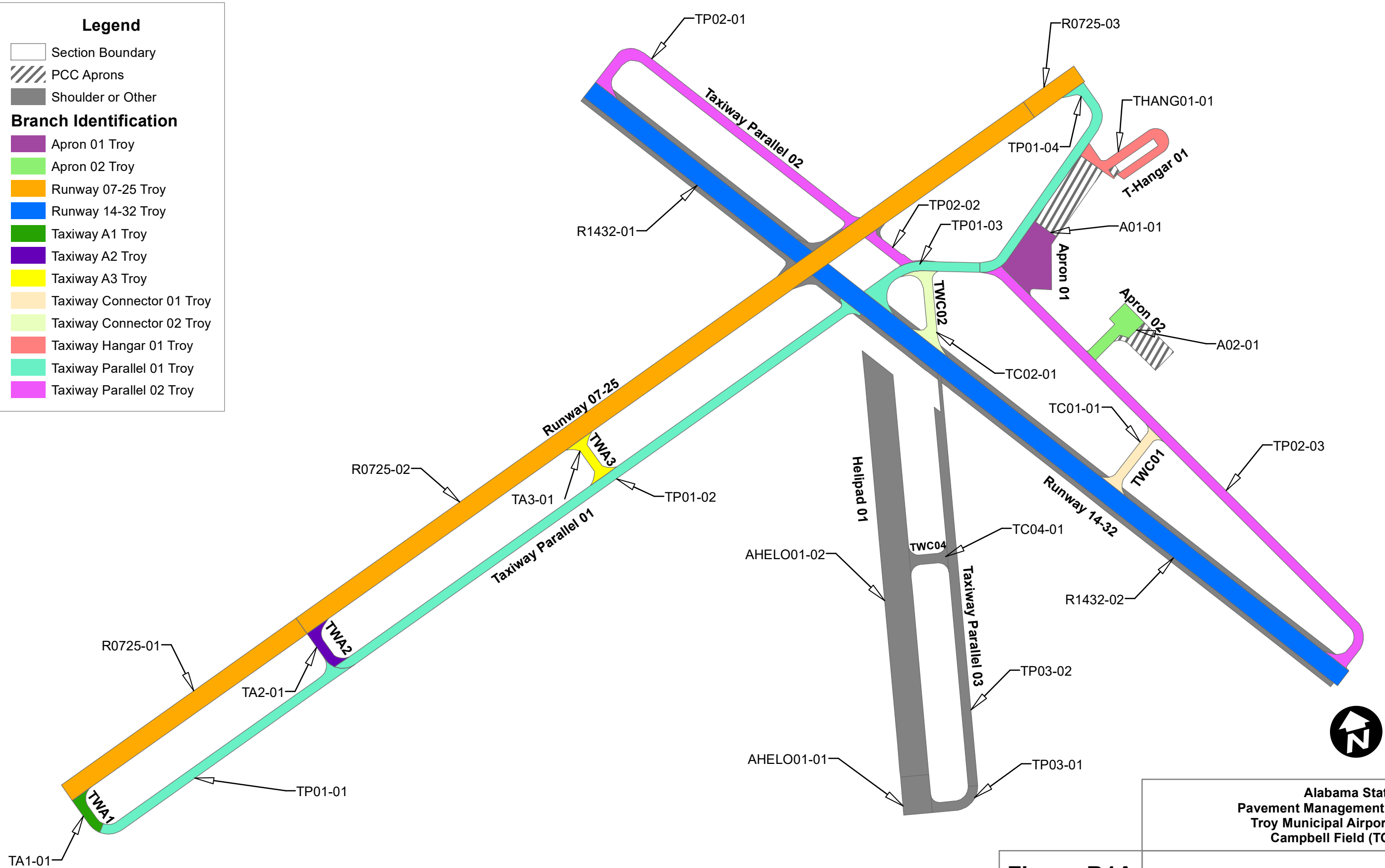


Figure B1A

Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
Branch Identification		
ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 1
REVISED JMA	SCALE 1 in = 500 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

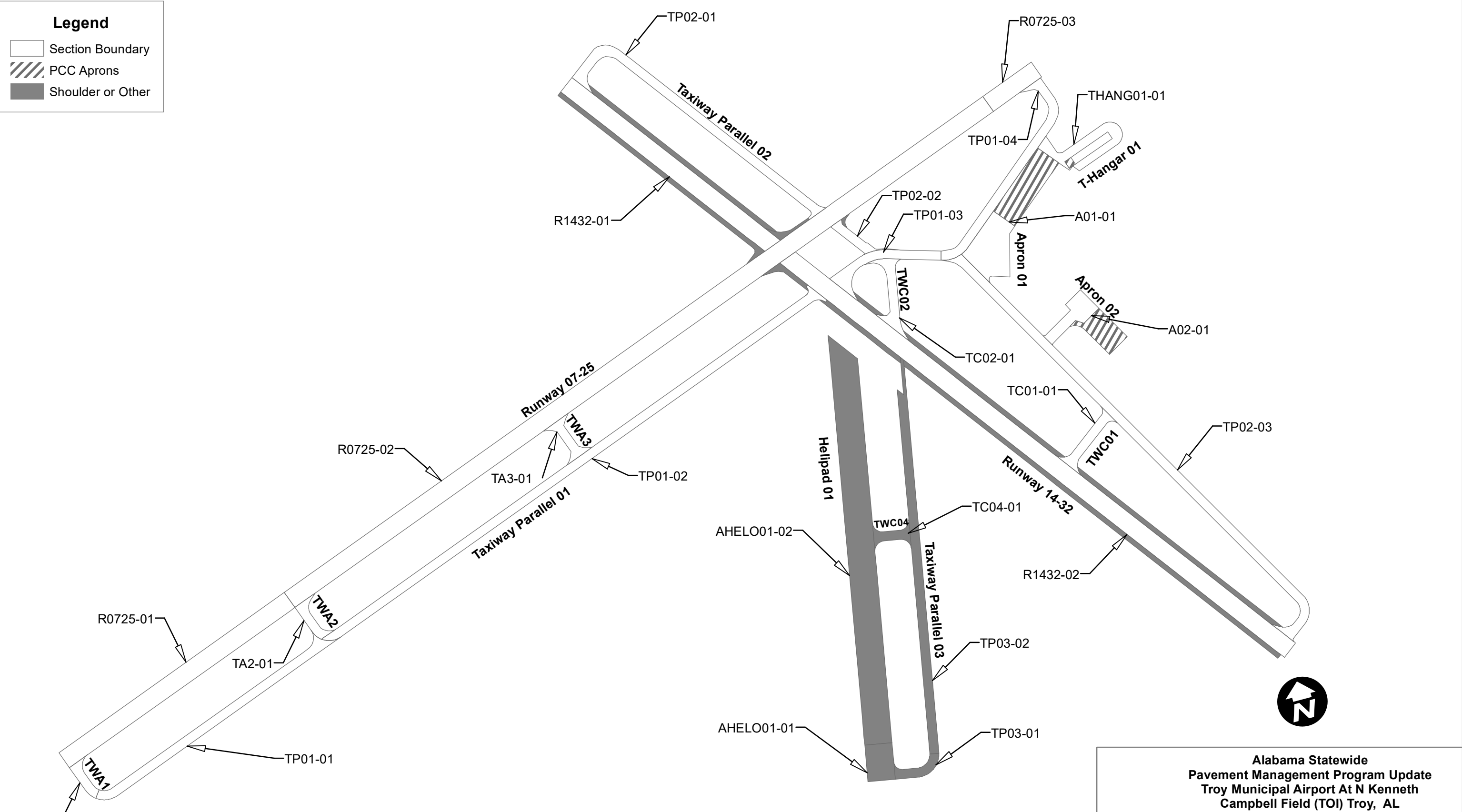





Figure B1B



Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
Section Identification		
ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 2
REVISED JMA	SCALE 1 in = 500 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

Sample Unit Layout

-  SU Boundary
-  Inspected

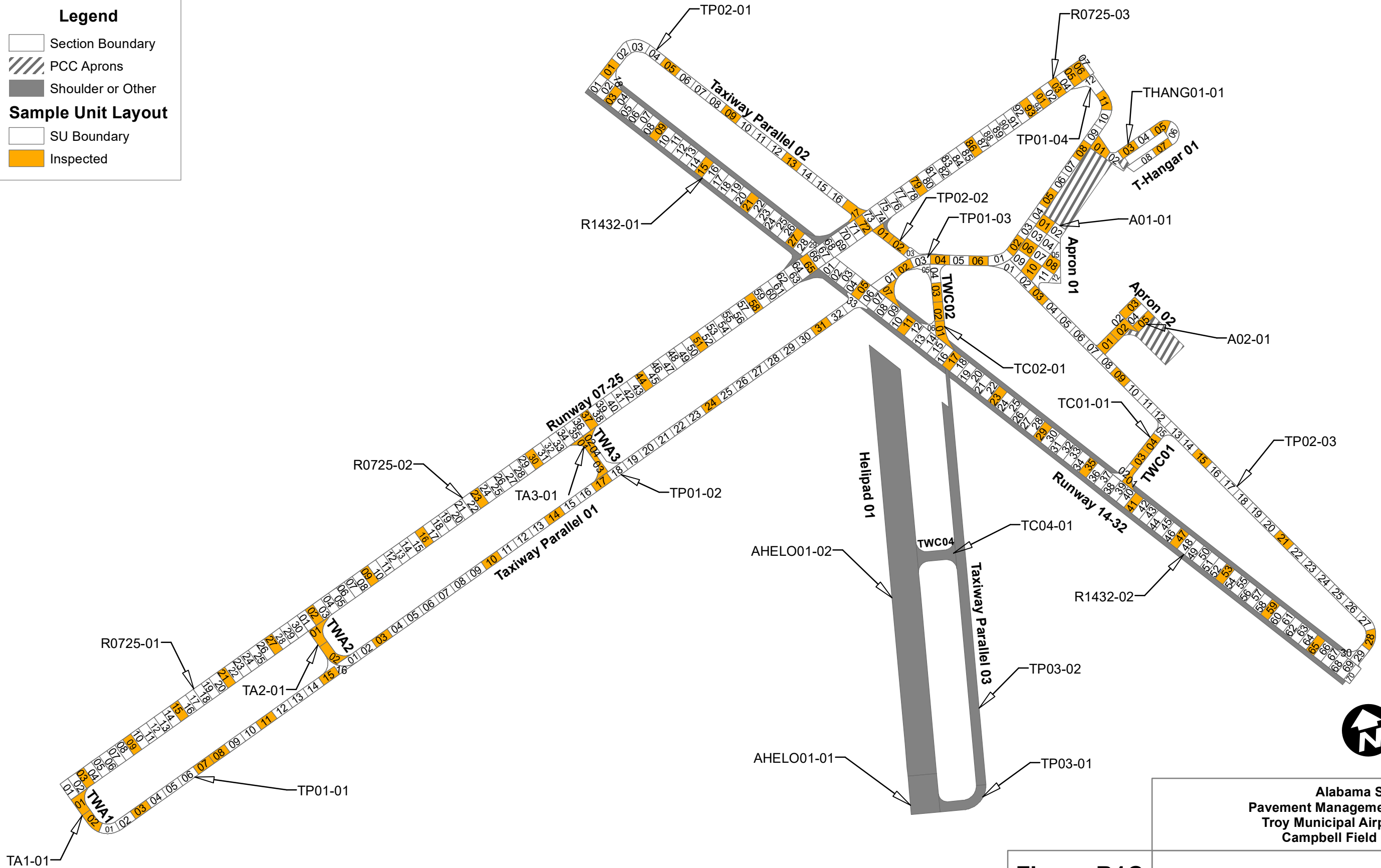





Figure B1C

**Alabama Statewide
Pavement Management Program Update
Troy Municipal Airport At N Kenneth
Campbell Field (TOI) Troy, AL**



Sample Unit Layout

<p>All About Pavements, Inc. (API) <small>www.allaboutpavements.com Telephone: 217-586-2765 FAX: 217-586-1967</small></p>	ENGINEER KP/MR	DATE May 2021	MAP NUMBER Page 3
	REVISED JMA	SCALE 1 in = 500 ft	FINAL

Legend

-  Section Boundary
-  PCC Aprons
-  Shoulder or Other

Pavement Type

-  Asphalt Concrete (AC)
-  Asphalt Overlay Over AC (AAC)

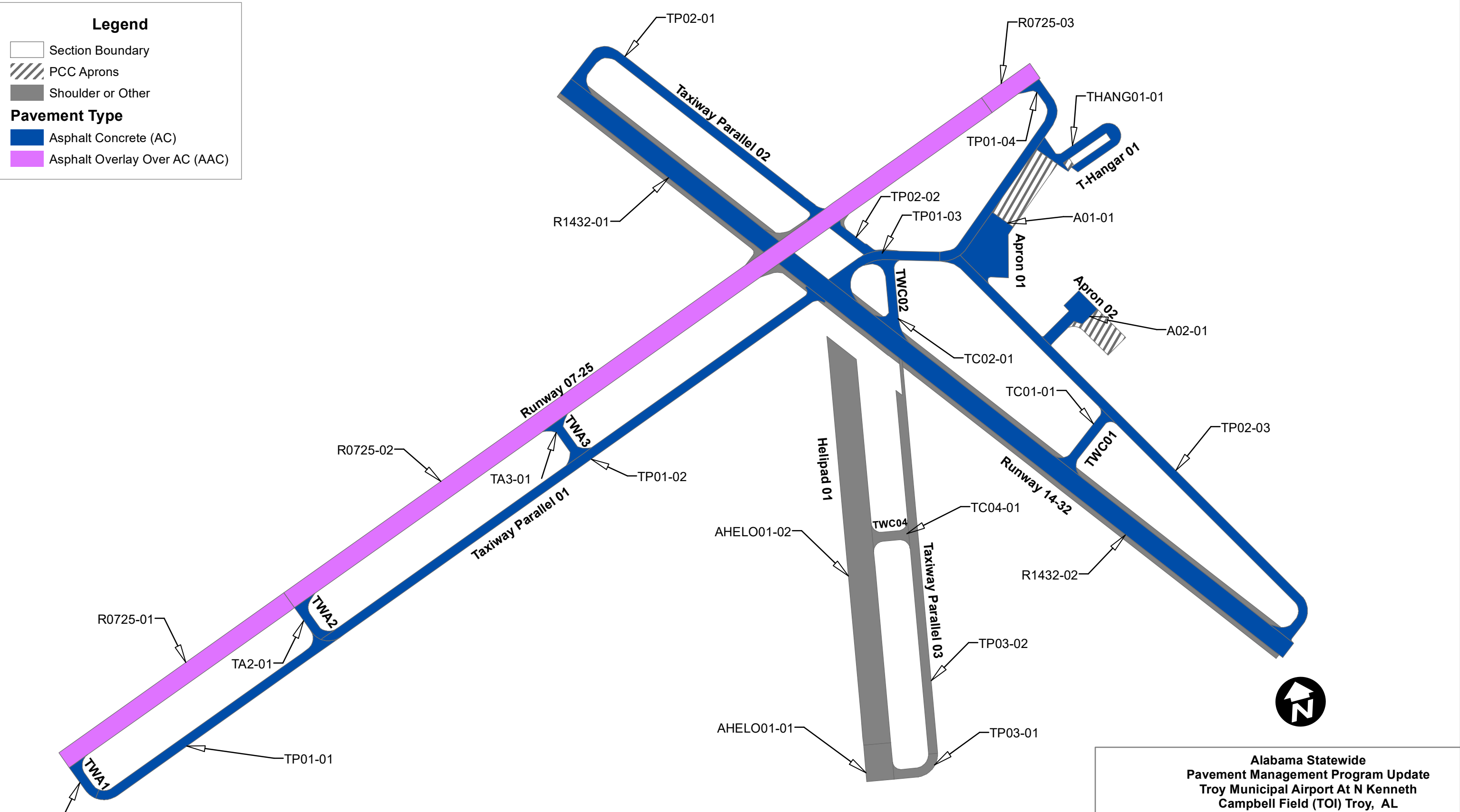





Figure B1D




Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
Pavement Type		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 4
REVISED JMA	SCALE 1 in = 500 ft	FINAL

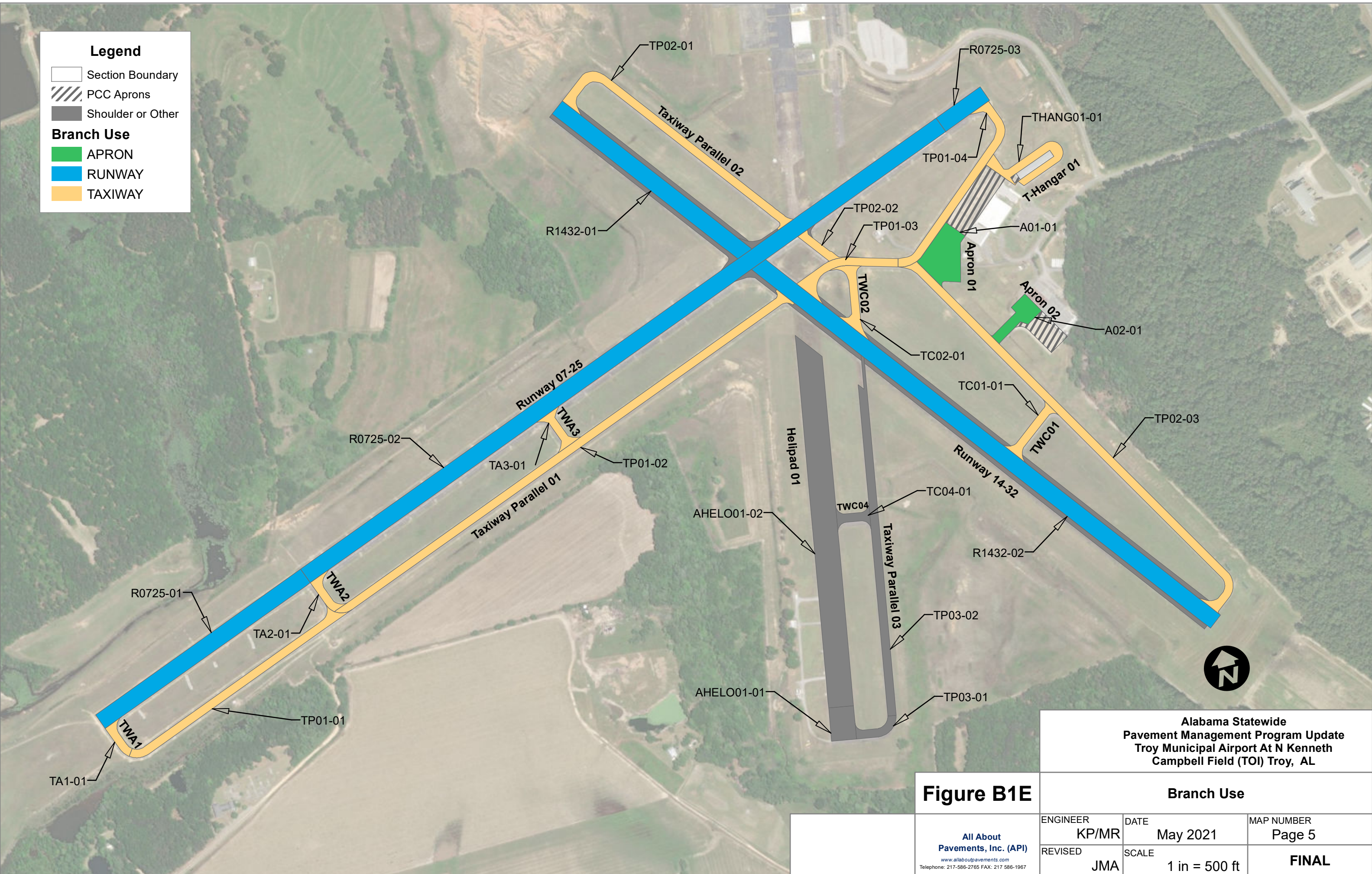
**All About
Pavements, Inc. (API)**
www.allaboutpavements.com
Telephone: 217-586-2765 FAX: 217-586-1967

Legend

-  Section Boundary
-  PCC Aprons
-  Shoulder or Other

Branch Use

-  APRON
-  RUNWAY
-  TAXIWAY






**Alabama Statewide
Pavement Management Program Update
Troy Municipal Airport At N Kenneth
Campbell Field (TOI) Troy, AL**

Figure B1E








Branch Use		
ENGINEER	DATE	MAP NUMBER
KP/MR	May 2021	Page 5
REVISED	SCALE	FINAL
JMA	1 in = 500 ft	

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

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)

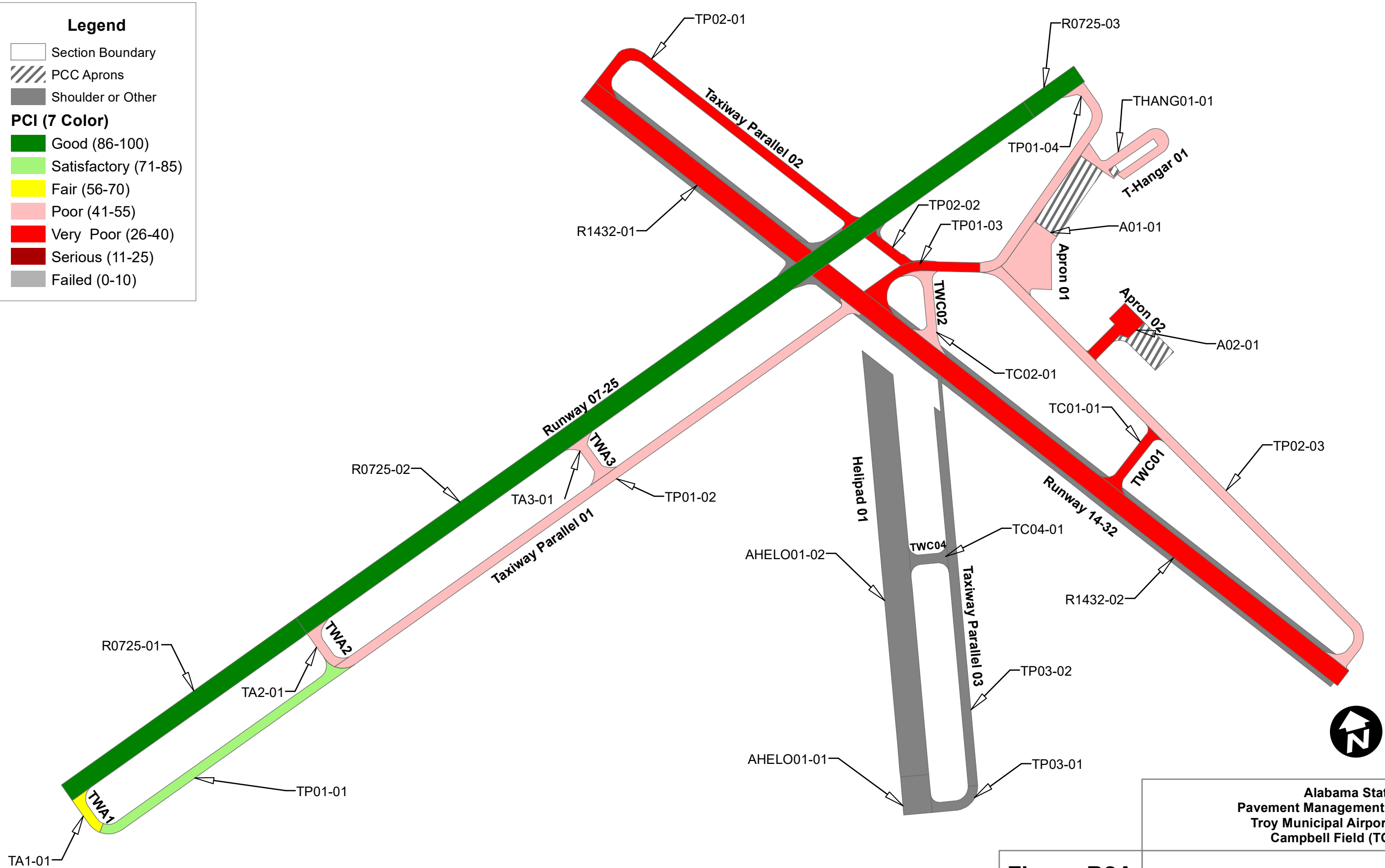





Figure B2A




Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
7-Color PCI		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 7
REVISOR JMA	SCALE 1 in = 500 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

PCI (3 Color)

-  Good (71-100)
-  Fair (56-70)
-  Poor (0-55)

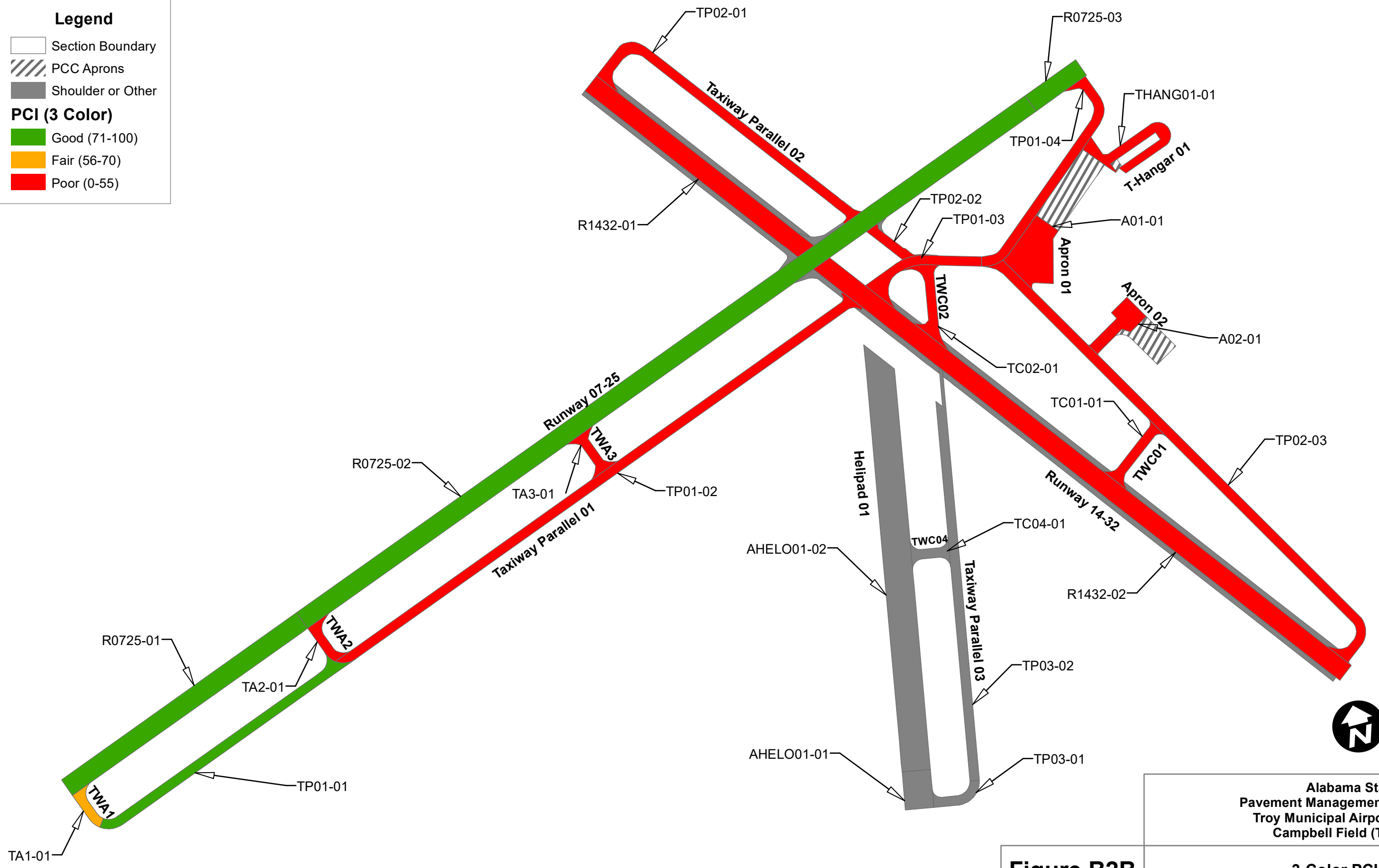





Figure B2B




Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
3-Color PCI		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 8
REVISED JMA	SCALE 1 in = 500 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

FOD Rating

-  Good (0 - 45)
-  Fair (46 - 60)
-  Poor (61 - 100)

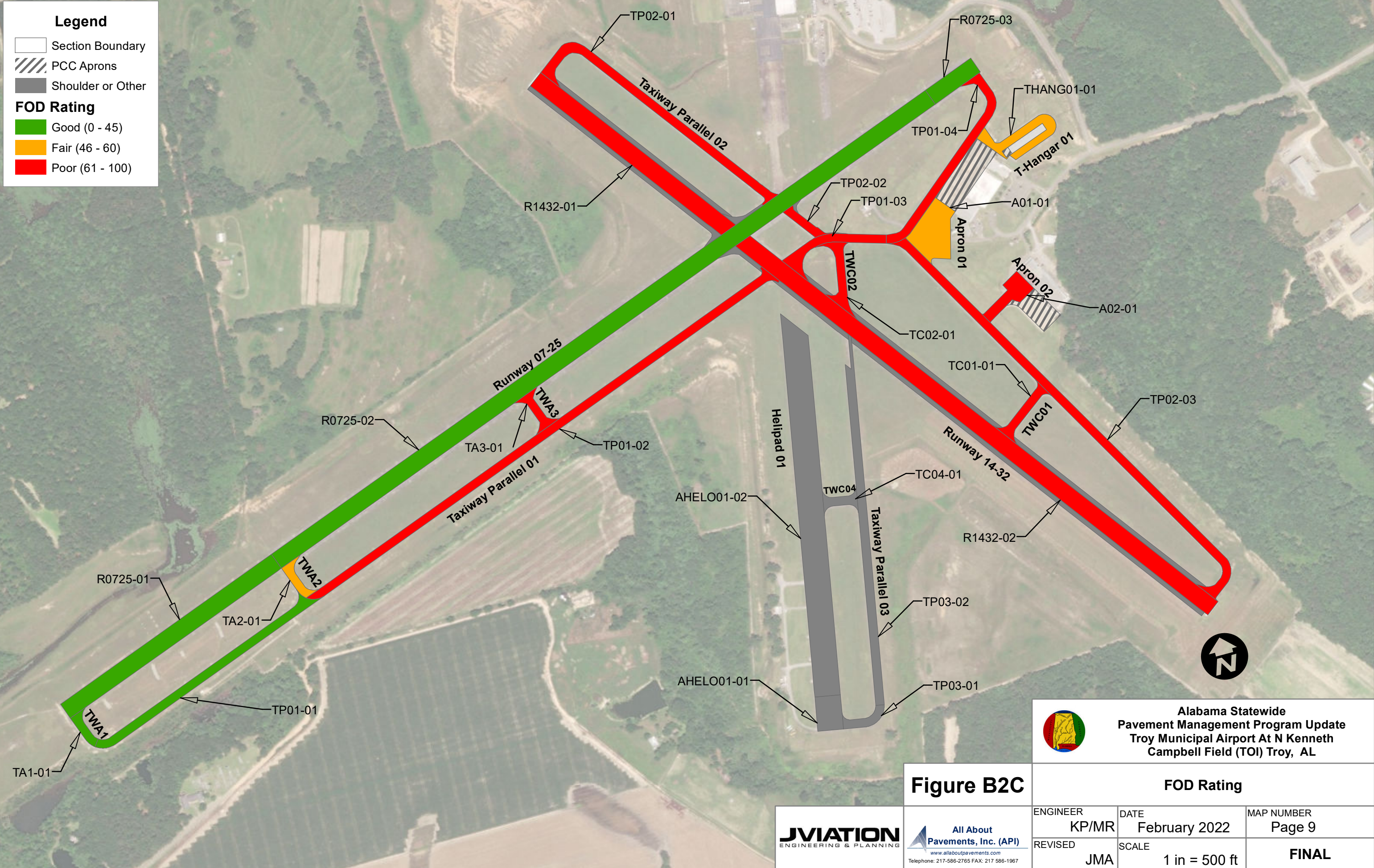


Figure B2C




 **Alabama Statewide
Pavement Management Program Update
Troy Municipal Airport At N Kenneth
Campbell Field (TOI) Troy, AL**

FOD Rating		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 9
REVISED JMA	SCALE 1 in = 500 ft	FINAL








JVIATION
ENGINEERING & PLANNING

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

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)

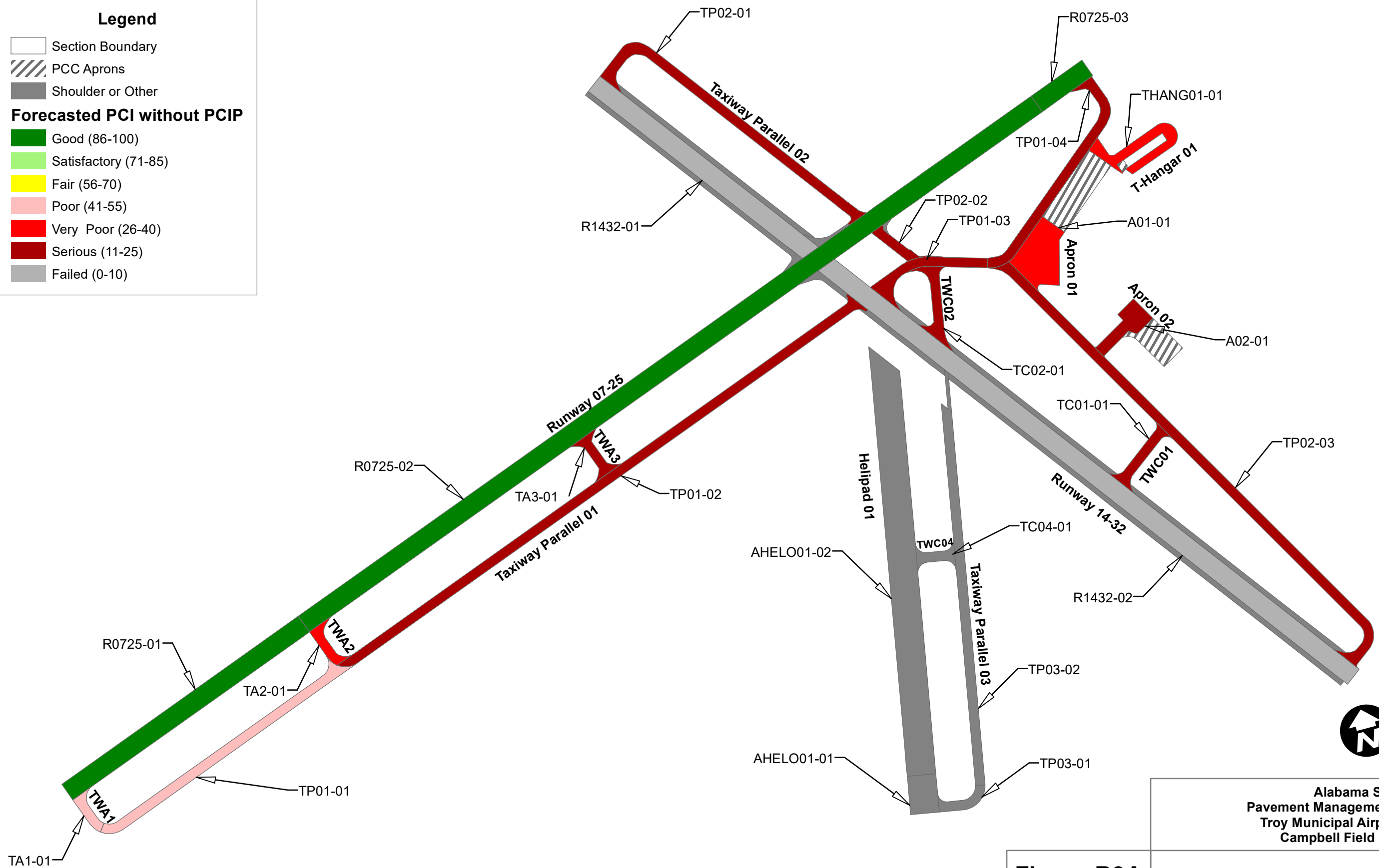





Figure B3A

Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
2027 Forecasted PCI without PCIP		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 11
REVISED JMA	SCALE 1 in = 500 ft	FINAL




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

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

-  No Activity
-  Reconstruction
-  Rehabilitation

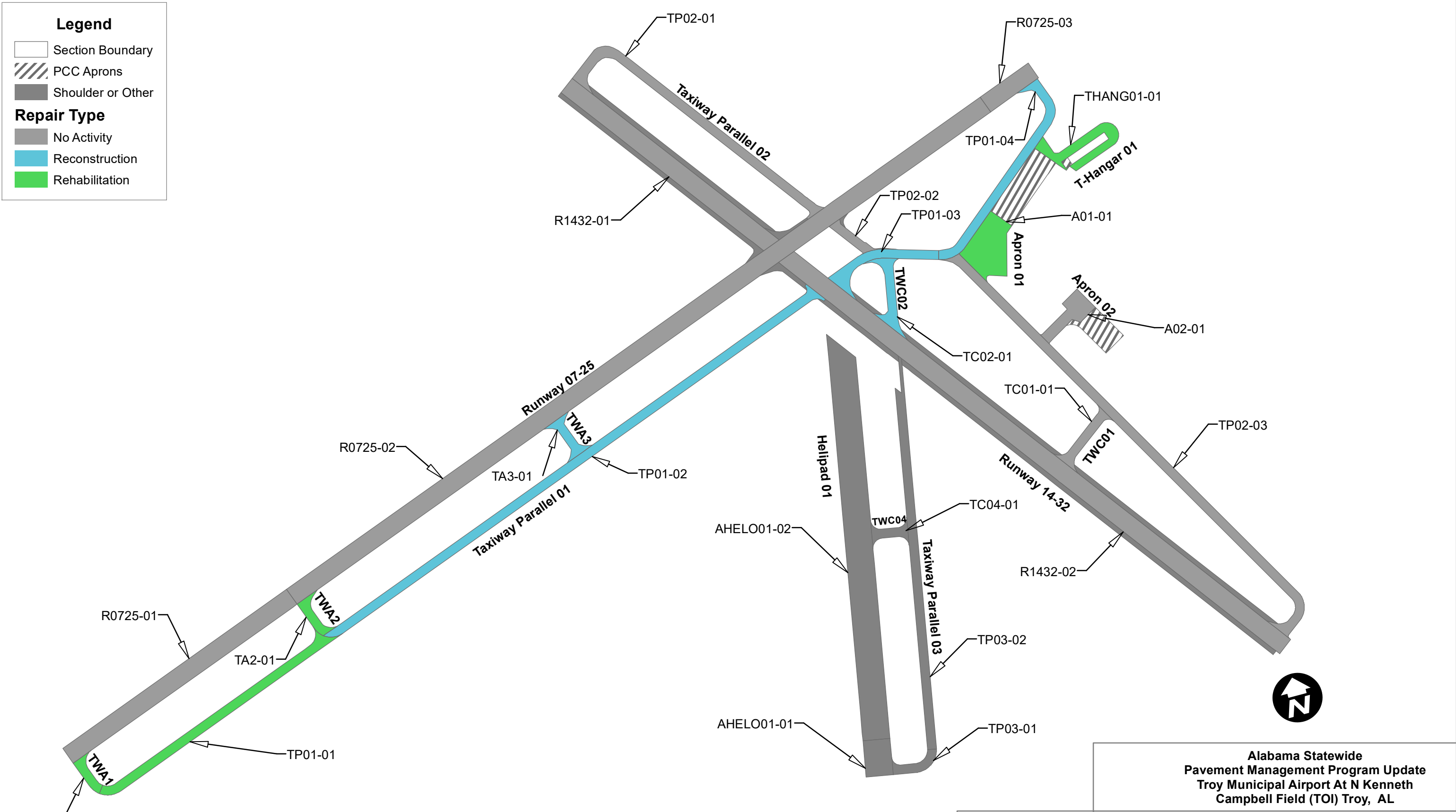


Figure B3B

Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
Repair Type		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 12
REVISED JMA	SCALE 1 in = 500 ft	FINAL

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

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

- TOI_22-01_Apron 01 Rehabilitation
- TOI_23-01_Taxiway Parallel 01 Rehabilitation
- No Project

M&R Activity

- AC Reconstruction
- Mill 2" & 2" AC OL
- Mill 2" & 2" AC OLP
- No Activity

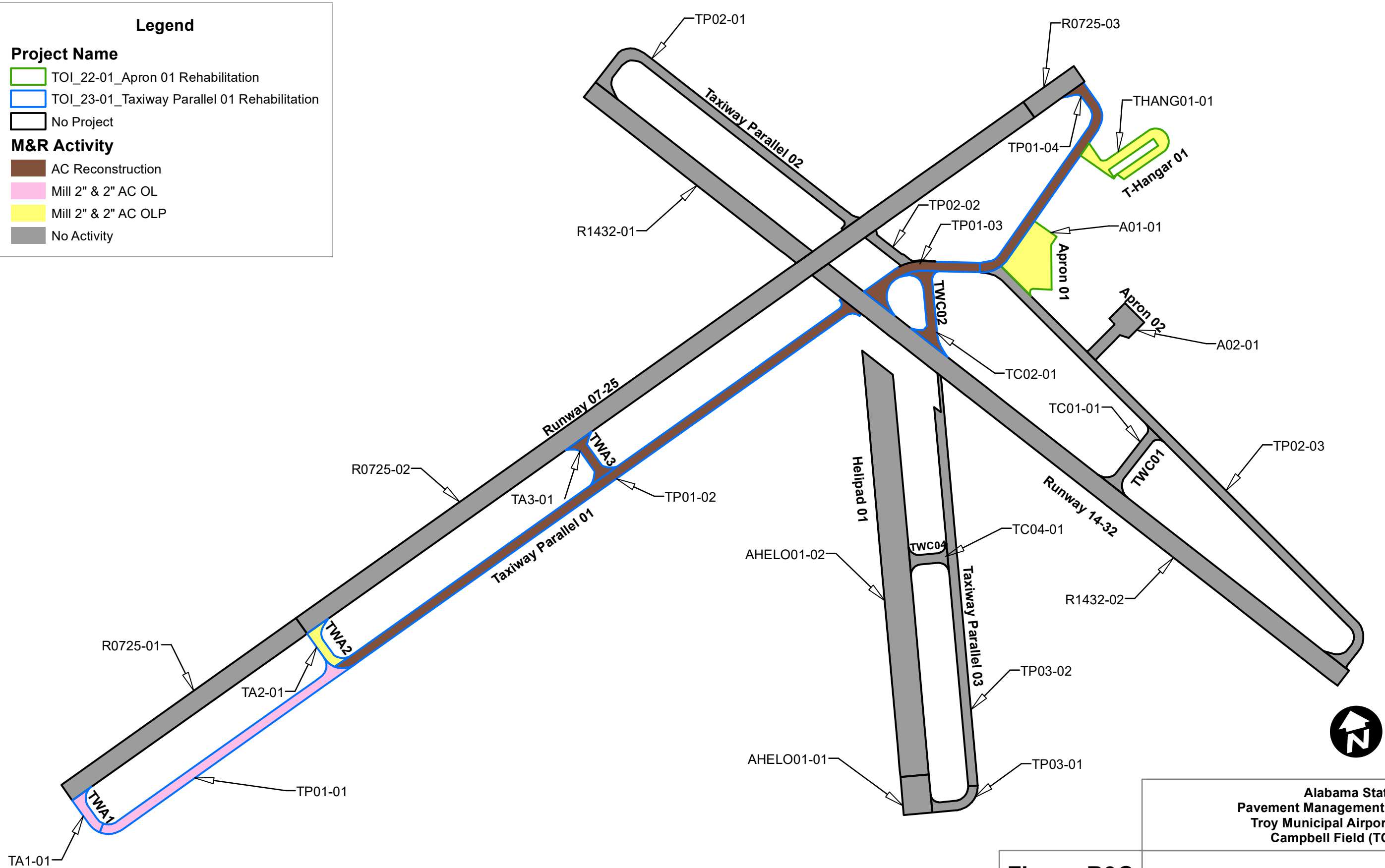


Figure B3C

Alabama Statewide Pavement Management Program Update Troy Municipal Airport At N Kenneth Campbell Field (TOI) Troy, AL		
PCIP Recommendations		
ENGINEER KP/MR	DATE February 2022	MAP NUMBER Page 13
REVISED JMA	SCALE 1 in = 500 ft	FINAL

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

APPENDIX C

OVERVIEW OF PAVEMENT DISTRESSES



% 5~|| Ucf7fUWb| f57L

5~|| UcfVWWh| lgUgfygcZfHfVbNWh| VWGwUgXVnZU|| iYZ|ifYcZhY
UgUHUWUfYg fZWk\YfYhgYgfygUxgU|b|g\|| \Ygi bWk\Y~cUg'HY
VWgdfcd|UfYc hYg fZW|b||UnlgUgfygcZdfUYVWg'5ZfYfYUfX
HZZWcU|h hYVWgWbWZfa| |'aUngXWg UfU| 'Xc|WghUfY Ycd
UdUmbfng|V| |WVWbk|YcfhYg |bcZbU|| Ucf"HYd|WgUfY YghU&
ZYhd| 'dbhYcd| YgY' 5~|| UcfVWWh| 'cWfGdbn|bUfYghUfYg VVWk'
fYUfXUfZ|WcU| |zg WUgk\Y' dHgZbX|gWghXVXUa UcfGf VUfU Xgfyg'

Gj YfHng

- ◆ @k! aUWi dcZbz\Uf' | YVWgfi b| | 'dfUYlc XWchYk|h bby
cfdbnUzk |HfVbNWh| VWG'HYVWgUfYbdcgUYX'
- ◆ A Y|a !: ifhYXj Ycda YfZ|| \HU|| UcfVWWh| |bc UdUmbcf
b|kcf 'cZVWghUa UfY|| \hngUYXA Y|a!gj Y|U|| UcfVWWh| '
|gX|bXVnUkY!X|bXUfbcZfHfVbNWh| VWGk\YfU' dWg
UfYgUfYm YX|bdUW|ccXU| |f|Uf|bf cWVWkYb|Wg/
- ◆ <|| \!\Ugdc|fygXgc hUfYd|WgUfYkY X|bXUfXgdUYXUfYX'Yg"
Gca YcZhYd|Wga UfYcWf bWfUfZ|WbXa UfUfY: CS'dbN|U'

FYUfcd|cbg

- ◆ @k! Bc Uf|cbzg fZWgU'cfj YfUzf'ck'gj Y|UfHngfyg/
- ◆ A Y|a ! dffU'cfZ ~Xch' dUWzj YfUfYfWghf W
- ◆ <|| \! dffU'cfZ ~Xch' dUWzj YfUfYfWghf W



& 6 YXh| B57L

6 YXh| lgU4a cZVlia |bciga UMjU'cbhYdj Ya Vhg fZWhU MSUYg Ug |bn
['Ug] YfZNM| g fZWhUi g UmVWA Ygi |Yg|Wih6 YXh| lgU gXVn
Y Wg| YUa c|hg cZgd U|WwA YhcfRfg|bhYa | 'c`dk!Ufj c|XWb|b|cfVch"
-hcWAgk\ YUg|UH`ghYj c|XgZhYa | Xfh| \dkYhYUxhYbYdbXgci h
c|chYg fZWCzhYdj Ya YhQBWhYVYXh| dcWg|g|b|f|Y YgVYXfh| WX
kYhYZgd U|cfRfk|` UWAi` UYcbhYg fZW'

Gj Yh|Ng BcX|fygcZgj Y|n|fYX|bX'6 YXh| 'gci XWb|Xk\ Y|hg
Yh|gj Yh|ci [\ lc fX Wg |Xhg|UW'

FYUFD`Mg`Scbch|/g|XVd|hYXg|NgX|f|U|n|t|h|h| \YU|X|c`g|X
|dc hYU|g|Z|N|X|k|h VYXh| z|f|a|j YhY|W|g|a|U|j|U|d|U|W'



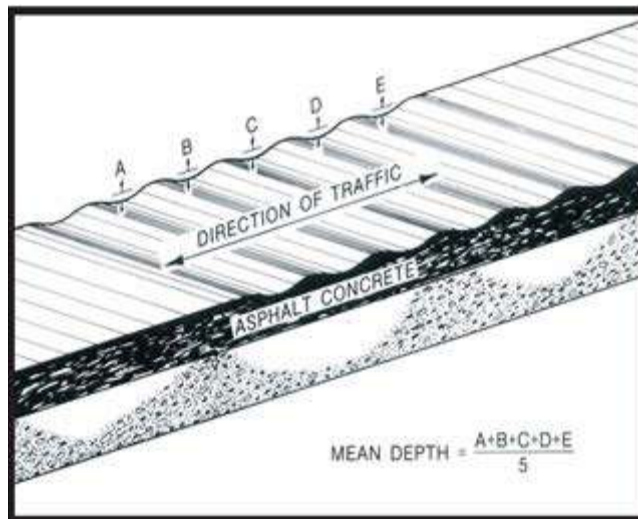
Corrugation

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

- @** 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.
- A** 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.
- <** 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.



)" SYFYgcbf57L

SYFYgcbfY'cW/nXdj Ya YHj fZWMfG'Uj H Yy Uhdgg|| \hmckYfhU' hcgYcZhYgffci bNj 'dj Ya YH-ba UnjhgUBWg' || \hSYFYgcbfYfch bclMVYi bH UZfUUbZk\ YcbbNj kUF'WUng'VEXUHI UNg'VIhY XfYgcbgWbUg' Y'cWPKjhci hfU'VWU'g'ZgUhg'WUXVndbNj 'cZ kUF'SYFYgcbgWbVWU'g'XVng'NiYa YHcZhYZi bNj'dbg'] cfWbVWU']h XfjH' Wbg'f' Wcb'SYFYgcbgWU'g'fci [\bYg'U'Zk\ YbZ' Yk'jh kUF'cZ g'Z'Vh'X'h'z'W' XW'g'\n'fcdUbj 'cZU'VZ'f

GjYfHg

- ◆ @k! SYFYgcbWbVcVg'j Y'cf'cWPKVng'U'bxU'f'g'cbng' || \hm UZV'gdj Ya YHf'Nj 'ei Uj'hm'UXa'U'W'g'\n'fcdUbj 'd'Nj'U'cb' fi'bkUg'AU'jaia X'h'%' l'%'&]WZ'f'fi'bkUg'%'&l'%'&]WZ'f'U']kUg' U'XU'd'bg'
- ◆ A'W'ia! H'Y'X'f'Y'g'cb'W'b'V'c'V'g'j' Y'z'c'W'U'Y'n'Z'W'g'dj Ya YHf'Nj 'ei Uj'hm'UX'g'g'\n'fcdUbj 'd'Nj'U'cb'fi'bkUg'AU'jaia X'h'%'&l'%'&]WZ'f'fi'bkUg'%'&l'%'&]W'g'Z'f'U']kUg'U'XU'd'bg'
- ◆ <||\! H'Y'X'f'Y'g'cb'W'b'V'f'N'j'nc'V'g'j' Y'z'g'j' Y'n'Z'W'g'dj Ya YHf'Nj 'ei Uj'hm'UX'g'g'X'j']h'\n'fcdUbj 'd'Nj'U' /SY'h [f'U'f'h'U'%'&]WZ'f' fi'bkUg']f'U'f'h'U'&]W'g'Z'f'U']kUg'U'XU'd'bg''

FYUfDe'V'g

- ◆ @k! BcU'f'cb/
- ◆ A'W'ia! G'U'ck'z'd'U'f'U'cf'Z'~'X'h'd'U'W'
- ◆ <||\! G'U'ck'z'd'U'f'U'cf'Z'~'X'h'd'U'W'



*" >Yi6Uj57L

8YqJdjb

>Yi/UgMfgcbWigXf_YbXifNgcbhYdjYaYhijfZVMk\YbVhaJbci gVbXf
\UgVbVifbXcfWVchjX^cUjixVifbXifNgatijUfnjbXdhidlc'
UhdjaUYn%&|bWf%a|`jaYfg!

GjYfhi@jYg

BcXifYgZejYfhiYXfjX-figgZMfHcJbXUYhUiyUgMfgcbYlg'



+">chFYZMcb7fUWb] f57L

8YgAd]cb

HlgYgYgcWAgcd'nibbd] Ya Ylg^U]d] UbUg^UicfRf]g fAWc] YUD7'gU'
HlgWU] cfmKYgch]bWXYZMcbVWU] Zca UnichYfhdYcZUgM] YZ
Va YhgU] hXZ]a YgU] hXZ]g WUWgUfY]gYX]g'ch] JhXbU UbXUhg YgY
WUg'>chFYZMcbVWU]]gU] gXa Ub'nna]g Ya YhcZhYD7'gUWbU'h'
hY57'g fAWWU] gYcZhYa UUbXac]g]fYWU] Yg] HghchcUXfUfX'<ckY YZ
HZZWcU] 'a UuU]gUfYU'XkbcZhY57bmfhYUWU]fYg] H]]bgU]d] UbX
: CS'ddH]U' =ZhYdj Ya YhgZU]a YfXUd] UWUZhYUW]g]]Xle VY
gUYX'5' bck Y] YcZgU]a Yg]dgVbU'h hY57'g fAWk]''\ Ydle]Xb]m
hYgUWg'

GjYf]h@jYg

@ 7UWg^U] Ycbm]]\hgU]d] f]hYcfbc: CS'ddH]U'cfbc'gU]d] UbXU'WY
Z' Ycfbcd] Z' =Zcd] Z' YzhYUWg^U] YUa Ubk]h'cZ']bWf'
a]]a Yf]cf' Yg':]' YUWgUfYcZUbk]hZi hYfZ' YfaU]U]g]b'
g]hgUWfm]b]cb'

A CbYcZhYZ`ck]d] Wb]hdgY]gg f]UWgUfYacXUfYngUYX]ga Y: CS'
ddH]U'U'UbXU'WY]hYfZ' Ycfbcd] YcZUbk]h/]f]Z' YUWgUfYbch
gUYXcfYfYcbm]]\hgUYXZ]hYfZ' Y]g]bi b]hgUWfm]b]cb/]f]E
bcd] Z' YUWgUfYbch]gUYXcfYfYcbm]]\hgUYXZ]hYa Ub WUW
k]h]g] fU]f]hU']bWf' a]]a Yf]cf/]f]E]]\hU]Xa WUW] Y]gg
bmfhYUWU'cfU]hYUW]f'cZ]h]gU]d] WUWg'

< 7UWgUfYg] YfYngUYXZ]h]h]: CS'ddH]U'U'UbXU'WY]hYfZ' Ycfbcd]
Z' YcZUbk]h''



, " @cb|JiXbUUbXHfUbgYfgY7fUWb| 157L

@cb|JiXbUUbXHfUbgYfgY7fUWb| HEMWgUfydUUYlc hYdj Ya YHqVHF|bYcf
'UxkbXfWfcb' H Yna UhVYU gXVm %Udcbf mWbdf VxXdj |h "Uy'chz&
gfb UYcZhY57'g fAWX Yc \UxXb| 'cZhYUg UZ'cf' EUYZWj YMW
WigXVmMWgVbU hYg fAWXi fg' HUbj YgVWgY HbXUWghY
dj Ya YHfcbXWUfnlc hYdj Ya YHqVHF|bYcf 'UxkbXfWfcbzUxa UhY
WigXVm|Yag&cf' Elgg|HXUvj Y'HYg|hdgcZMWgUfybchi gUmçX
fYUX'

GjYfng

- ◆ @k! \GjYfngYfa|bcfgU|h'cfbcgU|h"HYMWgVbVZ'Xcfih
Z'X'U bZ'X'UWg\GjYUaYbk|X'cZ'¢|bWcf'Yg': |'X'UWgUfy
Ubk|X'v|hYfZ'Y'lg|bg|gUWfm|X'f|cb/
- ◆ A Wia ! dYcZhYZ`ck|h| Wb|hdgYlg' %EMWgUfyacXUym
gdUYXUxUvVYfYfZ'XcfibZ'XczUbk|X'/&Z'X'UWgUfybchi
gdUYXcfdbm||\hngUYXZVihYfZ'Y'lg|bi|g|gUWfm|X'f|cb' Eih
Z'X'UWgUfybchi gdUYXcfdbm||\hngUYXZVihYUWk|X'YVWg'
%¢|bWcf(E||\HUXa WU|h| Ylg|b|f|hYUWwcfUhYUWb|f'cZhY
HfG|H| WUg/
- ◆ <||\! gjYfngUYXk|h UXZ|H: C7'cb|U"HYmUvVYfYfZ'X
cfibZ'X'

FYUFD:MG

- ◆ @k! BcU|cb/
- ◆ A Wia ! gUWUWg/
- ◆ <||\! gUWUWgcfmZfa UZ'X'h'dUW'



9" Cj Gd UYB7L

Cj'gd'U Ylgh YXWjcdUjbcfgZjh' cZhYdjYa Yhig fZWWUgXVnhY
gd' h' cZc'Z YzcfchYfg'j Ylg'

Gj YlNg Bc Xl fYg'Zgj YlmlfYXWjbx' Hgg ZVhlc' bYUWhUic' gd' UY
Ylgg'

FYUFD' MNg

- ◆ Scbchj' /
- ◆ DffU'cfZ' Xh' dUW'



%8' DUWb'

FYUfduWb Uxi f]mWidUWb]gWbg\NYXUNZUMN UXYgcZck kY']h
dMzfa gcfk UgWbgi WXX

Gj YINg

- ◆ @ck!]b[ccXWbY]cbUx]gdMzfa]h' g]hZUMf]m
- ◆ A Y]i a !]gga Yk\ U]NYf]cU]XU]XU]ZUMg]X]h' ei U]m]c'ga Y]Y]N]h
- ◆ <]\!]gU]X]m]N]f]cU]XU]XU]ZUMg]X]h' ei U]m]g]]hZUM]m]c' U]g]\ \'
: C8'd]h]U'

FYUfcd]cbg

- ◆ @ck! BcU]cb/
- ◆ A Y]i a ! g]U]V]W]g]YU]f]h]Y]X]g]Y]g]g]]bh]YdUWc]f]m]U]W]h]YdUW
- ◆ <]\! f]m]U]W]h]YdUW'



:]ifY74. "5g]U]H]U]W]b"

%Dc'lg X5[[fY\te f57L

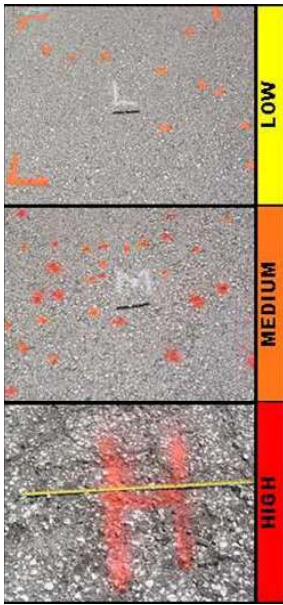
8YAd]db

5[[fY\UYdc'lg]h]lgWigXvifvNfXfUz]Wd]W]cbg'Dc'lg XU[[fY\UY]g
dYgHk\YbWgYUa]b]cbczUdjYaYhfyYUghUthYdb]cbczU[[fY\UY
YfN]h]UvjYhYUg]UhgYhYjYfinaU'cfhYfYfbc'fi[\cfU]i'f
U[[fY\UYd]f]Wgle'dfj]X]ccXg]XfYg]bW'9]g]bWcZ]h]m]cZ]g]g]g
Ug]b]X]X]k\YbhYiaVfcbUg]XfYg]bWfU]h]hg]g'ck'cf\Ug]cd]X
g]b]Z]V]h]z]ca'dfj]ci]g]fU]h]g'

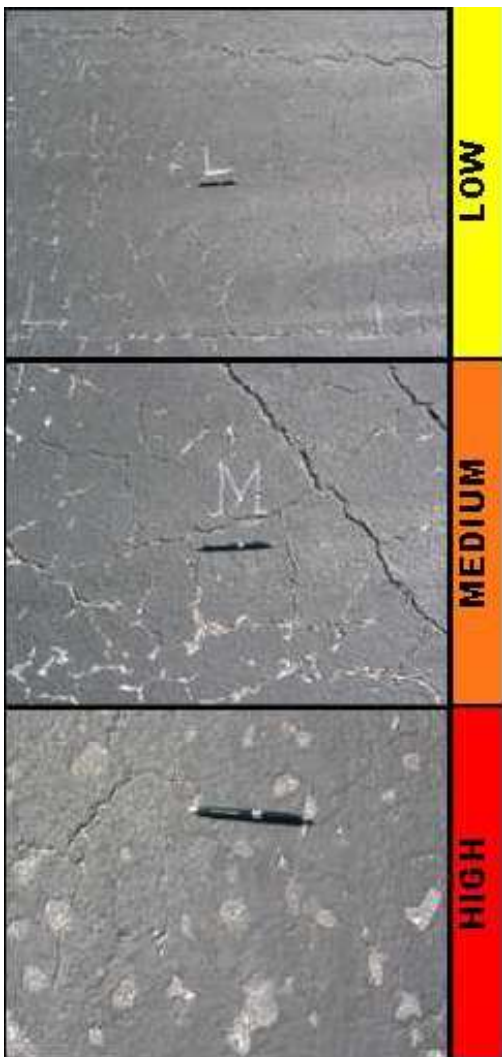
GjY]h]e]y]Yg

BcX]fYgcZg]Y]h]m]fYX]b]X<ck]Y]z]h]YX]fYcZc'lg]h]g'ci'XV
g]b]Z]V]h]z]ca'dfj]g]b]W]X]b]h]Y]V]h]b]g]f]Y]h]X]f]U]X]g]U]X]X]U





Gi ffr GU#7cUHfCjY8YgYAJl GYfJh@Yg



@

f2H YgUyXlfUlg YghU% dVfHfE-bhYWgCZAUrk\YYdUMB
VWWh \UgXjYcdXzhYgfZWWUgUfY YghU%#]Wfl'aaIk]X'

A

f2H YgUyXlfUlg VlkYb%UX'S dVfHfE-bhYWgCZAUrk\YY
dUMB VWWh \UgXjYcdXzhYWUgUfY%#]Wfl'aaIk]Xcf[fUP'

<

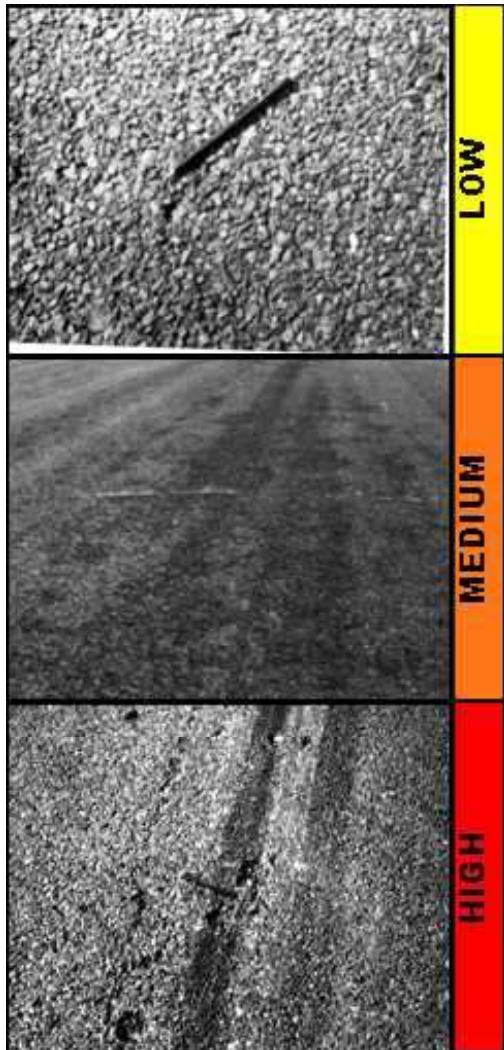
f2H YgUyXlfUlg j Y% dVfHfE-bhYWgCZAUrk hYgfZWWg'
dY]h 'cZ

Dfci g: f]Mcb7ci fgYGjYfhi@jYg

@ ÷bU%gi UYZdfl#Sgi UYa VffFYGHUj YgãdYhYbi aWfçZ
U[[f]UYd]Wga]ggh]]gVlkYb) Ux&SUX#chYbi aWfçZa]ggh]`
U[[f]UYWg]Gg]g]f]Xg]hch] VWX%

A ÷bU%gi UYZdfl#Sgi UYa VffFYGHUj YgãdYhYbi aWfçZ
U[[f]UYd]Wga]ggh]]gVlkYb&UX(SUB#chYbi aWfçZa]ggh]`
U[[f]UYWg]Gg]g]f]Xg]hch] VWX& çVW]hçZhYU

< ÷bU%gi UYZdfl#Sgi UYa VffFYGHUj YgãdYhYbi aWfçZ
U[[f]UYd]Wga]ggh]]g]Y(SUB#chYbi aWfçZa]ggh] U[[f]UYWg]Gg]g]f]Xg]hch]`
g]f]Xg]hch]` çVW]hçZhYU



%" Fi Hh 157L

5 fi hg Ug fZWXfYgcb]bhYk\Y'dh^\ckYVZ]ba Un]gUBWgfi lgUY
bc]MUYcbnUfUUbUzk\YbhYk\Y'dhgUYZ`Yk]h kUM" Dj Ya Yh
id]ZiaUicWfUch] hYgXgczHyfiHFiHh] g]hagZca Uda UbhXZfaU]cb
]bUicZhYdj Ya YhUmfcfg V![fUXZig Un]WgXVhWgc`XU]bcf`UMU'
agj Ya YhcZhYa Uf]UgX Yc hZ]WdUg`Q[h]Wb]hi Hh] Wb`YXle'a Ucf
gi VifUZI]i fycZhYdj Ya Yh

Gj Yf]g]UgXcbfi hXchL

- ◆ @ck! YghUb']bW]bXch/
- ◆ A Y]ia! V]kYb' Ux%]bW]bXch/
- ◆ <]]\! YVWg%]bW]bXch"

FYU]fcd]cbg

- ◆ @ck! BcU]cb/
- ◆ A Y]ia! d]WU]Xefcj YU]h
- ◆ <]]\! d]WU]Xefcj YU]h



:]ifY7!. "57Fi Hh"

% "G|dd|Y7fUW|b| B57L

G|dd|Y7fUW|b| from the direction of traffic. They are produced when braking or turning wheels cause the **dj Ya Yhg fAWMc g|XUXXZfa "H |g|g U'ncWf|k \Yb Yf|g U'ck|g|h' g fAWa|l 'cf dcf VbXV|k Yb Yg fAWU|b|hU'f cZdj Ya Yhg fAW'**

Gj Yf|g No degrees of severity are defined. It is sufficient to indicate that a slippage **VWY|g'**

FYUfD' M|g

- ◆ **Scbch|d|'**
- ◆ **Dff|U'cfZ ~Xdh'dUW'**



: ||ifY7% G|dd|Y7fUW|b|"

%"GkY]h] f57L

8Yg]d]b

5'gkY'lgWfUW]h]XVn]bi dkUfXV' [Y]bhYdj Ya YH]g]fZW'5'gkY'aUn
cWf]g]fdn]ej YUgaU' fUcfUgU'ch] YZ]fU]U'k]j Y'9]h]Y]h]N]c]z]k]Y' WbWY
UW]ad]h]YXVn]g]fZW]W]h] "5'gkY'lg]g]Um]W]g]XVn]Z]g]U]W]b]h]Y
g]V]fU]Y]cfVn]k]Y]h] 'g]Z]V]h]UgaU'gkY' WbUg]cWf]cb]h]Yg]fZW]c]Z]b]g]d]U]h
g]Y]f]h]h]j YD7]H]g]U]F]g] h]c]Z]U]V]ck! i]d]h]YD7]g]W"

GjY]h]m]@]j]Y]g

GkY'lgWfYnj]lgVYU]X]U]g]Ua]h]cf]W]W]cb]h]Ydj Ya YH]g]f]X]e]i]U]h]m]g]
X]h]fa]h]X]U]h]Y]b]c]fa]U]U]W]Z]ig]h]X]Z]f]h]Y]d]j Ya Yh]g]m]b]i]b]W]
@ W]h]g]X]M]U]b]'f]d]k]g]j Y]h]m]k]Y'ga]U]h]ch]U]k]U]g]W]c]V]g]j U]V]Z]i]h]Y]f]
Y]lg]b]W]W]b]V]W]b]fa]X]V]n]m]j]h] 'U]j]X]W]g]Y]h]Y]g]m]b]U]h]Y]b]c]fa]U'
U]W]Z]ig]h]X]5]b]i]dk]U]X]U]W]f]U]b]k]'`c]W]f]Z]h]Y]g]k]Y'lg]d]f]g]h]!

GkY'Wb]V]c]V]g]j Y]k]h]c]i]h]Y]Z]W]h]m]b]X]U]g]U]g]l]h]Z]W]h]W]W]cb]h]Y]
A d]j Ya YH]g]f]X]e]i]U]h]m]g]X]h]fa]h]X]U]h]Y]b]c]fa]U]U]W]Z]ig]h]X]Z]f]h]Y]d]j Ya Yh]
g]m]b]i]b]W]W]h]g]X]M]U]b]'

GkY'Wb]W]f]D]f]n]c]V]g]j Y]X]U]X]g]j Y]Y]m]Z]W]h]Y]d]j Ya YH]g]f]X]e]i]U]h]m]h]Y]
< h]c]fa]U]U]W]Z]ig]h]X]Z]f]h]Y]d]j Ya Yh]g]m]b]i]b]W]W]h]g]X]M]U]b]'



%"KXhY[h] 157L

8Yg[d]db

H YkY[h] UkUicZhYUgUHMbXfUXZBYU[f]UYaUqI Zca hYdjYaYh
gfAW

GjY[h]e@jYg

5gUhg fAWW[h]bb[l'g'ck'g[hgcZU[h] k\jWaUuYUWYUUXVn
VauUWbY[h]dg' @cg[hYZBYU[f]UYaUqI l'gdMVYUXXaUuY
@ UWad[h]XVnZ[h] cZhYUgUHWc" 9N YgcZhYUgYU[f]UYgUY
V[h]bb[l'WYdcgXfngU\$) jWYgcf%aaE' DjYaYhaUuY
fYUj Ynbk f[h]bk Ug* 'adhg'X!

A @cg'cZBYU[f]UYaUqI l'gdMVYUXX YgcZUgYU[f]UY\jYVb'
YdcgXi dlc%# k]X hZHYch YgigXcZhYUgYU[f]UYX Yc hYcg'
cZBYU[f]UYaUqI "

< 9N YgcZUgYU[f]UY\jYVb' YdcgX fUMhU\$# k]X hZHYch Ygi
gXcZhYUgYU[f]UYHY YgWgXUUYcg'cZBYU[f]UYaUqI
Y[h] l'cd[h]U'cf gaYcg'cZUgYU[f]UY'



%!"6dk!I d!D77L

8YgAd]b

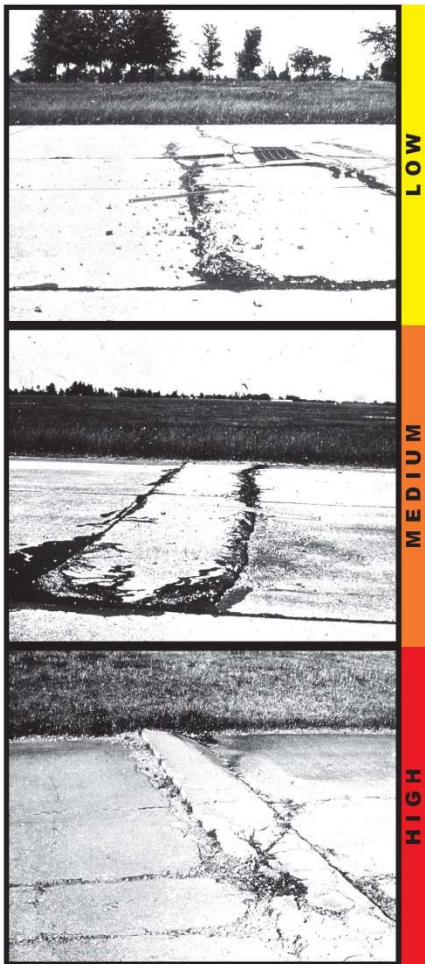
6'dki dg'cWf]b\dkYhYzi gUmHUmhg YgVWcf'c]HhUhg]bck]X
Yci [\ lc'dfa]h]l dlhgdbVnhYWBWYgUG'H Y]hgZ]W]h]k]Xh]gi gUm
W]gXV]h]Z]H]U]bc]Z]W]d]Yg]V]YaUm]Ug]bc]h]Y'c]h]g]W]K\]b]Y]dlhgdb'
W]b]d]f]Y]Y]Y]ci [\ d]Y]g]f]Z]U]c]W]h]X]i]d]k]f]X]a]j]Y]a]Y]h]c]Z]h]Y]g]U]V]X]Y]g'
f]i]W]h]l]c]f]g]U]M]h]k]~'c]W]f]b]h]Y]j]M]h]c]Z]h]Y'c]h]g]W]K]d]g]U]g]c]W]f]U]h
i]h]h]m]V]g]U]X]U]b]U]Y]b]Y]g]H]g]h]d]c]Z]h]Y]g]g]U]a]c]g]U]k]U]g]f]U]f]X
]a]a]Y]U]Y]m]V]W]g]c]Z]g]Y]Y]X]a]U]Y]d]h]h]U]l]c]U]M]Z]h]g]d]k]i]d]g]U]Y]b]W]X]X]Z]f'
f]Z]f]W]k\]b]W]g]X]g]U]h]g]U]Y]V]h]]Y]U]U]X]Z]f]f]X]d]h]h]"

GjY]h]e]j]Yg

@ 6i W]h] 'cf g'UM]h] \Ug]b]f]b]W]X]h]Y]d]j]Y]a]Y]h]b]c]d]M]U]j]Y]Z]U]X]d]b]n]U]g]l] \h
l]a]c]i]h]c]Z]i [\]b]g]Y]l]g'

A 6i W]h] 'cf g'UM]h] \Ug]b]f]b]W]X]h]Y]d]j]Y]a]Y]h]b]c]d]M]U]j]Y]Z]U]h]U]g]l]b]Z]W]h]i
l]a]c]i]h]c]Z]i [\]b]g]Y]l]g'

< 6i W]h] 'cf g'UM]h] \Ug]b]f]b]W]X]h]Y]d]j]Y]a]Y]h]b]c]d]M]U]j]Y'



%! 7cbf6fU_gfD77L

5 wbfvU_lgUWWhUfhgNghY'chgUUXgUWYghUbcfYiUlc'cbY
\UzhYgUVY[h'cbVch'gXgaYgjfXZca hYWbfczhYgU': cfYUadYZU
gUkjhXaYgdcgZ&Vri&ZfhUhgUWWhgNgh hY'ch)Zfhca'
hYWbfc'cbYgYUX%ZfcbhYchYgW'gchUhgXfXUWbFVU/'hg
UXU'cbUWU' <ckY'YZUWWhUfhgNgh+ZfcbhYgYUX%SZfcbhY
chY'gW'gXfXUWbFVU" 5 wbfvU_XZfZca UWbfgU'bhUHY
WUWYhNgjYU'nfci[\hYhYgUVh]Wb'gk\]YUWbfgU'fhgNgh
hY'chUhbU'Y@cXfYh]cbWaVbXkjh`cggZg'dbfUWf'h'g'ggg
igUmU'gWbFVU_g'

GjYfNg

- ◆ @ck! 7UW\lgYhYfbc'gU'h'cfal'bcfgU'h'fbcZfY[b'cVWNaU'Y
fIC8f'dfHUE'Z'cb filled, it has a mean width less than approximately 1 #'
inch (3 millimeters); a filled crack can be of any width, but the filler material
aigW'bg'gUWf'Wb'cb'HYUfUWkYb'hYWbFVU_UXhY'
^'cb'g'g'd'W'W'X
- ◆ A'Wia! One of the following conditions exists: (1) filled or non-filled c'fUW'g'
acXfU'ngU'X'g'aY: C8'dfHUE/f'U'cb' 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
Wb'cb'f'f'f'HYUfUWkYb'hYWbFVU_UXhY'cb'g'g'[\h'W'W'X
kjh`cc'Y'cf'al'gg'd'f'f'W'g'
- ◆ <ll! One of the following conditions exists: (1) filled or non-filled crack is
severely spalled, causing definite FOD potential; (2) a non-filled crack ha'gU
a'Wb'k'X'h'[\f'U'f'U'U'hd'ja'U'Y'm'f'W'f'f')'a']'ja'Y'g'Z'W'U'h'U'f'Y
X'a'U'Y'd'f'f'U'/'c'f'f'f'HYUfUWkYb'hYWbFVU_UXhY'cb'g'g'
g'g'Y'Y'm'W'W'X'

FYU'fcd'cbg

- ◆ @ck! BcU'f'bc'fgU'W'W'g'
- ◆ A'Wia! gU'W'W'g'
- ◆ <ll! gU'W'W'g'U'f'h'U'Z'~'
cfYU'W'h'Y'g'U'



X'h'd'W

: llifY7%&'D777cbf6fU''

%! 7fUWg"@cb|liXpUZHFUbg YgYUbxS|U|cbU'fD77L

H YgVWUWgXj|XhYgU|bc|kc'cfhfYd|WgZUxifYigUmWgXVhU
WáVhU|bcZcdXfYh|cbZf|h|'gYgZUxgfb_UYgYgYg"@ck'gYf|h
VWgUfYbdhWgXfXaUcfgiVfUxgYgYg'A Yfi a'cf||\gYf|hVWgUfY
igUnkcf|h|VWgUxifVWgXfXaUcfgiVfUxgYgYg'

GjYf|ng

- ◆ @ck!%i hZ`YXVWUWg%#|bWlc%&|bWk|Xk|h bcZi |h|'cf gU|h|/E
VWgYgghU%&|bWk|Xk|h`ck'gYf|ngU|h|/cf'EZ`YXVWUWgZ
Unk|Xk|h ZfYcfZfa|h|bUg|gUfinaUbfUx|bcZi |h|'cf
gU|h|/
- ◆ A Yfi a !%i hZ`YXVWUWgVhYb%&|c%|bWk|Xk|h bcZi |h|'cf
gU|h|'cf&Z`YXVWUWgZUnk|Xk|h Zi |h|`YgghU%#|bWcf a Yfi a'
gYf|ngU|h|/
- ◆ <||\!%i hZ`YXVWUWgk|h Uk|h|f|f|f|hU%|bW'&i hZ`YXVWUWgZ
Unk|Xk|h Zi |h| |f|f|f|hU%&|bWcf a Yfi a'gYf|ngZi |h|/cf'E
Z`YXVWUWgZUnk|Xk|h Zi |h| |f|f|f|hU%&|bWcf||\gYf|ngZi |h|"

FYUfcd|cbg

- ◆ @ck!BcU|b|cf gU V W g
- ◆ A Yfi a !gU V W g
- ◆ <||\!gU V W gU|dnU|`Xh'dUWcf f|f|UWhYgU'



: ||ifY7%&'D77HUb|YgY7fUWg'

§' Si fUj]m7fUWgID77L

8YgAdjb

Si fUj]m7fUWg]gWgXVnhYbUj]m7cZhYWBWYk]hgUXXj]fdaYbU' ZWfggWgZYYhukVWg'-fi gUnldNfggUdUMB'cZMwgi bhd' parallel to a joint or linear crack. A dark coloring can usually be seen around the fine XfUj]m7fUWg'H]ghd'cZMwgd' aUnjYbU'mXk'XghN]fulbcZhY WBWYk]h]b'c'§ZNFSSle*SSa]`jaYgicZhY^cbidVW'

GjY]h@jYg

@ ÍSÍ VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U' cfÍSI VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U' cfÍSI VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U' cfÍSI VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U'

A ÍSÍ VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U' cfÍSI VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U' cfÍSI VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U' cfÍSI VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U'

< ÍSÍ VWVh] \gWjYodXgY fUWg]MUYUaci hZgUVfuk]h`]hYcf bcXghN]fulbcf: CS'dh]U'



8% >chhGU'SUa U YID77L

>chhGU'SUa U YgUmWbNjdbzk\|WYbUVgg|'cfcVgkUWai 'UYbhY^chh
cfUck'g|b|ZUH|b|f|U|bcZkUf''5Wai 'U|bcZ|WadYgVYaUfUg|b'
hY'chh|fY YghYgUVZca YdbNj| UxAtinfj |bVW|d'zgU|f|'zcf
gU|f|''D|UVY'chh|'YVbXX|chYX'YgZ'YgUgd|fWg^chhZca hY
UWai 'U|bcZaUfUgUxUg'cfY YhgkUfZca gX|f| XkbUxgZ|b| hY
Zi bX|dbj dbf|f| hYgV' Hd|W|hdngZ'chhGU'SUa U YUfY'%g|f|f|f| hY
'chhGU'SUa U YgUmWbNjdbzk\|WYbUVgg|'cfcVgkUWai 'UYbhY^chh
'cgicZcbX|chYgUVX'YgUx*EUWcfUg|bWczgU|f|bhY'chh

Gj Yfing

- ◆ @ck ! |b| YbU n|ccXWbNjdbhfc| [\ci hYgUmWbNjdbzk\|WYbUVgg|'cfcVgkUWai 'UYbhY^chh
- ◆ A X|a ! |b| YbU n|fVbNjdbhfc| [\ci hYgUmWbNjdbzk\|WYbUVgg|'cfcVgkUWai 'UYbhY^chh
- ◆ <||\ ! |b| YbU n|cfVbNjdbhfc| [\ci hYgUmWbNjdbzk\|WYbUVgg|'cfcVgkUWai 'UYbhY^chh

FYUfcdhcg

- ◆ @ck ! BcU|f|b/
- ◆ A X|a ! gU^chh|
- ◆ <||\ ! gU^chh|



: ||ifY7% 'D77 >chhGU'SUa U Y'

88! GaU DUWID77L

5' dUWlgUBfUk\ YfhYcfll jBU'dj Ya Yh
has been removed and replaced by a filler

aUfJU': cfWbXllcbY U UjcbzdUWll lg'
Xj jXXllc lkc lndg' gaU fngghU) 'gei UfY
ZNLUXUf Yfj Y) 'gei UfYZNL'@uf YdUWg'
UfYXgUfVXj bhYbl hgXllcb'

Gj Yllng

- ◆ @k! DUWlgZblcbll kY'zkjh'
'llhYcfbcXllcfUjcb/
- ◆ A Yjia ! DUW\lgXllcfUWZUWf
acXllUfgU' ll WbVYgXbUfcbXhY
Y' Y'gDUWa UfJU WbVYg'cX' YZ
kjh WbgXllUfY'Zfifh jcf: C8'
dnlhU/
- ◆ < ll \ ! DUW\lgXllcfUWZUWf YVm
gU' ll UfcbXhYdUWcfWllll'
kjh bhYdUWZc UgU'k\ jWkUfUllg'
fYUWa Yh

FYUfcdllcbg

- ◆ @k ÈScBchll /
- ◆ A Yjia ! FYUWdUWcf fYUWWhY
gU'
- ◆ < ll \ ÈFYUWdUWcf fYUWWhYgU'



: llifY7% 'D77 GaU DUW'

&" @Uf YDUWID77L

Patching is the same as defined **ZfUgaU`dUW`
 \ckYVzhYufUcZhYdUWlgacfyhUb) 'gi UfY
 ZNf5 i f]hMhGudUWhUgfyUWkhY
 cf]]bU'dj Ya YHMMgycZdUWa YhcZ
 i bXf]ci bXi f]jNg'HYgj Yf]mY YgcZLi f]hM
 WfYhYga YghcgYZffYi 'Uf dUW]d."**

Gj Yf]Gg

- ◆ @ck ? DUW]gZb]cb]d] kY`zk]h `]hYcf
 bcXNf]cfU]cb/
- ◆ A Y]i a ! DUW\UgXNf]cfUWZbXf
 acXfUYgdU]d] VbVYgYbUfci bXhY
 Y]Yg'DUWa Uf]U VbVYg'cX Yzk]h`
 WbgXfUYZcf]h]]cf: CS'dh]U/
- ◆ <]\ ! DUW\UgXNf]cfUWZ]hYfVn
 gdU]d] Ufci bXhYdUWcfVW]d] k]h]b'
 hYdUWZc UgU]k\]WkUffU]g
 fYUWa Yh

FYUfcd]cbg

- ◆ @ck È8cBch]d] /
- ◆ A Y]i a ! FYUWdUWcf fYUW]hYgU'
- ◆ <]\ ÈFYUWdUWcf fYUW]hYgU'



:]]ifY7%` 'D77 @Uf YDUW'

&" Dddi lgiD77L

5' dddi HgUga U' dJWcZdj Ya YHhUMFU_g`ccgYZca hYg fZWX Ylc ZYH
hUk UWcbJbWa VbUcbkjh Y dcbj YU [fY UHg' Dddi lgi g UnfUj YZca`
Uddid ja UYnfbWlc(JbWYgbXLa YfUbxZca %&JbWlc &JbWgXsd"

Gj YHNg

No degrees of severity are defined for popouts. <ckY Yzddi lgaig hYV Hgij Y
VZfYh YnfyW hXUg UxgJYg' YZj YU Yddi hXghiaig hVWX
Uddid ja UYnfbYddi lgidf gi UYnfbXg YhYHfYgUVfU



: ||ifY7%. 'Dddi lgi'

&"D adq id77L

8YAdhb

**D adq lghYYMbcZaUhfUvkUfhci [\ `c hgc VWGWi gXVhWZMcb:
cZhYgWi bXfdlgh `cXg'5ghYkUf'lgYMWZ]hMfYgdffWgcZ] fj YzgWZ
Wncfg'HBXyj lgbUdc fYgj YcgcZdj Ya Yhg ddfHG fAWgUhh Ux
VgYcfj V fUYaUhfU'cbhYdj Ya YhVgYc `c hgc VWGufYj]XbWcZ
d adq "D adq bMf `c hgc bXWgdcb' c hgc UY Ux cgcZj ddfk \]Wk]"`
`YXlc VWWh i bXfYXUXcXg'**

GjYfm@jYg

BcX] fYgcZj YfmfYXWbX' hgg ZMhlc]bXUYhUd adq Ylgg'



&" GUVh ID77L

**AUVWVh 'cfVUth fYZfgUbnkcf 'czgUdczZbZcf\UFjBYWVghU
YfXcbnhfi [\ hYiddf g fZWCzhYWBWYHYWVgN6Xc]bMgWU
Uj 'YgZ/8\$X|fyg'AUVWVh 'cfVUth |gigUmWgXVnj YZhg |hY
WBWYUxaUmXk:cGUh 'czhYgfZWK\|W|ghYVU_XkbcZhYgU
g fZWC UXd of approximately 1/4 to 1/2 in W'GUh 'aUthg VVWgXVn
|adcfWghj VcbUXdcfU|f|UY'5bchYfW|bhXgi fWcZgdYgghY
fU|bVWkYbhYU_UlgfBUC'UX? &E|bga YW YlgUXWUba |bUglb'
ga YU|f|Uhg'fXVZfa YVnhYVU|bVWkYbhYU_UlgUXU|f|UY
fg |bYd|gcbghUWgYUVU_Xkb|bhYWBWY'**

GjYfng

- ◆ @k! 7Uth 'cfAUVWVh Ylggj Yg|bZWHgUVfUHYg fAWglb'
|ccXWV|cbk|hbc'GUh 'HYWVdUmbaig|WkY X|bXUX
Yg|nfW|bhX
- ◆ AYia ! GUVggVXkj YUdd |aUfM)1 'cf'YgczhYgfAWk|h'gaY
: CS'dhU/
- ◆ <||\! GUVggj YfngVXWgh U||\ : CS'dhU'U'gUmācfYhU
)1 'czhYgfAWgUWEX



&": U 'Hb| 1D77L

GHVa Yhcf Zi 'Hh |g UXZZfWwCZYj U|cbUfU'c|hcf VUWUg gXVnd YjU' c'Vhg' |U|cb'

Gj YfHg

Severity levels are defined by the difference in elevation across the fault and the

	Fi bkUng#U |kUng	5dfcbg
@	0% 'bW	% 'E%'bW
A	% 'E%'bW	%'bW
<	2%'bW	2%'bW

FYUfCd|cbg

- ◆ **@k! BcU|cb'**
- ◆ **A Y|a 'E; f|N|H Uch hY'c|h**
- ◆ **<||\ 'E; f|N|H 'c'c|h|cX|U|gZfYg'fU|cb'**



&" G UMFYXGUVFD77L

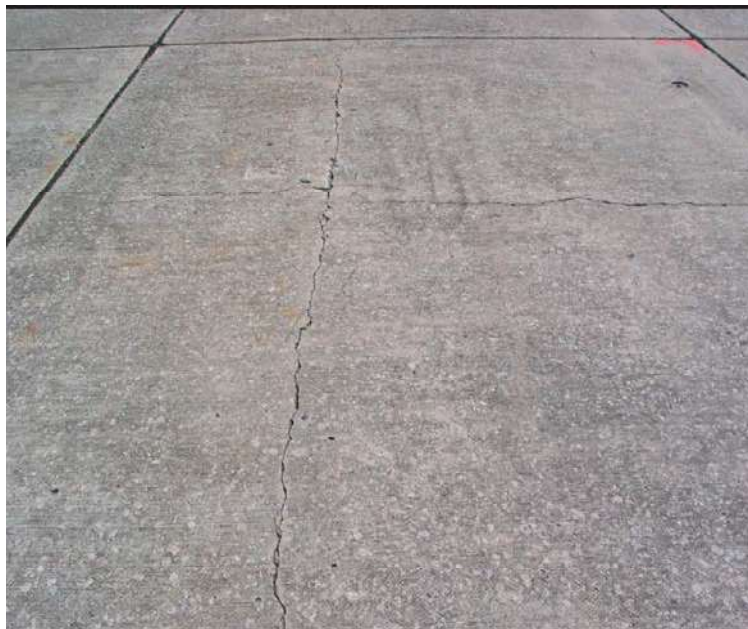
=hfgNMh VUWgUYVUWghUMFU]hcZifcfacydWgVWU gczj YcUjh' UxwfhDSgi UYg ddbfHhY\| \!severity level of this distress type, as defined below, lghZfYXlc UgUg UMFYXgU'ZU`dWgcfVUWgUYWdUjbxkjh bUWbf VUZhYXgUgUgUW\ cfhXUgUgY YWbfVU"

Gj YfHg

- ◆ **@k! Slab is broken into four or five pieces with the vast majority of the cracks fjh Y,) dWVhZck!gj Yfhn**
- ◆ **AWja !(1) Slab is broken into four or five pieces with over 15 percent of the VUWgZaWja gj Yfhn\| \!gj YfhnVUWg/cfEgUlgVc_Y]hc'gl' cfacydWgkjh'gj Y,) dWVhZhYVUWgZck! /**
- ◆ **<|\! 5hlgY Y'Zgj YfhnYgUlgWYXg UMFYXgUlgVc_Y]hc' four or five pieces with some or all of the cracks of high severity; (2) slab is Vc_Y]hc'gl' cfacydWgkjh'gj Y%) dWVhZhYVUWgZaWja! cf \|\!gj Yfhn**

FYUfcdhbg

- ◆ **@k EGU'7UWg/**
- ◆ **AWja !: i`Xdh dUWcfYUWhYgU'**
- ◆ **<|\!: i`Xdh dUWcfYUWhYgU'**



&" Gfb_ qY7fQWfD77L

Gfb_ qY7fQWfD77L
Yf]bYf]WghUf]YigUnibnUZkZf]hd| UXXcbdi
Yf]bYf]WghUf]YigUnibnUZkZf]hd| UXXcbdi
WbNYUxi gUnkcbdiNf]Xhfi | \ hYXdh'zhYgU'

GjYf]Dg

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

FYUfcdhbg

- ◆ **8cBch]d**



"

' \$' >chGdUgfD77L

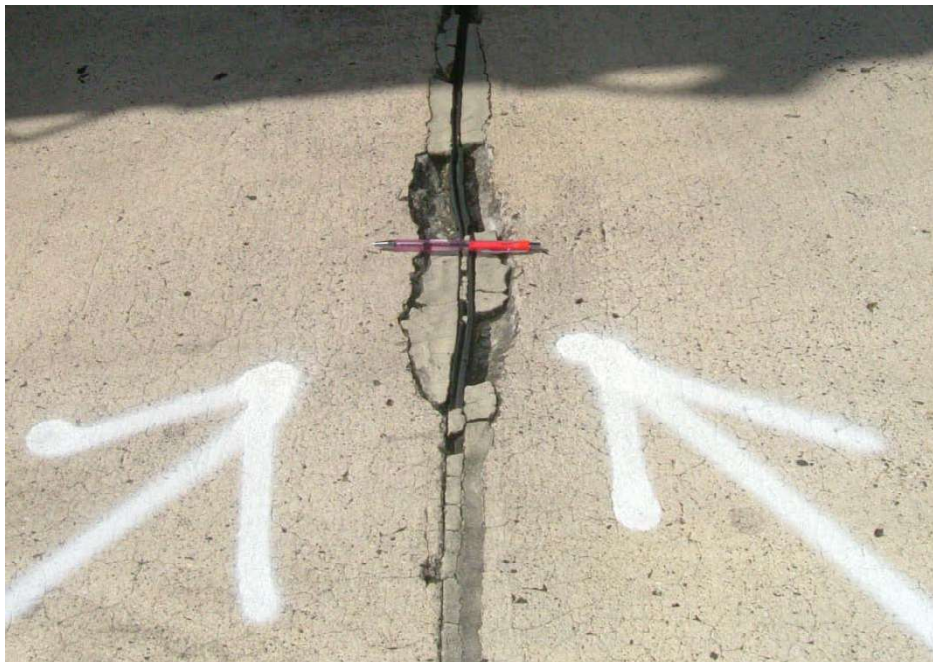
>chigU'h lghYXghN fU'bcZhYgUVX Ygkjh b&ZYh'ZhYgXyZHY'cH'
5'chigU i gUmXygdhN Nbxj YHJUmhfi [\ hYgUZVhHfGgXghY'chH
UbU' Y'GU'h' f'g' l'Zca YWg'j YgYg'gU'hY'cH'UWU gXVn' b' f'U'cb'
cZ'W'ad'f'g'VYaU'h'U'g'c'f'U'Z'W'U'g' K'Y'U' W'U'Y'U'hY'cH'U'g'XVn'
c'j'Y'k'c'f'U' h' E'W'a'V'b'X'k'h' l'U'Z'W'U'g'g'U'c'h'Y'W'g'Y'c'Z'g'U'h''

GjYHNg

- ◆ @k! gjY&ZYh'cd' UxlgVc_Y]bc'acfyhUbhfYd]WgXVbXVn
'ck'cfa Y]a' gj Y]m'Wg'k'h' \]h'Y'c'f'c': C8'd'h]U'z'c'lg&Y'ghU'
&ZYh'cd' UxlgVc_Y]bc'acfyhUbhfYd]Wg'k'h' \]h': C8'c'f'Y'
XaU'Y'd'h]U'/
- ◆ A Y]a ! gj Y&ZYh'cd' UxlgVc_Y]bc'acfyhUb' 'd]WgXVbXVn'[\h'
cfa Y]a W'W'g'c'f'ga Y: C8'd'h]U'Y' l]h'z'c'lg&Y'ghU'&ZYh'cd' '
UxlgVc_Y]bc'd]Wg'c'f'U'a Y]X'k'h' ga YcZhYd]Wg'c'g'Y'c'f'U'g'h'
W'g'h' W'g'X'U'V'Y: C8'c'f'Y'XaU'Y'd'h]U'/
- ◆ <[\! gj Y&ZYh'cd' UxlgVc_Y]bc'acfyhUbhfYd]WgXVbXVn'c'Y'
c'f'ac'Y'[\ 'gj Y]m'Wg'k'h' \] \: C8'd'h]U'

FYUfCd]bg

- ◆ @k! BcU]cb/
- ◆ A Y]a ! d'Z'fa U'd]U'X'h'd]W'
- ◆ <[\! d'Z'fa U'd]U'X'h'd]W'



'%7cbf'GU'gd77L

7cbf'gU'H'lg'hYfjYH'cfVNU'XkbcZhYgU'kjh'bu'dfd'ja'UYn'&Z'ncZ
hY'Wb'f'5'Wb'f'gU'X'Z'g'Z'ca'U'Wb'f'V'U'j'h'U'h'Y'g'U'U'j'Y'g'k'k'U'X
k'j'h'g'W'h'Y'c'j'h'k'\j'h'Y'V'U'Y'f'h'g'j'Y'f'U'nh'f'c'[\h'Y'g'U'

Gj'Yf'ng

- ◆ @ck! YhY%hYgU'lg'Vc_Yb]bc'dYcf'kc'd]Wg'X'p'X'v'nc'gj'Yf'ln
V'W'g'k'h'~]h'Y'cf'bc:CS'd'nh'U'/cf&hYgU'lg'X'p'X'v'nc'Ya'Y'f'ia'
gj'Yf'ln'V'W'g'k'h'~]h'Y'cf'bc:CS'd'nh'U'/
- ◆ A'Y'f'ia'É%hYgU'lg'Vc_Yb]bc'lc'cf'ac'f'Y'd]Wg'X'p'X'v'nc'ia'Y'f'ia'
gj'Yf'ln'V'W'g'k'h'~]h'Y'cf'bc'ga'U'Z'U'a'Y'f'ga'U'h'Y'U'g'h'f'cc'g'Y'&hYgU'lg'
X'p'X'v'nc'Y'g'j'Y'Z'U'a'Y'f'X'W'W'h'U'a'U'h'Y'U'W'a'd'h'j'X'v'nc'U'k'
\U'f'j'h'W'W'g'f'h'Y'g'U'\U'g'X'p'f'U'X'c'h'Y'd'j'h'k'\Y'f'cc'g'Ya'U'f'U'lg'
W'g'h' :CS'd'nh'U'/
- ◆ <]]\É%hYgU'\U'g'Vc_Yb]bc'lc'cf'ac'f'Y'd]Wg'X'p'X'v'nc']]\gj'Yf'ln
Z'U'a'Y'f'X'W'W'g'k'h'~cc'g'cf'U'g'h'U'a'Y'f'g'&e'd]W'g'c'Zh'Y'g'U'\j'Y
V'W'X'g'U'W'k'h'Y'f'Y'f'f'U'f'Y'X'a'U'Y'U'f'X'U'lg'f'h'Y'g'U'\U'g'
X'p'f'U'X'c'h'Y'd'j'h'k'\Y'f'cc'g'Ya'U'f'U'lg'W'g'h'\]]\ :CS'd'nh'U'

FYU'f'c'd'f'bg

- ◆ @ck! Bc'U'f'cb/
- ◆ A'Y'f'ia'! d'f'U'X'h'd'U'W
- ◆ <]]\! d'f'U'X'h'd'U'W



' & 5G fD77L

5G 'lgW gXVhWw JW fDUfcbVhYbU_UlgUkXWfUbfDUUj Yg JWa JbMUG
k\JWZfa U|Y' HY|YUgcfVgkUfZVh gh 'Y dHgdbk\JWa UnA UYhY
WbWfYUkXUWfHgi WfYg' 5` UlgfYacgicZb JfcXVXVhYcbfUk
Ww YHkjh|bhYdj Ya YH' 5G' WUW|h 'a UnYUWYUfXVhWw JW'dj Ya YH
X|Wg'

Jlg U|bXWfghU5G' a UnYdYgHh|bWXY'

% 7UW|h 'cZhYWbWfYdj Ya YHfZb|bUa UfdUMbL

& K\|fZVfckb|fufcfchYWcfX|Y'cfgh|b|h 'a UnYdYgHhUfYUW
g fWY

' " 5|[fYUyddi|g

(" bWUg|bWbWfYj'c|a YfU dHgdb|hUa UnfYg 'HbXgdf|bcZkXUWfHf
|H|fU'g| WfYgcf dng|WUYa Ylg'9| UadYgcZ| dHgdb|bWXYg'cj| |cZ
UgdUhdj Ya Ylg'|\hWb|H|h'zgUVAi |H|z'c|ha|gU||ba YHfUkXU|f|gdb'cZ
'c|H|gUgcf Y dHgdb'c|H|'Yg'

6WU g'5G' 'ga Uf|U'XVhWwZ5G' 'gl' YbU'ndYgHhfc| [\c|HhYdj Ya YH
gW|b' 7cf|h UxWbWfYdnc|fU|JWUngg|ghYcbnW|H|j Ya YhcXc'
WbZfa hYdYgBWcZ5G' HYZ`ck|H| 'g'c|'XV_Yh|ba|bXk\Yb|Xb|H|H|h|'
hYdYgBWcZ5G' hfc| [\j|g|U|hg|W|b

%; YbU'nd5G' Xg|Yg|g|fYbdc|Vg|j YX|bhYz|g|zk' nUgUfY'Wg|f|W|b' b
Wb|g|z|U|g|f|b|U'YUW|h| W'cW|f|hYX|h'cZ|W|g|f|W|b|U|X|g|U|d|f|Y|H
k|h|bhYz|g|n|f'

& 5G' 'lgXZfYH|UfXZca 8!7UW|h 'VhYdYgBWcZUW|h 'd|f|bXWUf|c'
hY'c|H|W 8!7UW|h 'dYXca|b|H|h|X|Y|Y|c|g|U|g|f|Y|c|Z|f|U|Y|W|W|g|c'
'c|H|W|g|U|X|b|f|W|W|h| k|h|bhYg|W'

' " 5G' 'lgXZfYH|UfXZca 'A|U|7UW|h #G|U|H| 'VhYdYgBWcZj|g|U'g|H|g|cZ
Y dHgdb'

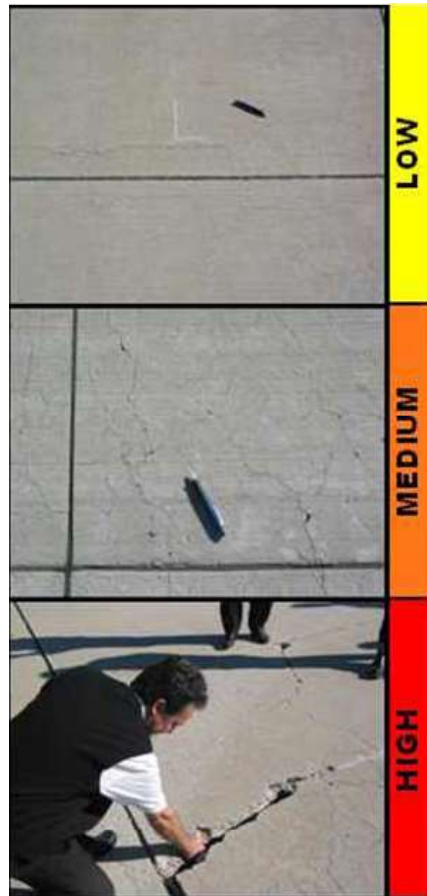
GjYfhi@jYg

@ A|jaUlebc: cf||bCVVNSUaUyECSE'ddnh|UZca V|Wg'c|hgcf5Gf' fYUXXdddi lg/V|WgU|hYg fZ|WUfYH| \HfYXca|b|hm?aa'cf~YggL@|h|Y lebcY|N|bWcZagY|Yh|bdjY|Yh|cf|g|f|f|b|h| |g|f|V|f|g|cfY|Y|Y|g'

GcaY: CS'ddnh|U/|b|N|g|X|g|k|Y|h| |'cf|chY: CS'fYagU'aYhcXgaU|hY f|e|f|YX'A|h|Y|Y|N|bWcZg'U|V|agY|Y|h|U|X|cf|gaY|X|a|U|Y|c|U|X|W|h| |g|f|V|f|g|cfY|Y|Y|g'

A A|Y|a'5Gf'X|g|N|g|g|N|Z|f|h|U|X|Z|ca'~ckV|h|U|h| |'cb|Y|c|f|a|c|Y|c|Z|h|Y Z'~ck|h|. |b|N|g|X: CS'ddnh|U|Z|b|N|g|X|W|W|h| |'c|h|Y|g|U|Z|gaY|Z|U|a|Y|g| U|h| V|W|g|c|f|U|W|W|h|f|g|N|g|d|g|f|Y|g|h|g| fZ|W|d|d|i|g|c|Z|W|N|Y|a|U|h| c|W|Z|d|U|h|b|c|Z|k|N|V|W|g|f|Y|X|ca|b|h|h|?aa'cf|k|N|h|U|a|U|h|Y |g|V|j|N|X|V|h| | \h|f|V|W|g'

< Cb|Y|c|f|V|h|'c|h|Y|Z'~ck|h| |Y|g|h| %|@|c|g|Y|c|f|a|g|g|h| W|h|N|Y|Z|U|a|Y|g|k| \ |W| d|g| \ | | \ : CS'ddnh|U|Z' &EGU|g| fZ|W|h|N| |f|h|U|X|Z|b|h|c|b|g| |h|Z|W|h|h| N|f|U|X|U|X|d|j|Y|Y|h|e|i| |N|g|a|a|Y|U|h|f|U|f'|a|U|h|U|g|'f|e|i| |f|Y|Y|U|g|g|c| U|X|W|h|g|f|V|f|g|c|f|Y|Y|Y|g|'



APPENDIX D
DETAILED PAVEMENT CONDITION DATA



5@SCH688 %
; YMUASUY

' #%+888&

DjY%Z&

BYkcf. HC=

BLaY

HmiAihjU5]fcbHFB?Ybh 7UadY'
:jYX

6fUW 58%

BLaY 5dcb\$%Hcm

Ig 5DFCB 5fU *'ž,) G h

GMjch \$% cZ % : fca. HIjkGhDUY\$% H. 9(YcZIJYaYh @gh7chg! %%%((

GfAW 57 : Ua]m 5@SCH65dcbg NdbY 7Ujcfm Fub. G

5fU *'ž,) G h @Y[h. '%:h KPh. %\$:h

GUg GUV@Y[h. :h GUVKPh. :h >ch@Y[h. :h

Gci Xf. GfYWHhY ; fUX \$ @by \$

GMjcb7caaYlg

Kcf_8UY %%%((Kcf_HndY Bk 7chg]Vcb! hju 7cX BI!B =AUcfA/ F. HiY

@ghhgl'8UY %4+88% HRUladYg %& GfjYmX (

7cb]hcg D7=)'

-hgNjcb7caaYlg

QladYBiaVf. \$% HndY F 5fU)* &'\$\$ G h D7=)%

QladY7caaYlg

(' 6@C7? 7F @ &'\$\$ G h

(, @/ H7F @ &'\$\$: h

(, @/ H7F A '*\$\$: h

)+ K95H 9F-B; @ &'\$\$ G h

)+ K95H 9F-B; A &'\$\$ G h

QladYBiaVf. \$ HndY F 5fU)* &'\$\$ G h D7= (&

QladY7caaYlg

() 89F9GCB A -'\$\$ G h

(, @/ H7F @ &'\$\$: h

(, @/ H7F A (*'\$\$: h

)& F5J9@B; A '*\$\$ G h

)+ K95H 9F-B; @ &'\$\$ G h

)+ K95H 9F-B; A &'\$\$ G h

QladYBiaVf. \$ HndY F 5fU))(\$\$\$ G h D7= *+

QladY7caaYlg

(, @/ H7F @ 88'\$\$: h

(, @/ H7F A %\$\$: h

)+ K95H 9F-B; @ &+\$\$ G h

)+ K95H 9F-B; A &+\$\$ G h

QladYBiaVf. % HndY F 5fU *+\$\$ G h D7=)(

QladY7caaYlg

(' 6@C7? 7F @ %6\$\$ G h

(, @/ H7F @ 89'\$\$: h

(, @/ H7F A '()'\$\$: h

)+ K95H 9F-B; @ ', \$\$\$ G h

)+ K95H 9F-B; A ', \$\$\$ G h

BVkf.	HC=	BuY	HmihjVU5)fbfIB?Ybh 7adY'	:jYX
6fUW	5S&	BuY	5dbSSfHm	Ig 5DFCB 5fU &,) G h
GMch	%	cZ %	: fca. HIkUuUUY&	H. <Ulf @g7chg! %%%((
GfZW	57	: Ua]m 5@SCH5dchg	NbY	7Uf]cfm FUb. G
5fU	&,) G h	@Y[h.	%\$: h	K]h. %\$: h
GUg	GU@Y[h.	: h	GVK]h.	: h >]h@Y[h. : h
Gci Xf.	GfYHhY		; fUY \$	@Ug \$
GMch7caaYlg				
Kcf_8UY %%%((		Kcf_HdY Bk 7chg]Vcb! :h]U		7cX BI !-B =AUcfA/ F. HiY
@g7chg! 8UY %%%((		HUgAdYg)		GfjYhX (
7cb]chg D7= ':-				
-hg]Vcb7caaYlg				
GadYBi aVf. %		HdY F	5fU	*\$(\$\$\$G h D7= '(
GadY7caaYlg				
(% 5@; 5HCF7F		A	, '\$\$ G h	
(' 6@C7? 7F		A	%%\$\$ G h	
(, @/ H7F		@	%%\$\$: h	
(, @/ H7F		A	), '\$\$ : h	
) + K95H 9F-B;		A	*\$(\$\$\$ G h	
GadYBi aVf. S&		HdY F	5fU	*, (\$\$\$G h D7= '*
GadY7caaYlg				
(% 5@; 5HCF7F		A	%%\$\$ G h	
(' 6@C7? 7F		A	%%\$\$ G h	
(, @/ H7F		A	*) \$\$: h	
) + K95H 9F-B;		A	*, (\$\$ G h	
GadYBi aVf. \$		HdY F	5fU	)+'\$\$G h D7= (*
GadY7caaYlg				
(' 6@C7? 7F		@	&\$\$ G h	
(' 6@C7? 7F		A	&\$\$ G h	
) + K95H 9F-B;		A	)+'\$\$ G h	
GadYBi aVf. \$)		HdY F	5fU	)%\$\$G h D7= (&
GadY7caaYlg				
(' 6@C7? 7F		A	)\$\$\$\$ G h	
) + K95H 9F-B;		A	)%\$\$ G h	

BVkf_	HC=	BláY	HmÁihjVU5)fbfIB?YBh'7ádY'	:jYX
6fUW	5<9cS%	BláY	<YjdxS/Hm	IgY <9@D58 5fU ++ž%Geh
GVfch	S&	cZ &	:fca. GVfcbS%	H. 9(YcZUjYh @Gj7chg! %%%((
GfáW	57	:Uá]m 5@SCH5dchg	NbY	7Uj]cfm FUb. G
5fU	',-ž), Geh	@Y[h.	ž+\$:h	K]h. %\$:h
GUg		GV@Y[h.	:h	GVK]h. :h >]h@Y[h. :h
Gci Xf.		GfYHhY	;fUY \$	@Ug \$
GVfcb7caaYhg				
Kcf_8UY %%%((		Kcf_HdY Bk7chg]Vfb!h]U		7cXY BI!B =AUcfA/ F. HiY
@Gj7chg!8UY ,#\$\$\$		HUUGádYg ++		GfjYhX ,
7cb]hcg D7= (*				
-hg]Vfb7caaYhg				
QádYBi aVf. <%%		HdY F	5fU	)S\$'SS Geh D7= (+
QádY7caaYhg				
(' 6@C7? 7F57?-B;		A	)S\$'SS Geh	
QádYBi aVf. <%&		HdY F	5fU	)S\$'SS Geh D7= (*(
QádY7caaYhg				
(' 6@C7? 7F57?-B;		@	)S\$'SS Geh	
QádYBi aVf. <%		HdY F	5fU	)S\$'SS Geh D7= (+
QádY7caaYhg				
(' 6@C7? 7F57?-B;		A	)S\$'SS Geh	
QádYBi aVf. <%(		HdY F	5fU	)S\$'SS Geh D7= ',
QádY7caaYhg				
(' 6@C7? 7F57?-B;		A	(*SS\$ Geh	
(' 6@C7? 7F57?-B;		<	(SS\$ Geh	
QádYBi aVf. <%)		HdY F	5fU	)S\$'SS Geh D7= (&
QádY7caaYhg				
(' 6@C7? 7F57?-B;		A	)S\$'SS Geh	
)& F5J9@B;		<	SS\$ Geh	
QádYBi aVf. <%#		HdY F	5fU	)S\$'SS Geh D7= ',
QádY7caaYhg				
(' 6@C7? 7F57?-B;		A	(*S\$'SS Geh	
(' 6@C7? 7F57?-B;		<	(SS\$ Geh	
QádYBi aVf. <%+		HdY F	5fU	)S\$'SS Geh D7= ',
QádY7caaYhg				
(' 6@C7? 7F57?-B;		A	(*S\$'SS Geh	
(' 6@C7? 7F57?-B;		<	(SS\$ Geh	
QádYBi aVf. <%		HdY F	5fU	)S\$'SS Geh D7=)*
QádY7caaYhg				
(' 6@C7? 7F57?-B;		@	'*S\$'SS Geh	
(' 6@C7? 7F57?-B;		A	%SS\$ Geh	

6fUBW	5<9@C\$%	BuY	<YdXS%Fm	Ig	<9@D58	5fU	++z%Gh
GWfch	\$%	cZ &	: fca.	9(YcZDjYaYh	H.	GWfcbS&	@Gf7chg! %%%((
GfZAW	57	: Ua]m	5@SCH5dchg	NbY	7Uf]cfm		FUb. G
5fU		',-z), Gh	@Y[h.	&+\$:h	K]h.	}%\$:h	
GUg		GU@Y[h.	:h	GVK]h.	:h	>]h@Y[h.	:h
Gci Xf.		GfYHhY		; fUY \$		@Ug \$	
GWfcb7caaYhg							
Kcf_8UY	%%%(	Kcf_HdY	Bk7chg]Vcb!h]U		7cXY BI!B		=AUcfA/ F. HiY
@Gf7chg!8UY	,#\$\$\$		HUGLadYg	++		GfjYhX	,
7cb]hcg	D7=	(*					
-hg]Vcb7caaYhg							
QadYBi aVf.	<%%	HdY	F	5fU	)\$%'\$Gh	D7=	(+
QadY7caaYhg							
(' 6@C7: 7F57?-B;		A		)\$%'\$Gh			
QadYBi aVf.	<%&	HdY	F	5fU	)\$%'\$Gh	D7=	*(
QadY7caaYhg							
(' 6@C7: 7F57?-B;		@		)\$%'\$Gh			
QadYBi aVf.	<%	HdY	F	5fU	)\$%'\$Gh	D7=	(+
QadY7caaYhg							
(' 6@C7: 7F57?-B;		A		)\$%'\$Gh			
QadYBi aVf.	<%(	HdY	F	5fU	)\$%'\$Gh	D7=	',
QadY7caaYhg							
(' 6@C7: 7F57?-B;		A		(*\$\$Gh			
(' 6@C7: 7F57?-B;		<		(\$\$Gh			
QadYBi aVf.	<%)	HdY	F	5fU	)\$%'\$Gh	D7=	(&
QadY7caaYhg							
(' 6@C7: 7F57?-B;		A		)\$%'\$Gh			
)& F5J9@B;		<		\$\$Gh			
QadYBi aVf.	<%'	HdY	F	5fU	)\$%'\$Gh	D7=	',
QadY7caaYhg							
(' 6@C7: 7F57?-B;		A		(*&'\$Gh			
(' 6@C7: 7F57?-B;		<		(\$\$Gh			
QadYBi aVf.	<+%	HdY	F	5fU	)\$%'\$Gh	D7=	',
QadY7caaYhg							
(' 6@C7: 7F57?-B;		A		(*&'\$Gh			
(' 6@C7: 7F57?-B;		<		(\$\$Gh			
QadYBi aVf.	<%	HdY	F	5fU	)\$%'\$Gh	D7=)*
QadY7caaYhg							
(' 6@C7: 7F57?-B;		@		'*&'\$Gh			
(' 6@C7: 7F57?-B;		A		%\$\$Gh			

BVkf.	HC=		BláY	HmÁiHjMU5)fbfIB?Bbh 7ádY'				
				:jYX				
GfUBW	FS-&		BláY	Fibkú!&Hfm	Ig	FIEK5M	5fU	*)SS\$Gé h
GfUBW	557		:lá]m 5@SCHFKg	NbY		7U[cfm		FUb. D
5fU		'&SSGé h	@Y[h.	'&:h	KPh.	%S:h		
GUg		GUV@Y[h.		:h	GUVKPh.	:h	>clh@Y[h.	:h
Gci Xf.		GfYHhY			; fUY \$		@Ug \$	
GfUBW	7caaYhg							
Kcf_SUY	%#%((		Kcf_HdY Bk 7chg Vfb! h]U			7cXY BI!B		=gAUcfA/ F. HiY
Kcf_SUY	'#4SS%		Kcf_HdY 7cXA]`&/'&CjYUm			7cXY 7A!C@&		=gAUcfA/ F. HiY
@g]hg'	SUY '#4SS%		HRUldYg +			GfjYK %		
7cb]hg	D7= %S							
-hg]	7caaYhg							
QádYBi aVf.	SS%		HdY F	5fU	)SS\$Gé h		D7= %S	
QádY	7caaYhg							
OBcS	gYg							

BYkcf.	HC=		BláY	HmÁih]MU5]fcbfIB?Ybh 7ádY'				
				: JYX				
GfUBW	FS-@		BláY	FibkÚn!& Ffm	I g	FIEK5M	5fU	*) \$\$\$G\$ h
GUVch	\$%		cZ'	: fca. FibkÚn: 9bX		H. GUVcb&&	@Gj7cbg! '#\$\$\$%	
GfZAW	557		: Úa]m 5@SCHFKg	NbY		7UWcfm	FUb. D	
5fU	%\$\$\$G\$ h		@Y[h.	%%&: h	KPh.	%%\$: h		
GUg			GUV@Y[h.	: h	GUVKPh.	: h	>cbh@Y[h.	: h
Gci Xf.			GfYWHhY		; fUY \$		@Ug \$	
GUVcb7caa Ylg								
Kcf_8UY	%\$\$\$&		Kcf_HdY Bk 7cbg! Vcb! :h]U			7cXY BI !B	=gAUcfA/ F. HiY	
Kcf_8UY	'#\$\$\$%		Kcf_HdY 7cXA]'&/'&CjYUm			7cXY 7A!C@&	=gAUcfA/ F. HiY	
@Gj7cbg! 8UY	'#\$\$\$%		HRUÚhdYg '\$			GfjYhX %		
7cbN]cbg	D7= %\$							
-hgN]cb7caa Ylg								
QádYBi aVf.	\$\$%		HdY	F	5fU	) \$\$\$G\$ h	D7= %\$	
QádY7caa Ylg								
OBc8]gYg								

BVkf., HC=	BLAY	HmAtjVU5)fbfIB?Ybh 7adY'	: JYX
6fUW F% &	BLAY	FibkUn%!' &fm	I g FIEK5M 5fU (-%\$\$Geh
GMch S&	cZ &	: fca. FibkUn!&	H. FibkUn&GK @g7chg! %%%((
GfZAW 57	: Ua]m 5@SCHFKg	NbY	7U]cfm Fub. D
5fU	'(, z\$\$Geh @Y[h.	'z, +: h	K]h. \$\$: h
GUg	GU@Y[h.	: h	GUVK]h. : h >]h@Y[h. : h
Gci Xf.	GfYHhY	; fUX \$	@Ug \$
GMch7caaYlg			
Kcf_8UY %%%((	Kcf_HdY Bk 7chg]Vcb! :h]U		7cXY BI !-B =AUcfA/ F. HiY
@g7chg]8UY %%%((	HUgAdYg +\$		GfjYhX %
7cb]chg D7= '+			
-hg]Vcb7caaYlg			
GadYBi aVf. \$	HdY F	5fU	)\$\$\$\$Geh D7= '-
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
(, @/ H7F	A	%)'\$\$: h	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. %	HdY F	5fU	)\$\$\$\$Geh D7= '+
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. %	HdY F	5fU	)\$\$\$\$Geh D7= '+
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. &	HdY F	5fU	)\$\$\$\$Geh D7= '+
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. &	HdY F	5fU	)\$\$\$\$Geh D7= '+
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. ')	HdY F	5fU	)\$\$\$\$Geh D7= '+
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. (%	HdY F	5fU	)\$\$\$\$Geh D7= '+
GadY7caaYlg			
(' 6@C7? 7F	A	)\$\$\$\$Geh	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	
)+ K95H 9F-B;	A	&\$\$\$\$Geh	
GadYBi aVf. (+	HdY F	5fU	)\$\$\$\$Geh D7= '*
GadY7caaYlg			
(' 6@C7? 7F	A	(\$\$\$\$\$Geh	
(, @/ H7F	A	%'\$\$\$: h	
)+ K95H 9F-B;	@	&\$\$\$\$Geh	

)+ K95H 9F-B;	A		QSSSS Gz h		
QladYBi aVF.)'	HrdY	F	5fU	)SSSSGz h	D7= '+
QladY7caaYlg					
(' 6@C7? 7F	A		)SSSS Gz h		
)+ K95H 9F-B;	@		QSSSS Gz h		
)+ K95H 9F-B;	A		QSSSS Gz h		
QladYBi aVF.)-	HrdY	F	5fU	)SSSSGz h	D7= '+
QladY7caaYlg					
(' 6@C7? 7F	A		)SSSS Gz h		
)+ K95H 9F-B;	@		QSSSS Gz h		
)+ K95H 9F-B;	A		QSSSS Gz h		
QladYBi aVF. *)	HrdY	F	5fU	)SSSSGz h	D7= '+
QladY7caaYlg					
(' 6@C7? 7F	A		)SSSS Gz h		
)+ K95H 9F-B;	@		QSSSS Gz h		
)+ K95H 9F-B;	A		QSSSS Gz h		

6fUBW	F%&	BuY	FibkUn' & fcm	I g	FIEK5M	5fU	(- %\$\$ Gz h
GMVch	5%	cZ &	: fca. FibkUn' 9bX		H. FibkUn' !@		@G77chg! %%%((
GfZAW	57	: Ua]m 5@SCHFKg	NbY		7UN]cfm		Fub. D
5fU	%' \$\$\$Gz h	@Y[h.	%' \$: h	K]h.	\$\$: h		
GUg		GUV@Y[h.	: h	GVK]h.	: h	>clh@Y[h.	: h
Gci Xf.		GfYHhY		; fUX \$		@Ug \$	
GMVch7caa Ylg							
Kcf_8UY %%%((		Kcf_HdY Bk7chg] Vcb! :h]U			7cXY BI !:B		=AUcfA/ F. HiY
@G77chg! 8UY %%%((		HUUGadYg &			GfjYhX)		
7cb]hcg D7= ':-							
-hg]hcb7caa Ylg							
GadYBi aVf. \$		HdY	F	5fU	) \$\$\$ \$ Gz h		D7= (%)
GadY7caa Ylg							
(' 6@C7? 7F		@		% \$ \$ Gz h			
(' 6@C7? 7F		A		' \$ \$ \$ Gz h			
(, @/ H7F		A		) \$ \$ : h			
) + K95H 9F-B;		A		\$ \$ \$ \$ Gz h			
GadYBi aVf. \$		HdY	F	5fU	) \$\$\$ \$ Gz h		D7= (\$
GadY7caa Ylg							
(' 6@C7? 7F		@		+ \$ \$ Gz h			
(' 6@C7? 7F		A		\$ \$ \$ \$ Gz h			
(, @/ H7F		A		% \$ \$: h			
) + K95H 9F-B;		@		\$ \$ \$ \$ Gz h			
) + K95H 9F-B;		A		\$ \$ \$ \$ Gz h			
GadYBi aVf. %		HdY	F	5fU	) \$\$\$ \$ Gz h		D7= '+
GadY7caa Ylg							
(' 6@C7? 7F		A		) \$ \$ \$ \$ Gz h			
) + K95H 9F-B;		@		\$ \$ \$ \$ Gz h			
) + K95H 9F-B;		A		\$ \$ \$ \$ Gz h			
GadYBi aVf. &		HdY	F	5fU	) \$\$\$ \$ Gz h		D7= ',
GadY7caa Ylg							
(' 6@C7? 7F		@		% \$ \$ Gz h			
(' 6@C7? 7F		A		' +) \$ \$ Gz h			
) + K95H 9F-B;		@		\$ \$ \$ \$ Gz h			
) + K95H 9F-B;		A		\$ \$ \$ \$ Gz h			
GadYBi aVf. &		HdY	F	5fU	) \$\$\$ \$ Gz h		D7= ',
GadY7caa Ylg							
(' 6@C7? 7F		@		% \$ \$ Gz h			
(' 6@C7? 7F		A		' +) \$ \$ Gz h			
) + K95H 9F-B;		@		\$ \$ \$ \$ Gz h			
) + K95H 9F-B;		A		\$ \$ \$ \$ Gz h			

GVkcf.	HC=	BláY	HmÁitjVU5)cbfIB?Ybh'7ádY'	:jYX
GFUW	H5%	BláY	HI]kÚ5%Fcm	IgY H5L-K5M 5fU %Z-9 Gē h
GVkch	S%	cZ %	: fca. FikÚ5!@	H. HI]kÚ5fUY'S% @Gj7chg' %Z-9&
GfZW	57	: Úa]m 5@SCH57HI]kÚg	NbY	7U]cfm FUb. G
5fU	%Z-9 Gē h	@Y]h.	SS:h	K]h.)S:h
GUg		GV@Y]h.	:h	GVK]h. :h >clh@Y]h. :h
Gci Xf.		GfYHhY	; fUY \$	@Ug \$
GVkcb7caaYlg				
Kcf_8UY %Z-9&		Kcf_HdY Bk7chg'Vcb!-h]U		7cXY BI!-B =gAUcfA/ F. HfY
@Gj7chg'8UY %Z-9&		HUcladyg &		GfjYhX &
7cb]hcg D7= +\$				
-hg]hcb7caaYlg				
CládYBiaVf. S%		HdY F	5fU	*@)SSGē h D7= +%
CládY7caaYlg				
(, @/ H7F		@	%SSS :h	
(, @/ H7F		A	%SSS :h	
)+ K95H 9F-B;		@	(*)'SS Gē h	
)+ K95H 9F-B;		A	%)SSS Gē h	
CládYBiaVf. S&		HdY F	5fU	))SSSSGē h D7= *-
CládY7caaYlg				
(, @/ H7F		@	%SSS :h	
(, @/ H7F		A	%SSS :h	
)+ K95H 9F-B;		@	(&SSS Gē h	
)+ K95H 9F-B;		A	%@SSS Gē h	

6fUW	H5&	BuY	HI]kU5&Hcm	IgY	H5L-K5M	5fU	%Z & G h
GU]ch	%	cZ %	: fca. FihkU5!&	H.	HI]kU5fUY%	@G]7ch! %%%((
GfZAW	57	: Ua]m 5@SCH57HI]kUg	NbY	7U]cfm		FU. G	
5fU	%Z & G h	@Y]h.	& : h	K]h.	)S: h		
GUg		GU@Y]h.	: h	GUVK]h.	: h	>cl]h@Y]h.	: h
Gci Xf.		GfY]HhY	; fUY \$			@Ug \$	
GU]cb7caa Ylg							
Kcf_8UY %%%((		Kcf_HdY Bk7ch]U]b! :h]U		7cXY BI!B		=AUcfA/ F. HiY	
@G]hgl'SUY %4+5%		HU]G]dYg &		GfjY]X &			
7ch]hcg D7=)%							
-hg]U]b7caa Ylg							
Q]dYBi aVf. %		HdY F	5fU	*, +)'\$\$G h		D7=)\$	
Q]dY7caa Ylg							
(' 6@C7? 7F		@	+\$\$\$\$ G h				
() 89DF9GCB		@	()'\$\$ G h				
() 89DF9GCB		A	%'\$\$ G h				
(, @/ H7F		A	(+'\$\$: h				
)+ K95H 9F-B;		A	*, +)'\$\$ G h				
Q]dYBi aVf. &&		HdY F	5fU	*-) '\$\$G h		D7=)&	
Q]dY7caa Ylg							
(' 6@C7? 7F		@	- \$\$\$ G h				
(' 6@C7? 7F		A	%\$\$\$\$ G h				
(, @/ H7F		A	& \$\$\$: h				
)+ K95H 9F-B;		A	*-) '\$\$ G h				

BVkf.	HC=	BlaY	Hm!i]VU5]fcbfIB?Ybh'7adY'	:YX			
6fUW	H'	BlaY	HI]kUis' Hcm	I g	H5L-K5M	5fU	%z%&Geh
GM]ch	S%	cZ %	: fca. FikUis!&	H.	HI]kUis'UY'S%	@g]7chg' %%%((
GfZAW	57	: Ua]m	5@SCH57HI]kUig Nby	7U]cfm	FU.	G	
5fU	%z%&Geh	@Y]h.	8g : h	K]h.	)S: h		
GUg	GU@Y]h.	: h	GUVK]h.	: h	>clh@Y]h.	: h	
Gci Xf.	GfYHhY		; fUY \$		@Ug \$		
GM]cb7caaYlg							
Kcf_8UY %%%((	Kcf_HdY Bk'7chg'Vcb! :h]U			7cXY BI!B	=AUcfA/ F. HiY		
@g]7chg'8UY %%%((	HU]GadYg (			GfjYhX '			
7cb]hcg D7= ((
-hg]M]cb7caaYlg							
GadYBi aVf. S%	HdY	F	5fU	'*)\$SSGeh	D7= ('		
GadY7caaYlg							
(' 6@C7: 7F	A		&SSGeh				
(, @/ H7F	A		%SS : h				
)+ K95H 9F-B;	A		'*)\$SS Geh				
GadYBi aVf. S&	HdY	F	5fU	'*\$SSGeh	D7= (%		
GadY7caaYlg							
(' 6@C7: 7F	@		+SSGeh				
(' 6@C7: 7F	A		+SSGeh				
(, @/ H7F	A		(SSG : h				
)+ K95H 9F-B;	A		'*\$SS Geh				
GadYBi aVf. \$	HdY	F	5fU	(' &'SSGeh	D7= (,		
GadY7caaYlg							
(' 6@C7: 7F	A		%' SSS Geh				
(, @/ H7F	A		&SS : h				
)+ K95H 9F-B;	A		(' &'SS Geh				

BVkf.	HC=	BlaY	HriAihjVU5)fbfIB?Ybh'7adY'					
6fUW	H7S%	BlaY	HI]kUn7dbNMf\$%Hcm	IgY	H5L-K5M	5fU	SS*, Gc h	
GM]ch	S%	cZ %	: fca. FihkUn(! &		H. HI]kUnDUY'S&		@Gj7chg! %%%((
GfZAW	57	: Ua]m	5@SCH57HI]kUg Nby		7UN]cfm		Fub. G	
5fU		SS*, Gc h	@Y[h.	'\$: h	K]Ph.	)\$ : h		
GUg		GU@Y[h.	: h	GVK]Ph.	: h	>clh@Y[h.	: h	
Gci Xf.		GfYHhN		; fUX \$		@Ug \$		
GM]cb7caaYlg								
Kcf_8UY %%%((		Kcf_HdY Bk7chg]Vcb! :h]U			7cXY BI !:B		=AUcfA/ F. HiY	
@Gj:hg]8UY %%%((		HUUGadYg)			GfjYhX '			
7db]hcg D7= ':-								
-hg]NM]cb7caaYlg								
QadYBiaVf. S%		HdY	F	5fU	', %'SS Gc h		D7= '+	
QadY7caaYlg								
(' 6@C7? 7F		A			', %'SS Gc h			
) + K95H 9F-B;		@			%9'SS Gc h			
) + K95H 9F-B;		A			%%'SS Gc h			
QadYBiaVf. \$		HdY	F	5fU	)SS'SS Gc h		D7= '*	
QadY7caaYlg								
(' 6@C7? 7F		A			)SS'SS Gc h			
() 89IF9GCB		A			SS'SS Gc h			
) + K95H 9F-B;		A			)SS'SS Gc h			
QadYBiaVf. \$		HdY	F	5fU	)SS'SS Gc h		D7= (&	
QadY7caaYlg								
(' 6@C7? 7F		A			)SS'SS Gc h			
) + K95H 9F-B;		A			)SS'SS Gc h			

BVkf.	HC=	BlaY	HmAtjVU5)bbfIB?Ybh 7adY'				
6fUW	H7S&	BlaY	HI]kUn7dbNMf'SSfcm	IgY	H5L-K5M	5fU	&z+%Ge h
GMVch	S%	cZ %	: fca. FibkUn(!' &		H. HI]kUnDUY'S%	@g7chg! %%%((
GfZAW	57	: Ua]m	5@SCH57HI]kUg Nby		7UN]cfm	Fub. G	
5fU	&z+%Ge h	@Y[h.	'-' :h	K]Ph.	)S: h		
GUg		GU@Y[h.	:h	GVK]Ph.	:h	>clh@Y[h.	:h
Gci Xf.		GfYHhN		; fUY \$		@Ug \$	
GMVcb7caaYlg							
Kcf_8UY %%%((		Kcf_HdY Bk7chgVcb! :h]U			7cXY BI !:B		=gAUcfA/ F. HiY
@g7chg! 8UY %%%((		HUQladYg *			GfjYkX '		
7db]hcg D7= (&							
-hgNMVcb7caaYlg							
QladYBiaVf. S%		HdY	F	5fU	*S)'SS Ge h	D7= (&	
QladY7caaYlg							
(' 6@C7? 7F		A			*S)'SS Ge h		
)+ K95H 9F-B;		A			*S)'SS Ge h		
QladYBiaVf. S&		HdY	F	5fU	)SSSS Ge h	D7= (&	
QladY7caaYlg							
(' 6@C7? 7F		A			)SSSS Ge h		
)+ K95H 9F-B;		A			)SSSS Ge h		
QladYBiaVf. S		HdY	F	5fU	)SSSS Ge h	D7= (&	
QladY7caaYlg							
(' 6@C7? 7F		A			)SSSS Ge h		
)+ K95H 9F-B;		A			)SSSS Ge h		

BVkf.	HC=	BláY	HmÁitjVU5)fbfIB?Ybh 7ádY'
			:jYX
GfUW	H7S	BláY	HI]kÚn7dbNMfS Hcm I gY H5L-K5M 5fU -j-+ Gz h
GWjch	S%	cZ %	: fca. <Yjdxs% H. HI]kÚnDUY'S @g7chg! %%%((
GfZAW	57	: Úa]m 5@SCH57HI]kúg	NbY 7UN]cfm FUb. G
5fU	-j-+ Gz h	@Y[h.	sss:h K]h. ') :h
GUg		GUV@Y[h.	:h GUVK]h. :h >ch@Y[h. :h
Gci Xf.		GfYHhY	; fUY \$ @Ug \$
GWjcb7caa Ylg			
Kcf_8UY %%%((		Kcf_HdY Bk 7chg Vcb! :h]U	7cXY BI !B =AUcfA/ F. HiY
@g7chg!8UY , #\$\$\$		HHUQladYg &	GfjYhX %
7db]hcg D7= *(
-hgNM]cb7caa Ylg			
QádYBiaVf. HK(!%	HdY	F	5fU (+, 'SS Gz h D7= *(
QádY7caa Ylg			
(' 6@C7? 7F57?-B;	@		(+, 'SS Gz h

BVkf. HC= BUAY HmiAitjVU5)fbfIB?Ybh 7adY' :YX

GFUW H5B; % BUAY HI]kUxU]f\$Hcm IgY H5L-K5M 5fU (%\$\$Geh

GM]ch % cZ % : fca. HI]kUxU]f\$Hcm H. H<U]Ug @G]7chg! %%%((

GfZAW 57 : Ua]m 5@SCH57HI]U]G Nby 7U]cfm Fub. H

5fU (%\$\$Geh @Y]h. +, \$: h K]h.)\$: h

GUg GUV@Y]h. : h GUVK]h. : h >clh@Y]h. : h

Gci Xf. GfYHhY ; fUY \$ @U]g \$

GM]cb7caaYlg

Kcf_8UY %%%((Kcf_HdY Bk7chg]V]b! :h]U 7cXV BI!B =AUcfA/ F. HiY

@G]i:hg]8UY %%%((HUUG]dyg , GfjYhX (

7cb]hcg D7=))

-hg]M]b7caaYlg

Q]dYBi aVf. % HdY F 5fU)- +\$\$Geh D7=))

Q]dY7caaYlg

() 89IF9GCB A &'\$\$ Geh

(, @/ H7F @ ('\$\$: h

(, @/ H7F A &'\$\$: h

)(G:CJ-B; A %\$\$ Geh

) + K95H:9F-B; @ &,'\$\$ Geh

) + K95H:9F-B; A &,'\$\$ Geh

Q]dYBi aVf. \$ HdY F 5fU)\$\$Geh D7=))

Q]dY7caaYlg

(, @/ H7F @ '\$\$\$\$: h

(, @/ H7F A &'\$\$: h

)& F5J9@B; @ \$\$\$Geh

)& F5J9@B; A (,'\$\$ Geh

) + K95H:9F-B; @ (+) \$\$\$ Geh

Q]dYBi aVf. \$ HdY F 5fU)%\$\$Geh D7=),

Q]dY7caaYlg

(, @/ H7F @ \$\$\$Geh

(, @/ H7F A &\$\$\$: h

)& F5J9@B; @ \$\$\$Geh

) + K95H:9F-B; @ (-, \$\$\$ Geh

Q]dYBi aVf. \$ HdY F 5fU (&'\$\$Geh D7=))

Q]dY7caaYlg

() 89IF9GCB A %\$\$ Geh

(, @/ H7F @ \$\$\$Geh

(, @/ H7F A &'\$\$: h

)& F5J9@B; @ \$\$\$Geh

) + K95H:9F-B; @ (\$ \$\$\$ Geh

BVkf_ HC= BUAY HmiAihjVU5)fbfHFB?YBh 7adV' :jYX

6fUW HD% BUAY HI]kUdUUY%Fm I g H5L-K5M 5fU '((z%Gh

GMch S& cZ (: fca. GUVbS% H. FibkUn6" & @G7chg! %%%((
GfZW 57 : Ua]m 5@SCH57HI]kUg Nby 7UN]dm Fub. D
5fU %)z+(Gch @Y[h. 'z: :h KPh.)S: h
GUg GUV@Y[h. :h GUVKPh. :h >ch@Y[h. :h
Gci Xf. GfYHhY ; fUY \$ @Ug \$
GMcb7caaYlg

Kcf_8UY %%%((Kcf_HdY Bk 7chg Vcb! :hJU 7cX BI !B =AUcfA/ F. HiY

@G7chg!8UY %%%((HUGadYg '' GfjYkX *
7ch]chg D7= ((
-hgN]cb7caaYlg

GadYBiaVf. \$ HdY F 5fU)SS\$Gch D7= (&
GadY7caaYlg
(' 6@C7? 7F @ %SS\$ Gch
(' 6@C7? 7F A %SS\$ Gch
(, @/ H7F @ %'SS :h
(, @/ H7F A &'SS :h
)+ K95H 9F-B; @ &SS\$ Gch
)+ K95H 9F-B; A &SS\$ Gch

GadYBiaVf. % HdY F 5fU)SS\$Gch D7= ((
GadY7caaYlg
(' 6@C7? 7F @)SS\$ Gch
(' 6@C7? 7F A %SS\$ Gch
(, @/ H7F @ %SS\$:h
(, @/ H7F A &S\$:h
)+ K95H 9F-B; @ &SS\$ Gch
)+ K95H 9F-B; A &SS\$ Gch

GadYBiaVf. % HdY F 5fU)SS\$Gch D7= (*
GadY7caaYlg
(' 6@C7? 7F @)SS\$ Gch
(' 6@C7? 7F A %SS\$ Gch
(, @/ H7F @ %'SS :h
(, @/ H7F A &S\$:h
)+ K95H 9F-B; @ &SS\$ Gch
)+ K95H 9F-B; A &SS\$ Gch

GadYBiaVf. % HdY F 5fU)SS\$Gch D7= (+
GadY7caaYlg
(, @/ H7F @ 'SS\$:h
(, @/ H7F A (\$S\$:h
)* GK9@@B; @ \$\$\$ Gch
)+ K95H 9F-B; @ &SS\$ Gch
)+ K95H 9F-B; A &SS\$ Gch

GadYBiaVf. & HdY F 5fU)SS\$Gch D7= ((
GadY7caaYlg
(, @/ H7F @ \$\$\$:h
(, @/ H7F A *(S\$:h
)+ K95H 9F-B; @ &SS\$ Gch
)+ K95H 9F-B; A &SS\$ Gch

GadYBiaVf. '% HdY F 5fU)SS\$Gch D7= '-
GadY7caaYlg
(' 6@C7? 7F @ %SS\$ Gch
(' 6@C7? 7F A &SS\$ Gch
(, @/ H7F A %SS\$:h
)+ K95H 9F-B; @ &SS\$ Gch
)+ K95H 9F-B; A &SS\$ Gch

BVkf.	HC=	BuY	HmihjVU5)cbfIB?Bbh7adY'				
6fUW	HD%	BuY	HI]kUdUUY%Fm	Ig	H5L-K5M	5fU	'((z%Gh
GMch	%	cZ (	: fca. HI]kU5%		H. GMcbS&	@g7chg!	%4S9&
GfZW	57	: Ua]m	5@SCH57HI]kUg	NbY	7U]cfm	Fb. D	
5fU		+ ,Z% Gc h	@Y[h.	% & : h	KPh.	)S: h	
GUg		GU@Y[h.	: h	GVKPh.	: h	>clh@Y[h.	: h
Gci Xf.		GfYHhY		; fUY \$		@Ug \$	
GMcb7caaYlg							
Kcf_8UY	%4S9&	Kcf_HdY	Bk7chgVcb!h]U		7cX BI!B		=AUcfA/ F. HiY
@g7chg!	%4S9&		HUcladyg %		GfjYhX)		
7cb]chg	D7= ++						
-hgNMcb7caaYlg							
QadYBi aVf.	\$	HdY	F	5fU	)SS\$Gc h	D7= , &	
QadY7caaYlg							
(, @/ H7F		@		%\$: h			
(, @/ H7F		A		\$' : h			
)+ K95H 9F-B;		@		)SS\$ Gc h			
QadYBi aVf.	\$	HdY	F	5fU	)SS\$Gc h	D7= +(
QadY7caaYlg							
(, @/ H7F		@		%\$: h			
(, @/ H7F		A		%\$: h			
)+ K95H 9F-B;		@		)SS\$ Gc h			
QadYBi aVf.	\$	HdY	5	5fU	)SS\$Gc h	D7= +(
QadY7caaYlg							
(, @/ H7F		@		%\$: h			
(, @/ H7F		A		'- : h			
)\$ D5H<-B;		@		%\$ Gc h			
)+ K95H 9F-B;		@		(, \$Gc h			
QadYBi aVf.	%	HdY	F	5fU	)SS\$Gc h	D7= +	
QadY7caaYlg							
(, @/ H7F		@		%\$: h			
(, @/ H7F		A		(' : h			
)+ K95H 9F-B;		@		)SS\$ Gc h			
QadYBi aVf.	%	HdY	F	5fU	)SS\$Gc h	D7= +(
QadY7caaYlg							
(, @/ H7F		@		%\$: h			
(, @/ H7F		A		%\$: h			
)+ K95H 9F-B;		@		)SS\$ Gc h			

6fUW	HD%	BuY	HI]kUdUUY'S'fcm	Ig	H5L-K5M	5fU	'((z%Geh
GM]ch \$		cZ (	: fca. FibkUn6! &		H. GM]cbS		@g]7chg! %%%((
GfZW 57		: Ua]m 5@SCH57HI]kUg	NbY		7U]cfm		FUb. D
5fU		'z+ Geh	@Y[h.	*) :h	K]h.	)S: h	
GUg		GU@Y[h.	:h	GVK]h.	:h	>clh@Y[h.	:h
Gci Xf.		GfYHhY		; fUY \$		@Ug \$	
GM]cb7caaYlg							
Kcf_8UY %%%((		Kcf_HdY Bk7chg]Vcb! :h]U			7cXY BI !:B		=AUcfA/ F. HiY
@g]7chg]8UY %%%((		HU]G]adYg +			GfjYhX (
7cb]hcg D7= (\$							
-hg]M]cb7caaYlg							
QadYBi aVf. S&		HdY	F	5fU	(, \$\$\$Geh	D7= (&	
QadY7caaYlg							
(' 6@C7? 7F		A		(, \$\$\$ Geh			
) + K95H 9F-B;		A		(, \$\$\$ Geh			
QadYBi aVf. \$		HdY	F	5fU	) \$\$\$Geh	D7= ',	
QadY7caaYlg							
(' 6@C7? 7F		A		' + \$\$\$ Geh			
(, @/ H7F		A		\$\$\$:h			
) + K95H 9F-B;		@		\$ \$\$\$ Geh			
) + K95H 9F-B;		A		\$ \$\$\$ Geh			
QadYBi aVf. \$		HdY	F	5fU	) \$\$\$Geh	D7= '+	
QadY7caaYlg							
(' 6@C7? 7F		@		% \$\$\$ Geh			
(' 6@C7? 7F		A		\$ \$\$\$ Geh			
(, @/ H7F		A		' \$\$\$:h			
) + K95H 9F-B;		@		\$ \$\$\$ Geh			
) + K95H 9F-B;		A		\$ \$\$\$ Geh			
QadYBi aVf. \$		HdY	F	5fU	) - \$' \$\$\$Geh	D7= (&	
QadY7caaYlg							
(' 6@C7? 7F		A		) - \$' \$\$\$ Geh			
) + K95H 9F-B;		@		) - \$' \$\$\$ Geh			

BVkf.	HC=	BuY	HmAtjVU5)cbfIB?Bbh 7adY'	:jYX
6fUW	HD%	BuY	HI]kUdUUY'%Hm	IgY H5L-K5M 5fU '((z%Gh
GVfch S	cZ (: fca.	GVfcbS	H. FibkUn!@	@Gf7chg! %%%((
GfZAW 57	:Ua]m 5@SCH57HI]kUg	NbY	7U]cfm	Fub. D
5fU	*!z%Gh @Y]h.	%z : h	K]h.	)S: h
GUg	GU@Y]h.	: h	GVK]h.	: h >]h@Y]h. : h
Gci Xf.	GfYHhY	; fUY \$		@Ug \$
GVfcb7caaYlg				
Kcf_8UY %%%((	Kcf_HdY Bk 7chg]Vcb! :h]U		7cXY BI !-B	=AUcfA/ F. HfY
@Gf7chg]8UY %%%((	HUUGadYg %		GfjYhX (
7cb]hcg D7= (&				
-hg]Vcb7caaYlg				
GadYBi aVf. S&	HdY F	5fU	)SS\$Gh	D7= ((
GadY7caaYlg				
(' 6@C7? 7F	A	\$SS\$ Gh		
(, @/ H7F	@	('SS : h		
(, @/ H7F	A	%SS : h		
)+ K95H 9F-B;	@	\$SS\$ Gh		
)+ K95H 9F-B;	A	\$SS\$ Gh		
GadYBi aVf. 9	HdY F	5fU	)SS\$Gh	D7= '-
GadY7caaYlg				
(' 6@C7? 7F	@	%SS\$ Gh		
(' 6@C7? 7F	A	\$SS\$ Gh		
(, @/ H7F	A	%)'SS : h		
)+ K95H 9F-B;	@	\$SS\$ Gh		
)+ K95H 9F-B;	A	\$SS\$ Gh		
GadYBi aVf. \$	HdY F	5fU	)SS\$Gh	D7= ('
GadY7caaYlg				
(' 6@C7? 7F	@	\$SS\$ Gh		
(' 6@C7? 7F	A	\$SS\$ Gh		
)+ K95H 9F-B;	A	)SS\$ Gh		
GadYBi aVf. %	HdY F	5fU	)%\$Gh	D7= ('
GadY7caaYlg				
(' 6@C7? 7F	@	%\$ Gh		
(' 6@C7? 7F	A	'+) \$ Gh		
)+ K95H 9F-B;	A	)%\$ Gh		

BVkf. HC= BUAY HmiAihjVU5)fbfIB?Ybh 7adY' :jYX

GFUBW HD&& BUAY HI]kUdUUY'SSfcm IgY H5L-K5M 5fU &S%' G:h

GVfch S& cZ ' : fca. FibkUis!& H. HI]kUdUUY'S% @Gj7chg' (#%#+

GfZAW 57 :Ua]m 5@SCH57HI]kUg Nby 7U]cfm FUb. D

5fU %Z* G:h @Y[h. &S:h K]h.)S:h

GUg GUV@Y[h. :h GUVK]h. :h >ch@Y[h. :h

Gci Xf. GfYHhY ; fUY \$ @Ug \$

GVfcb7caaYhg Kcf_8UY %&&SS Kcf_HdY Bk7chg' Vcb! :h]U 7cX BI !:B =gAUcfA/ F. HiY

Kcf_8UY (#%#+ Kcf_HdY Bk7chg' Vcb! :h]U 7cX BI !:B =gAUcfA/ F. HiY

@Gj7chg'8UY %&&SS% HUGhdYg & GfjYhX &

7cb]hdg D7= '- -hg]Vcb7caaYhg

GhdYBi aVf. S% HdY F 5fU *+'('SS G:h D7= (&

GhdY7caaYhg

(' 6@C7? 7F A *+'('SS G:h

)+ K95H 9F-B; A *+'('SS G:h

GhdYBi aVf. S& HdY F 5fU *+')'SS G:h D7= '+

GhdY7caaYhg

(' 6@C7? 7F A *+')'SS G:h

)\$ D5H<-B; @ (SSSS G:h

)+ K95H 9F-B; A *+')'SS G:h

6fUBW	HD&&	BuY	HI]kUdUUY'SSfcm	I gY	H5L-K5M	5fU	&82%' Ge h
GM]ch \$	cZ ' : fca.	HI]kUdUUY'S%	H. FibkUn6!' &	@G]7chg! %%%((
GfZW 57	: Ua]m 5@SCH57HI]kUg NdbY		7UN]cfm	FUb. D			
5fU	%+Z** Ge h @Y[h. &.) : h	K]Ph.	)S: h				
GUg	GU@Y[h. : h	GVK]Ph.	: h	>clh@Y[h. : h			
Gci Xf.	GfYHhNf	; fUX \$		@Ug \$			
GM]cb7caaYlg							
Kcf_8UY %%%((	Kcf_HdY Bk7chg]Vcb! :h]U		7cXY BI !-B	=AUcfA/ F. HiY			
@G]hgl'SUY %4+8%	HUUGadYg ' \$		GfjYhX)				
7cb]hcg D7= (&							
-hg]M]cb7caaYlg							
QadYBi aVf. \$	HdY F	5fU	)SS\$S Ge h	D7= (&			
QadY7caaYlg							
(' 6@C7? 7F	A	)SS\$S Ge h					
)+ K95H 9F-B;	A	)SS\$S Ge h					
QadYBi aVf. \$	HdY F	5fU	)SS\$S Ge h	D7= (&			
QadY7caaYlg							
(' 6@C7? 7F	A	)SS\$S Ge h					
)+ K95H 9F-B;	A	)SS\$S Ge h					
QadYBi aVf. %	HdY F	5fU	)SS\$S Ge h	D7= (&			
QadY7caaYlg							
(' 6@C7? 7F	A	)SS\$S Ge h					
)+ K95H 9F-B;	A	)SS\$S Ge h					
QadYBi aVf. &	HdY F	5fU	)SS\$S Ge h	D7= (&			
QadY7caaYlg							
(' 6@C7? 7F	A	)SS\$S Ge h					
)+ K95H 9F-B;	A	)SS\$S Ge h					

GFUBW	HD&&	BuY	HI]kUdUUY'S&Hm	I gY	H5L-K5M	5fU	&82%' Gz h
GMVch	%	cZ '	: fca. FikU9(!' &		H. FikU9(!' &		@G7chg' %%%((
GfZAW	57	: Ua]m 5@SCH57HI]kUg	NbY		7U9]cfm		Fub. D
5fU		- \$), Gz h @Y[h.	%%: h	K]h.	)S: h		
GUg		GU@Y[h.	: h	GVK]h.	: h	>clh@Y[h.	: h
Gci Xf.		GfYHhY		; fUY \$		@Ug \$	
GMVcb7caaYhg							
Kcf_8UY %%%((		Kcf_HdY Bk7chg' Vcb! :h]U			7cXY BI !-B		=AUcfA/ F. HiY
@G7chg' 8UY %%%((		HUUGadYg %			GfjYhX)		
7cb]chg D7= ',							
-hg]cb7caaYhg							
QadYBi aVf. %		HdY	F	5fU	)SSSS Gz h		D7= '-
QadY7caaYhg							
(' 6@C7? 7F		A		)SSSS Gz h			
)+ K95H 9F-B;		@		&SSSS Gz h			
)+ K95H 9F-B;		A		&SSSS Gz h			
QadYBi aVf. %		HdY	F	5fU	)SSSS Gz h		D7= (&
QadY7caaYhg							
(' 6@C7? 7F		A		)SSSS Gz h			
)+ K95H 9F-B;		A		)SSSS Gz h			
QadYBi aVf. \$		HdY	F	5fU	)SSSS Gz h		D7= (&
QadY7caaYhg							
(' 6@C7? 7F		A		)SSSS Gz h			
)+ K95H 9F-B;		A		)SSSS Gz h			
QadYBi aVf. %		HdY	F	5fU	)SSSS Gz h		D7= (&
QadY7caaYhg							
(' 6@C7? 7F		A		)SSSS Gz h			
)+ K95H 9F-B;		A		)SSSS Gz h			
QadYBi aVf. %		HdY	F	5fU	*%)'SS Gz h		D7= &
QadY7caaYhg							
(' 6@C7? 7F		A		*%)'SS Gz h			
() 89F9GCB		A		%)'SS Gz h			
)& F5J9@B;		A		%)'SS Gz h			
)+ K95H 9F-B;		@		&SSSS Gz h			
)+ K95H 9F-B;		A		&SSSS Gz h			

6fUW	HD	BuY	HI]kUdUUY'S Hm	Ig	H5L-K5M	5fU	(' &((G h
GM]ch	%	cZ &	: fca. <YdXS%		H. GM]cbSS&	@G]7chg! %%%((
GfZAW	57	: Ua]m 5@SCH57HI]kUg	NbY		7U]cfm	Fub. D	
5fU		@Y]h.	(Z&: h	K]Ph.	)S: h		
GUg		GU@Y]h.	: h	GVK]Ph.	: h	>cl]h@Y]h.	: h
Gci Xf.		GfY]HhY	; fUX \$		@Ug \$		
GM]cb7caaYlg							
Kcf_8UY %%%((		Kcf_HdY Bk7chg]V]b! :h]U			7cXY BI !:B	=AUcfA/ F. HiY	
@G]i:hg]!8UY , #\$\$\$		HU]G]adYg (%)			GfjYhX)		
7cb]H]hg D7= (-							
-hg]N]b7caaYlg							
QadYBi aVf. DH!%		HdY F	5fU	)SS\$G h	D7=)-		
QadY7caaYlg							
(' 6@C7? 7F57?-B;		@	)SS\$G h				
(, @CB; H 8-B5@F5BGJ9FC@		<	)\$SS : h				
7F57?-B;							
QadYBi aVf. DH!&		HdY F	5fU	)SS\$G h	D7= *\$		
QadY7caaYlg							
(' 6@C7? 7F57?-B;		@	(,)SS\$G h				
)\$ D5H<-B;		@	%\$SS\$G h				
QadYBi aVf. DH!'		HdY F	5fU	)SS\$G h	D7= *%		
QadY7caaYlg							
(' 6@C7? 7F57?-B;		@	)SS\$G h				
)\$ D5H<-B;		@	)\$SS\$G h				
QadYBi aVf. DH!(		HdY F	5fU	)SS\$G h	D7= ('		
QadY7caaYlg							
(' 6@C7? 7F57?-B;		@	&\$SS\$G h				
(' 6@C7? 7F57?-B;		A	&\$SS\$G h				
)& F5J9@B;		@	&\$SS\$G h				
QadYBi aVf. DH!)		HdY F	5fU	)SS\$G h	D7= &&		
QadY7caaYlg							
(' 6@C7? 7F57?-B;		<	)SS\$G h				

6fUW	HD	BuY	HI]kUdUUY'S Hm	Ig	H5L-K5M	5fU	(' &((G h
GU]ch S&	cZ &	: fca.	GU]cbS%	H.	FibkUn6! &	@G]7chg! %%%((
GfZAW 57	: Ua]m 5@SCH57HI]kUg	NbY		7UN]cfm		Fub. D	
5fU	S%ZSSG h	@Y]h.	(ZS: h	K]Ph.	)S: h		
GU]g	GU]@Y]h.	: h	GU]VK]Ph.	: h	>cl]h@Y]h.	: h	
Gci Xf.	GfY]HhY		; fUX \$		@U]g \$		
GU]cb7caa Ylg							
Kcf_8UY %%%((	Kcf_HdY Bk7chg]V]cb! :h]U			7cXY BI !-B		=AUcfA/ F. HiY	
@G]i:hg]!8UY , #\$\$\$	HU]G]adYg (%)			GfjY]kX)			
7cb]V]chg D7= (-							
-hg]N]V]cb7caa Ylg							
QadYBi aVf. DH!%	HdY	F	5fU	)SS\$G h		D7=)-	
QadY7caa Ylg							
(' 6@C7? 7F57?-B;	@		)SS\$G h				
(, @CB; H 8-B5@F5BGJ9FC@	<		)\$SS : h				
7F57?-B;							
QadYBi aVf. DH!&	HdY	F	5fU	)SS\$G h		D7= *\$	
QadY7caa Ylg							
(' 6@C7? 7F57?-B;	@		(,)SS\$G h				
)\$ D5H<-B;	@		%\$SS G h				
QadYBi aVf. DH!'	HdY	F	5fU	)SS\$G h		D7= *%	
QadY7caa Ylg							
(' 6@C7? 7F57?-B;	@		)SS\$G h				
)\$ D5H<-B;	@		)\$SS G h				
QadYBi aVf. DH!(	HdY	F	5fU	)SS\$G h		D7= ('	
QadY7caa Ylg							
(' 6@C7? 7F57?-B;	@		&\$SS\$ G h				
(' 6@C7? 7F57?-B;	A		&\$SS\$ G h				
)& F5J9@B;	@		&\$SS\$ G h				
QadYBi aVf. DH!)	HdY	F	5fU	)SS\$G h		D7= &&	
QadY7caa Ylg							
(' 6@C7? 7F57?-B;	<		)SS\$G h				

APPENDIX E
DISTRESS SUMMARY REPORT



Troy Municipal Airport ATN Kenneth Campbell Field (10)

BarndID	SectionID	Surface ¹	Area(sf)	Distress Number	Description	Distress Mechanism	Severity	Quantity	Quantity Units	Distress Density
AO1	01	AC	63,98E	4E	HOCKCRACKING	Climate/Durability	Low	347E	Sqft	54%
AO1	01	AC	63,98E	4E	DEPRESSION	Other	Medium	2A	Sqft	00%
AO1	01	AC	63,98E	4E	LONGITUDINAL/TRANSVERSE	Climate/Durability	Low	243E	R	39%
AO1	01	AC	63,98E	4E	LONGITUDINAL/TRANSVERSE	Climate/Durability	Medium	3,53E	R	56%
AO1	01	AC	63,98E	5E	RAVING	Climate/Durability	Medium	9E	Sqft	02%
AO1	01	AC	63,98E	5E	WEATHERING	Climate/Durability	Low	31,90E	Sqft	499%
AO1	01	AC	63,98E	5E	WEATHERING	Climate/Durability	Medium	31,97E	Sqft	500%
AOE	01	AC	29,58E	4I	ALLIGATORCRACKING	Load	Medium	23I	Sqft	08%
AOE	01	AC	29,58E	4E	HOCKCRACKING	Climate/Durability	Low	311C	Sqft	105%
AOE	01	AC	29,58E	4E	HOCKCRACKING	Climate/Durability	Medium	12,34I	Sqft	416%
AOE	01	AC	29,58E	4E	LONGITUDINAL/TRANSVERSE	Climate/Durability	Low	12I	R	04%
AOE	01	AC	29,58E	4E	LONGITUDINAL/TRANSVERSE	Climate/Durability	Medium	1,53E	R	52%
AOE	01	AC	29,58E	5E	WEATHERING	Climate/Durability	Medium	29,53E	Sqft	1000%
ROZE	01	AC	151,20I		NODISTRESS					
ROZE	0E	AC	48,50I		NODISTRESS					
ROZE	0E	AC	32,50I		NODISTRESS					
R143	01	AC	14300I	4E	HOCKCRACKING	Climate/Durability	Low	2574I	Sqft	180%
R143	01	AC	14300I	4E	HOCKCRACKING	Climate/Durability	Medium	1029C	Sqft	720%
R143	01	AC	14300I	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	1,144R	Rt	08%
R143	01	AC	14300I	5E	WEATHERING	Climate/Durability	Low	57,20I	Sqft	400%
R143	01	AC	14300I	5E	WEATHERING	Climate/Durability	Medium	71,50I	Sqft	500%
R143	0E	AC	38,70I	4E	HOCKCRACKING	Climate/Durability	Medium	3328C	Sqft	955%
R143	0E	AC	38,70I	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	2,124R	Rt	06%
R143	0E	AC	38,70I	5E	WEATHERING	Climate/Durability	Low	1743C	Sqft	500%
R143	0E	AC	38,70I	5E	WEATHERING	Climate/Durability	Medium	1743C	Sqft	500%
TA1	01	AC	11,70E	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Low	270R	Rt	23%
TA1	01	AC	11,70E	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	220R	Rt	19%
TA1	01	AC	11,70E	5E	WEATHERING	Climate/Durability	Low	890E	Sqft	761%
TA1	01	AC	11,70E	5E	WEATHERING	Climate/Durability	Medium	280I	Sqft	239%

Troy Municipal Airport AT/N Kenneth Campbell Field (10)

BarthID	SectionID	Surface ¹	Area(sf)	Distress Number	Description	Distress Mechanism	Severity	Quantity	Quantity Units	Distress Density
TA2	01	AC	1382	4	CRACKING	Climate/Durability	Low	160	Sqft	11.7%
TA2	01	AC	1382	4	CRACKING	Climate/Durability	Medium	160	Sqft	11.6%
TA2	01	AC	1382	4	DEPRESSION	Other	Low	4	Sqft	0.3%
TA2	01	AC	1382	4	DEPRESSION	Other	Medium	15	Sqft	0.1%
TA2	01	AC	13825	48	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	71	Rt	51%
TA2	01	AC	1382	5	WEATHERING	Climate/Durability	Medium	1382	Sqft	100%
TA3	01	AC	15912	4	CRACKING	Climate/Durability	Low	93	Sqft	60%
TA3	01	AC	15912	4	CRACKING	Climate/Durability	Medium	622	Sqft	39.1%
TA3	01	AC	15912	48	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	1,113	Rt	70%
TA3	01	AC	15912	5	WEATHERING	Climate/Durability	Medium	15912	Sqft	100%
TK01	01	AC	2096	4	CRACKING	Climate/Durability	Medium	2096	Sqft	100%
TK01	01	AC	2096	4	DEPRESSION	Other	Medium	30	Sqft	1.4%
TK01	01	AC	2096	5	WEATHERING	Climate/Durability	Low	280	Sqft	13.3%
TK01	01	AC	2096	5	WEATHERING	Climate/Durability	Medium	1807	Sqft	86.2%
TK02	01	AC	26871	4	CRACKING	Climate/Durability	Medium	26871	Sqft	100%
TK02	01	AC	26871	5	WEATHERING	Climate/Durability	Medium	26871	Sqft	100%
THNG01	01	AC	41,800	4	DEPRESSION	Other	Medium	8	Sqft	0.2%
THNG01	01	AC	41,800	48	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Low	1,160	Rt	2.8%
THNG01	01	AC	41,800	48	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	2,191	Rt	5.2%
THNG01	01	AC	41,800	5	RAVING	Climate/Durability	Low	1,230	Sqft	2.9%
THNG01	01	AC	41,800	5	RAVING	Climate/Durability	Medium	98	Sqft	0.2%
THNG01	01	AC	41,800	5	SHOVING	Other	Medium	30	Sqft	0.7%
THNG01	01	AC	41,800	5	WEATHERING	Climate/Durability	Low	31,332	Sqft	82.2%
THNG01	01	AC	41,800	5	WEATHERING	Climate/Durability	Medium	6,119	Sqft	14.6%
TR01	01	AC	78,188	48	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Low	1,624	Rt	2.1%
TR01	01	AC	78,188	48	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	1,040	Rt	1.3%

Troy Municipal Airport AT/N Kenneth Campbell Field (10)

BarthID	SectionID	Surface ¹	Area(sf)	Distress Number	Description	Distress Mechanism	Severity	Quantity	Quantity Units	Distress Density
TFOI	01	AC	78,18E	5	PAVING	Climate/Durability	Low	18	Sqft	02%
TFOI	01	AC	78,18E	5	WEATHERING	Climate/Durability	Low	78,00E	Sqft	998%
TFOI	0E	AC	165,974	4E	BLOCKCRACKING	Climate/Durability	Low	17,704	Sqft	107%
TFOI	0E	AC	165,974	4E	BLOCKCRACKING	Climate/Durability	Medium	33,19E	Sqft	200%
TFOI	0E	AC	165,974	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Low	4,9E2	Rt	30%
TFOI	0E	AC	165,974	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	10,7E1	Rt	65%
TFOI	0E	AC	165,974	5E	SWELLING	Other	Low	1,10E	Sqft	07%
TFOI	0E	AC	165,974	5	WEATHERING	Climate/Durability	Low	82,9E	Sqft	500%
TFOI	0E	AC	165,974	5	WEATHERING	Climate/Durability	Medium	82,9E	Sqft	500%
TFOI	0E	AC	37,37E	4E	BLOCKCRACKING	Climate/Durability	Low	2,164	Sqft	58%
TFOI	0E	AC	37,37E	4E	BLOCKCRACKING	Climate/Durability	Medium	30,5E	Sqft	81.7%
TFOI	0B	AC	37,379	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	9E6	Rt	25%
TFOI	0E	AC	37,37E	5	WEATHERING	Climate/Durability	Low	19,704	Sqft	527%
TFOI	0E	AC	37,37E	5	WEATHERING	Climate/Durability	Medium	17,6E	Sqft	473%
TFOI	04	AC	63,2E	4E	BLOCKCRACKING	Climate/Durability	Low	15,894	Sqft	251%
TFOI	04	AC	63,2E	4E	BLOCKCRACKING	Climate/Durability	Medium	35,404	Sqft	560%
TFOI	04	AC	63,2E0	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Low	13E1	Rt	02%
TFOI	04	AC	63,2E0	4B	LONGITUDINAL/TRANSVERSE CRACKING	Climate/Durability	Medium	9E6	Rt	15%
TFOI	04	AC	63,2E	5	WEATHERING	Climate/Durability	Low	15,7E	Sqft	249%
TFOI	04	AC	63,2E	5	WEATHERING	Climate/Durability	Medium	47,5E4	Sqft	751%
TFOE	01	AC	90,8E	4E	BLOCKCRACKING	Climate/Durability	Medium	89,154	Sqft	981%
TFOE	01	AC	90,8E	4E	DEPRESSION	Other	Medium	51E	Sqft	06%
TFOE	01	AC	90,8E	5E	RAVING	Climate/Durability	Medium	5,1E1	Sqft	56%
TFOE	01	AC	90,8E	5	WEATHERING	Climate/Durability	Low	16,3E	Sqft	180%
TFOE	01	AC	90,8E	5	WEATHERING	Climate/Durability	Medium	67,5E	Sqft	744%
TFOE	0E	AC	13,4E	4E	BLOCKCRACKING	Climate/Durability	Medium	13,4E	Sqft	1000%
TFOE	0E	AC	13,4E	5	PAVING	Climate/Durability	Low	40	Sqft	30%

) o k
Troy Municipal Airport At N Kenneth Campbell Field (IO)

BarndID	SectionID	Surface¹	Area(sf)	Distress Number	Description	Distress Mechanism	Severity	Quantity	Quantity Units	Distress Density
TPO	OE	AC	1346	5	WEATHERING	Climate/Durability	Medium	1306	Sqft	970%
TPO	OE	AC	14786	4	BLOCKCRACKING	Climate/Durability	Medium	14786	Sqft	1000%
TPO	OE	AC	14786	5	WEATHERING	Climate/Durability	Medium	14786	Sqft	1000%

¹ AC= Asphalt Cement Concrete, AAC= Asphalt Overlay AC, RCC= Portland Cement Concrete, APC= Asphalt Overlay RCC

² ICD= last construction date. The date of the last major pavement rehabilitation (eg AC Overlay)

APPENDIX F

PAVEMENT CONDITION REPORTS

F1: Section Forecasted Pavement Condition Rating

F2: Branch PCI Rating

F3: Branch FOD Rating



Appendix F1
Forecasted Section PCI
Troy Municipal Airport At N Kenneth Campbell Field (TOI)

Branch ID	Section ID	Forecasted PCI						
		2021	2022	2023	2024	2025	2026	2027
A01	01	50	48	46	44	42	39	37
A02	01	36	34	32	30	28	25	23
R0725	01	100	99	98	97	96	94	93
R0725	02	100	99	98	97	96	94	93
R0725	03	100	99	98	97	96	94	93
R1432	01	34	30	26	21	17	13	8
R1432	02	32	28	24	19	15	11	6
TA1	01	66	62	57	52	48	45	43
TA2	01	46	45	41	38	34	30	27
TA3	01	40	36	33	29	26	22	19
TC01	01	35	31	28	24	21	17	14
TC02	01	38	34	31	27	24	20	17
THANG01	01	49	46	44	40	37	33	30
TP01	01	75	72	70	66	62	57	52
TP01	02	40	36	33	29	26	22	19
TP01	03	36	32	29	25	22	18	15
TP01	04	38	34	31	27	24	20	17
TP02	01	34	30	27	23	20	16	13
TP02	02	35	31	28	24	21	17	14
TP02	03	38	34	31	27	24	20	17

Pavement Database: ALDOT_220316

Branch ID	Number of Sections	Sum Section Length (Ft)	Avg Section Width (Ft)	True Area (SqFt)	Use	Average PCI	Standard Deviation PCI	Weighted Average PCI
A01	1	315.00	150.00	63,985.00	APRON	53.00	0.00	53.00
A02	1	140.00	140.00	29,585.00	APRON	39.00	0.00	39.00
R0725	3	6,522.00	100.00	652,200.00	RUNWAY	100.00	0.00	100.00
R1432	2	4,917.00	100.00	491,700.00	RUNWAY	38.00	1.00	37.58
TA1	1	200.00	50.00	11,705.00	TAXIWAY	70.00	0.00	70.00
TA2	1	225.00	50.00	13,825.00	TAXIWAY	51.00	0.00	51.00
TA3	1	225.00	50.00	15,912.00	TAXIWAY	44.00	0.00	44.00
TC01	1	360.00	50.00	20,968.00	TAXIWAY	39.00	0.00	39.00
TC02	1	393.00	50.00	26,871.00	TAXIWAY	42.00	0.00	42.00
THANG01	1	780.00	50.00	41,800.00	TAXIWAY	55.00	0.00	55.00
TP01	4	6,674.00	50.00	344,801.00	TAXIWAY	50.75	15.22	50.68
TP02	3	4,860.00	50.00	252,193.00	TAXIWAY	39.67	1.70	40.40

3/18/2022

Branch Condition Report

Page 2 of 2

Pavement Database: ALDOT_220316

Use Category	Number of Sections	Total Area (SqFt)	Arithmetic Average PCI	Average STD PCI	Weighted Average PCI
APRON	2	93,570.00	46.00	7.00	48.57
RUNWAY	5	1,143,900.00	75.20	30.38	73.17
TAXIWAY	13	728,075.00	47.92	11.93	46.88
ALL	20	1,965,545.00	54.55	21.69	62.26

3/18/2022

Branch Condition Report

Page 1 of 2

Pavement Database: ALDOT_220316

Branch ID	Number of Sections	Sum Section Length (Ft)	Avg Section Width (Ft)	True Area (SqFt)	Use	Average FOD Potential	Standard Deviation FOD Pote	Weighted Average FOD Poten
A01	1	315.00	150.00	63,985.00	APRON	60.00	0.00	60.00
A02	1	140.00	140.00	29,585.00	APRON	71.00	0.00	71.00
R0725	3	6,522.00	100.00	652,200.00	RUNWAY	0.00	0.00	0.00
R1432	2	4,917.00	100.00	491,700.00	RUNWAY	76.00	1.00	76.42
TA1	1	200.00	50.00	11,705.00	TAXIWAY	43.00	0.00	43.00
TA2	1	225.00	50.00	13,825.00	TAXIWAY	60.00	0.00	60.00
TA3	1	225.00	50.00	15,912.00	TAXIWAY	70.00	0.00	70.00
TC01	1	360.00	50.00	20,968.00	TAXIWAY	73.00	0.00	73.00
TC02	1	393.00	50.00	26,871.00	TAXIWAY	72.00	0.00	72.00
THANG01	1	780.00	50.00	41,800.00	TAXIWAY	57.00	0.00	57.00
TP01	4	6,674.00	50.00	344,801.00	TAXIWAY	62.75	16.08	62.86
TP02	3	4,860.00	50.00	252,193.00	TAXIWAY	74.00	1.41	73.24

3/18/2022

Branch Condition Report

Page 2 of 2

Pavement Database: ALDOT_220316

Use Category	Number of Sections	Total Area (SqFt)	Arithmetic Average FOD	Average STD FOD Potential	Weighted Average FOD P
APRON	2	93,570.00	65.50	5.50	63.48
RUNWAY	5	1,143,900.00	30.40	37.24	32.85
TAXIWAY	13	728,075.00	65.23	12.45	66.53
ALL	20	1,965,545.00	56.55	26.05	46.78

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

Appendix G2
Localized Preventive Repair Policy

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 RSMMeans, 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.

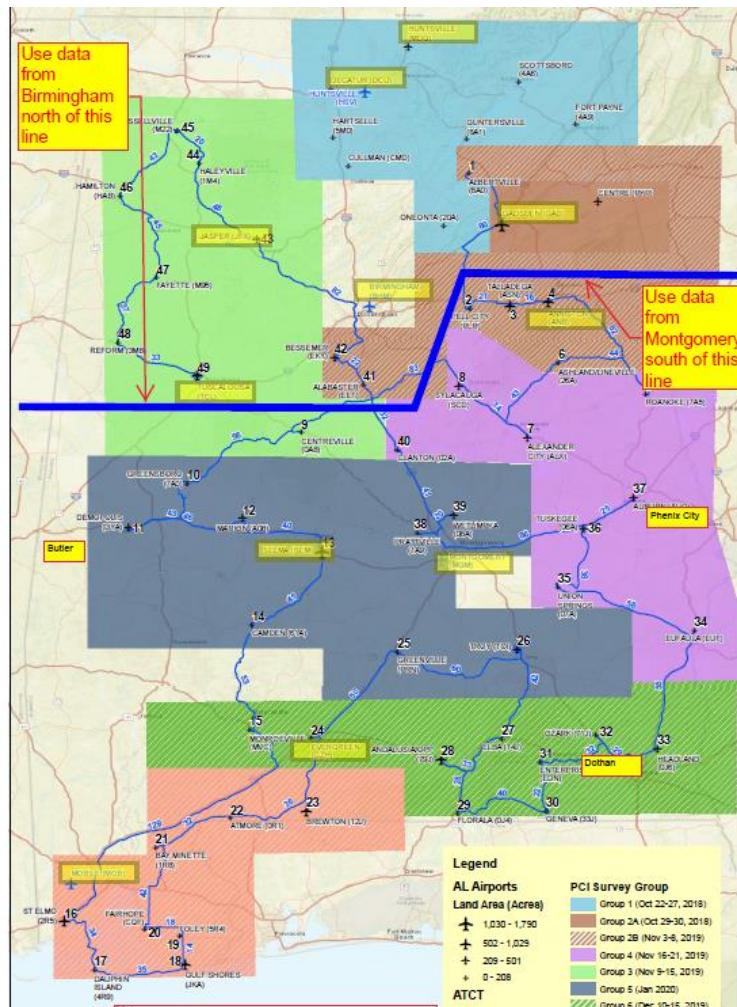


Figure 1: RSMMeans Unit Costs Locations.

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

¹For 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 RSMMeans 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

k

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	

