

Kentucky Airport Pavement Maintenance Program

EXECUTIVE SUMMARY



Kentucky
UNBRIDLED SPIRIT
DEPARTMENT OF AVIATION



Acknowledgments

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KENTUCKY DEPARTMENT OF AVIATION

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Overview

BACKGROUND

Pavements represent one of the largest capital investments in the Kentucky aviation system, and the condition of these pavements is important both for cost-effectiveness and safety. It is crucial to apply pavement maintenance and rehabilitation (M&R) in a timely manner because the rate of repair costs accelerate as conditions deteriorate. Additionally, airport pavement weaknesses such as cracks and loose debris can eventually pose a significant safety risk to aircraft.

Recognizing a need to protect this critical investment, the Kentucky Transportation Cabinet (KYTC)—Department of Aviation (KDA) maintains a statewide Airport Pavement Management System (APMS) to monitor the condition of the Kentucky airport infrastructure and to proactively plan for its preservation. The ultimate goal of the APMS is to provide the airport sponsors, KDA, and the Federal Aviation Administration (FAA) with pavement information and analytical tools that can be used to identify pavement-related needs, optimize the selection of projects and treatments over a multiyear period, and evaluate the long-term impacts of their project priorities.

Applied Pavement Technology, Inc. (APTech) implemented the APMS in 2011 and updated it in 2014 and 2018. This report provides an overview of the findings and recommendations of the most recent APMS update, during which the pavement conditions at fifty-two Kentucky airports were assessed and the APMS database updated with the most current information. The data was analyzed to identify

pavement-related needs and to provide recommendations for pavement M&R. More detailed information may be found in the individual airport reports.

BENEFITS OF THE APMS

Kentucky's APMS yields many benefits to airport sponsors, KDA, and the FAA. These benefits include:

- Information needed to monitor the condition of the pavements to ensure they can safely accommodate aircraft operations.
- Data necessary to make cost-effective decisions about the M&R of the pavement infrastructure while understanding the long-term impacts of the decisions made.
- Ability to fulfill most of the Public Law 103-305 and Grant Assurance 11 requirements for maintaining an effective pavement maintenance management system, which are required for airports that are part of the National Plan of Integrated Airport Systems (NPIAS).

In addition, the APMS identifies when the application of pavement M&R would be most appropriate. The timing of projects is important because preventive maintenance actions, such as crack sealing and surface treatments, can cost-effectively extend the life of a pavement. Once preventive maintenance is no longer the appropriate repair, it is critical to step in with major rehabilitation, such as an overlay or surface reconstruction, as soon as possible. At some point, the pavement structure may become so degraded that the only viable alternative is complete reconstruction. The

financial impact of delaying repairs until this point is reached can be severe, as the cost of reconstruction can be many times that of an overlay. Additionally, there is a point when the pavement becomes unsafe for aircraft operations. The effective utilization of APMS data and results demonstrates Kentucky's effort to maintain its airport infrastructure in line with the priorities of the FAA for continued maintenance of existing pavement.



Timely application of preventive maintenance can extend the life of the pavement at a fraction of the cost of major rehabilitation or reconstruction. Full reconstruction of a pavement can cost many times that of an overlay.

PROJECT OVERVIEW

In 2018, APTech reviewed the pavement work history information at fifty-two airports, assessed the pavement conditions, and updated the Kentucky APMS PAVER database and airport maps to include the collected information. These airports represent approximately 49.68 million square feet of pavement, which equates to a two-lane highway stretching from Lexington, Kentucky, to Washington, D.C. This pavement can be further broken down into 25.65 million square feet of runway pavement, 11.92 million square feet of taxiway pavement, 8.78 million square feet of apron/helipad pavement, and 3.33 million square feet of T-Hangar pavement. The map below identifies the airports included during this update

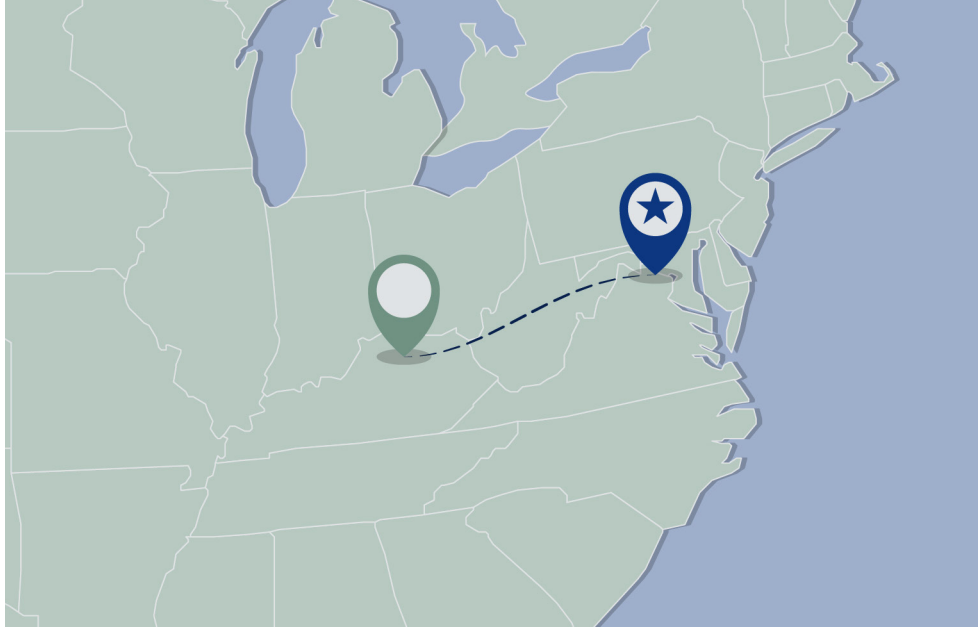
except for the following airports that were not part of the project scope: Blue Grass Airport, Bowman Field, Cincinnati/Northern Kentucky International Airport, Louisville International Airport—Standiford Field, and Tradewater Airport.

A visual assessment of the pavement condition was also completed using the Pavement Condition Index (PCI) procedure. In 2011, the overall PCI of the system was 83; in 2018 it dropped to 77. This decline can be attributed to many factors. First, the pavement system has aged from an area-weighted value of 12.6 years to 13.5 years. In addition, the amount of funding for pavement projects has not kept pace with the needs of the system.

During the 2014 APMS update, it was estimated that 33 percent of the pavement system would need major rehabilitation or reconstruction during the next 7 years. However, during the 4 years since, it is estimated that only 17 percent of the system received major work.

During FY2017 through FY2020, KDA spent \$70.3 million on airport projects; the jet fuel tax funds totaled \$31.6 million (an average of \$7.9 million per year), and the pavement funds were \$38.7 million (an average of \$9.7 million per year). The current projected jet fuel tax funds for all airport projects are \$11.7 million annually, with the current projected pavement funds estimated at \$10 million annually.





Kentucky's airport pavements are equal to a two-lane highway stretching from Lexington, Kentucky, to Washington, D.C.

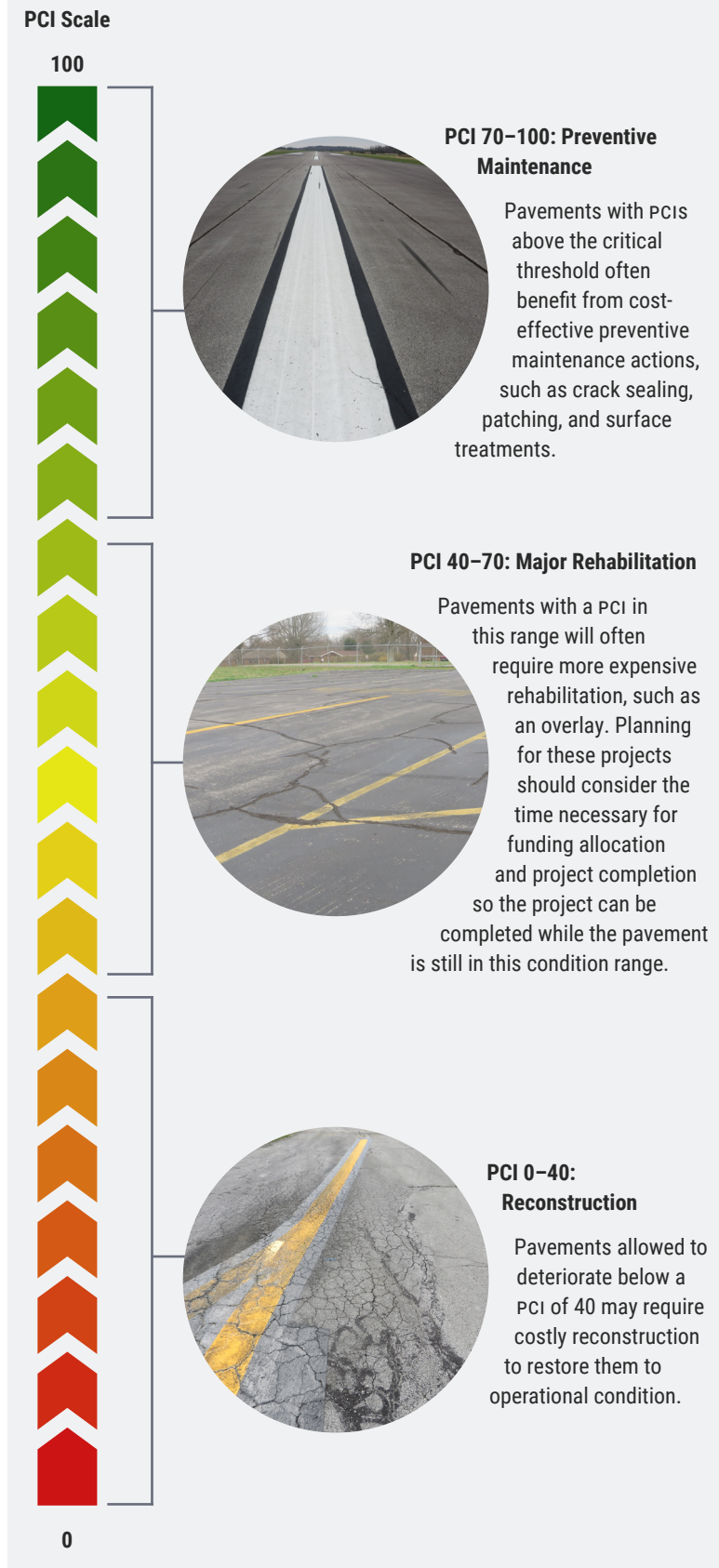


Pavement Condition Assessment

The pavements were evaluated using the PCI procedure, documented in FAA Advisory Circular 150/5380-6C, Guidelines and Procedures for Maintenance of Airport Pavements, and ASTM D5340-12, Standard Test Method for Airport Pavement Condition Index Surveys. This procedure is the standard used by the aviation industry in the United States for visually assessing and monitoring the condition of airport pavements. It provides a consistent, objective, and repeatable method to evaluate the pavement condition.

During a PCI survey, the types, severities, and amounts of distress present on a pavement's surface are quantified. This information is then used to develop a composite index that represents the overall condition of the pavement in numerical terms, ranging from 100 to 0. The PCI is a measure of overall condition and is indicative of the level of work that will be required to maintain or repair a pavement. Furthermore, the distress information provides insight into what is causing the pavement to deteriorate, which is the first step in selecting the appropriate repair action.

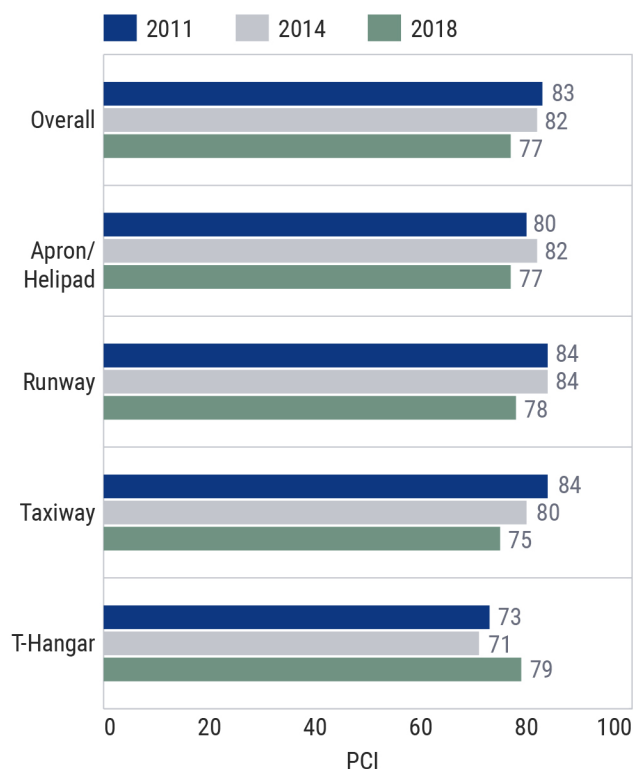
Programmed into an APMS, PCI data are used to determine current pavement condition, predict future pavement condition, and identify the most cost-effective repair type and timing of that repair. The relationship between a pavement's PCI and the typical type of repair identified for the pavement is shown in the figure to the right.



Pavement Condition Results

OVERALL PAVEMENT CONDITION

The 2018 area-weighted PCI (average PCI adjusted to account for the relative size of the pavement sections) of the fifty-two airports included in the Kentucky APMS is 77, as compared to a 2014 PCI of 82 and a 2011 PCI of 83. The figure below shows the 2018 area-weighted PCI of the pavement distributed by branch use (apron/helipad, runway, taxiway, and T-Hangar) compared to PCIs observed during the 2011 and 2014 projects.



PAVEMENT CONDITION DISTRIBUTION

This study indicates that approximately 72 percent of Kentucky's airport pavement would benefit from preventive maintenance actions, such as crack sealing, joint sealing, patching, or surface treatments. Approximately 23.5 percent of the pavement infrastructure needs more extensive rehabilitation, such as overlays, while 4.5 percent has deteriorated to the point where reconstruction may be the only viable alternative to restore the pavement.

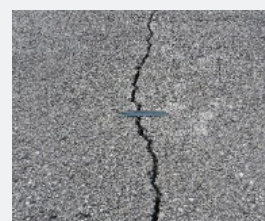
TYPICAL DISTRESS TYPES AT KENTUCKY AIRPORTS

Following are the most frequently observed pavement distresses at the evaluated Kentucky airports. This list is limited to asphalt-surfaced pavements because most of the Kentucky airport infrastructure consists of this type of pavement.

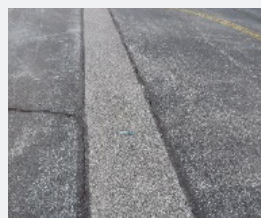
Alligator Cracking



Longitudinal and Transverse (L&T) Cracking



Patching/Utility Cut Patch



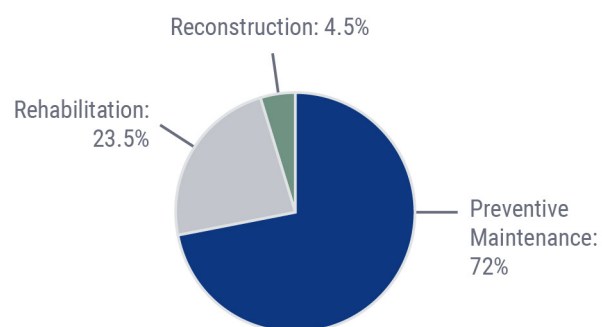
Raveling



Rutting



Weathering



Needs Assessment

An M&R program was developed for the Kentucky airports using the PAVER pavement management software. The analysis was prepared for 7 years (2020 through 2026). Localized preventive maintenance and major rehabilitation/reconstruction were considered during this analysis with an inflation rate of 3 percent applied when calculating the future cost of work.

For each year of the analysis, the future conditions of the pavements were estimated, and a determination made as to whether localized preventive maintenance or major rehabilitation/reconstruction was the appropriate and most cost-effective strategy. For asphalt-surfaced pavements, if a pavement was projected to be above a critical PCI threshold of 60 for aprons,

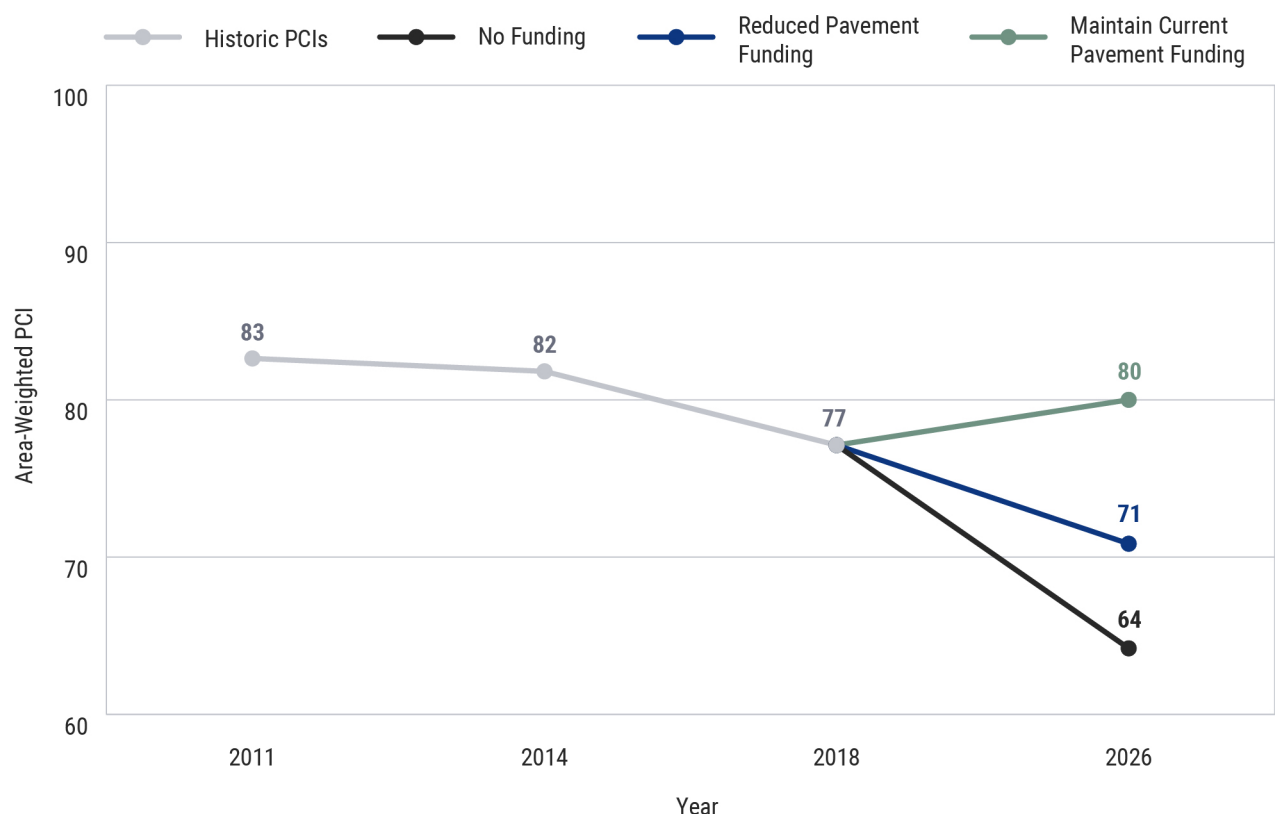
helipads, and T-Hangars; 65 for taxiways; and 70 for runways, the pavement was recommended for localized preventive maintenance. Below these critical PCI thresholds, major rehabilitation/reconstruction was recommended. For portland concrete cement (PCC) pavements, a critical PCI threshold of 55 was set for all branch uses.

If no funding is provided for pavement M&R, Kentucky's pavement system will experience a slow but steady decline in condition, with an anticipated PCI of 64 for the entire system by 2026. This decrease would result in greater need for major rehabilitation/reconstruction, which would substantially increase the costs to keep the pavement system in a safe and serviceable condition.

On the other hand, if all M&R projects identified were funded, the resulting PCI of the project airports would be 87 by 2026. This would require approximately \$120.2 million in funding over the next 7 years. The tables on the following pages summarize pavement funding needs through 2026 for each airport under a fully funded budget scenario.

Two additional budget scenarios were analyzed: \$5 million and \$11 million of annual funding for major rehabilitation projects. These budgets resulted in projected 2026 PCIs of 71 and 80, respectively.

Note that the unit costs used during these analyses were based on 2011 bid tab values that were inflated by 3 percent per year at KDA's request to estimate current project costs.



Pavement Condition Information and 7-Year Pavement Funding Needs

The following table does not reflect all of the pavement projects completed in 2019.

County	Airport Name	2018 Area-Weighted PCI					7-Year Estimated Funding Needs
		Overall	Apron	Runway	Taxiway	T-Hangar	
Adair	Columbia-Adair County	77	61	88	36	88	\$334,099
Barren	Glasgow Municipal	82	78	92	71	70	\$1,877,537
Bell	Middlesboro-Bell County	75	79	67	100	70	\$1,723,665
Boyd	Ashland Regional	94	100	90	100	66	\$146,494
Boyle	Danville-Boyle County-Stuart Powell Field	39	63	32	24	64	\$6,449,789
Breathitt	Julian Carroll	87	84	88	92	52	\$41,075
Breckinridge	Breckinridge County	95	97	94	98	N/A	\$3,389
Caldwell	Princeton-Caldwell County	77	83	77	85	46	\$1,170,484
Calloway	Murray-Calloway County	92	84	100	75	98	\$1,067,446
Christian	Hopkinsville-Christian County	82	87	81	73	95	\$3,309,330
Crittenden	Marion-Crittenden County	85	85	81	89	97	\$2,680
Daviess	Owensboro-Daviess County Regional	71	56	83	63	56	\$12,742,475
Fleming	Fleming-Mason	77	72	75	78	88	\$2,150,326
Floyd	Big Sandy Regional	95	80	100	100	82	\$111,608
Franklin	Capital City	62	59	54	69	71	\$7,509,352
Fulton	Fulton	82	65	84	86	92	\$1,828,597
Graves	Mayfield-Graves County	80	98	75	77	91	\$2,040,753
Grayson	Rough River State Park	90	36	100	100	N/A	\$328,700
Grayson	Leitchfield-Grayson County	75	72	78	84	33	\$1,322,935
Hancock	Lewisport-Hancock County	73	84	72	67	81	\$1,533,483

County	Airport Name	2018 Area-Weighted PCI					7-Year Estimated Funding Needs
		Overall	Apron	Runway	Taxiway	T-Hangar	
Hardin	Addington Field-Elizabethtown Regional	74	79	71	73	76	\$3,491,862
Harlan	Tucker-Guthrie Memorial	76	93	66	94	N/A	\$917,170
Harrison	Cynthiana-Harrison County	79	79	76	89	66	\$1,378,441
Henderson	Henderson City-County	83	96	76	83	79	\$2,118,682
Hopkins	Madisonville Regional	81	90	84	73	58	\$3,660,954
Laurel	London-Corbin-Magee Field	71	88	64	76	65	\$4,984,114
Logan	Russellville-Logan County	98	76	100	100	100	\$122,308
Madison	Central Kentucky Regional	66	69	66	65	63	\$3,246,249
Marshall	Kentucky Dam State Park	73	84	67	80	69	\$1,454,594
McCracken	Barkley Regional	72	67	71	75	88	\$11,280,637
McCreary	McCreary County	98	99	98	98	86	\$0
Montgomery	Mount Sterling-Montgomery County	84	72	76	95	100	\$1,882,793
Monroe	Tompkinsville-Monroe County	99	97	100	100	99	\$0
Morgan	West Liberty	96	83	100	88	N/A	\$466
Muhlenburg	Muhlenberg County	75	79	72	81	65	\$1,762,238
Nelson	Nelson County-Samuels Field	92	68	100	99	85	\$546,198
Ohio	Ohio County	75	70	76	69	80	\$1,682,333
Pendleton	Falmouth-Pendleton County	60	65	59	55	N/A	\$1,259,797
Perry	Wendell H. Ford Regional	79	74	81	68	100	\$2,700,803
Pike	Pike County-Hatcher Field	71	75	65	78	87	\$1,806,403
Powell	Stanton-Powell County	81	64	76	94	94	\$846,694
Pulaski	Lake Cumberland Regional	81	84	75	87	90	\$2,044,946
Rowan	Morehead-Rowan County	76	74	74	80	86	\$1,880,633

County	Airport Name	2018 Area-Weighted PCI					7-Year Estimated Funding Needs
		Overall	Apron	Runway	Taxiway	T-Hangar	
Russell	Russell County	75	76	70	81	91	\$1,228,999
Scott	Georgetown-Scott County Regional	82	81	75	95	87	\$2,990,903
Taylor	Taylor County	66	69	66	67	53	\$3,246,994
Trigg	Lake Barkley State Park	78	68	79	80	N/A	\$2,191,977
Union	Sturgis Municipal	94	80	100	100	63	\$122,083
Warren	Bowling Green-Warren County Regional	62	67	73	34	55	\$12,074,697
Washington	Lebanon-Springfield	83	85	89	64	63	\$1,190,404
Wayne	Monticello-Wayne County	89	97	90	84	86	\$337,832
Whitley	Williamsburg-Whitley County	81	72	80	86	90	\$2,060,025
Estimated Statewide Total: \$120,206,445							

Summary

Each Kentucky airport serves as an economic gateway for the communities of the county in which they reside as well as their surrounding counties. A vibrant aviation system with viable and safe pavements is key to attracting new businesses and retaining existing businesses in each county of Kentucky.

Business aviation is an invaluable tool for companies in Kentucky to support their operations, thus bringing in new business, investment, and jobs to Kentucky. Business aircraft improve efficiency, save money, and open doors of opportunity to rural areas not reached by commercial aviation.

Through fiscal responsibility and prudent use of state funds, the KDA is committed to maintaining the pavements and supporting the aviation infrastructure of the Commonwealth to ensure that a healthy and robust environment exists for continuing the economic growth for all Kentuckians.

Kentucky's Aviation System consists of:

- 260 Airports
 - » 111 Heliports
 - » 149 Airports
 - ◆ Public Use — 57
 - ◆ Private Use — 90
 - ◆ Military — 2
- 2,517 FAA Registered Aircraft
- 6,244 FAA Certified Pilots
- Kentucky Airport direct payroll contributes over \$1.44 billion to the state's economy*

**CDM Smith Kentucky Statewide Aviation System Plan, September 2017*



**FOR MORE INFORMATION,
PLEASE CONTACT**

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