

AIRPORT PAVEMENT MANAGEMENT SYSTEM UPDATE (2016)

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AIRPORT PAVEMENT MANAGEMENT SYSTEM UPDATE

Inspection Report
For
Concord Regional Airport
(JQF)

Provided by the NCDOT:



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2016

Prepared By:



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Concord Regional Airport**2016 APMS Update****Pavement Inspection and Condition Analysis**

RDM International, Inc. (RDM) and CH2M HILL Inc. (CH2M), under contract with the North Carolina Department of Transportation, Division of Aviation (DOA), performed an update to the Airport Pavement Management System (APMS) at Concord Regional Airport (JQF). An inspection team performed the pavement condition and pavement marking assessment inspection in March 2016. This inspection was performed according to the Pavement Condition Index (PCI) evaluation methodology set forth in the Federal Aviation Administration (FAA) Advisory Circular 150/5380-7B *"Airport Pavement Management Program (PMP)"* and ASTM D5340 *"Standard Airport Pavement Condition Index Surveys"*. The DOA uses the PCI method to evaluate the current pavement condition for each commercial (Part 139) and general aviation airport in the state. An independent rating system for the pavement markings was used to evaluate the general condition of the markings, which is exhibited as an average at each branch level (i.e.: runways, taxiways, aprons, blast pads, helipads, and shoulders). The PCI and marking data is used to plan and prioritize future pavement maintenance and rehabilitation projects. The results of this pavement condition survey at JQF are summarized in this report.

The PCI methodology separates the airport pavements into a four level inventory: (1) Network; (2) Branches; (3) Sections; and (4) Sample Units. The Network is the highest level in the PCI hierarchy and is defined as all airside pavements at a single airport. Therefore, JQF has one network defined. Networks are divided into branches which represent a pavement facility of the airport, for example Runway 2/20 would be considered one branch. For the purpose of calculating the PCI and planning required maintenance and major projects these branches are further divided into sections. Each section represents pavements of similar characteristics including, but not limited to: pavement composition, construction history, traffic, and pavement condition. For the purpose of this study, a Network level inspection was completed. In order to optimize funding and capture representative conditions and distresses, approximately fifteen to twenty percent of the sample units were inspected, which results in a statistical confidence level greater than 95%. The distresses were then extrapolated for the entire pavement section to estimate distress and repair quantities, as well as existing conditions. Pavement sections not used by aircraft, closed pavements, and pavements not maintained by the airport are not included in the survey, or recommended for maintenance and rehabilitation.

For the purpose of a network level evaluation, the pavement sections have been divided into sample units that are generally 5,000 square feet (+/- 2,000SF) in area. During the inspection, observed distress types, severities, and quantities were recorded for each inspected sample unit. The inspection data was entered into the latest version (7.0.6) of the PAVER™ pavement management software, and the current and predicted PCIs are calculated and a pavement maintenance and repair (M&R) plan developed.

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The PAVER™ software, developed by the US Army Corps of Engineers, calculates the PCI based on the type, severity and quantity of distresses observed on the pavement surface. The PCI is a numerical number ranging from 0 to 100 with a PCI of 0 representing a pavement with severe distresses which is completely failed, while a PCI of 100 represents a pavement with no distresses or new pavement. Following FAA and ASTM standards, the PCI is calculated and pavements are assigned a PCI Category. The categories and representative color codes are shown in Figure 1.

PCI Range	PCI Category
0 -10	Failed
11 – 25	Serious
26 – 40	Very Poor
41 – 55	Poor
56 – 70	Fair
71 – 85	Satisfactory
86 – 100	Good

Figure 1: PCI Category and Ranges

The results of the airport’s pavement condition inspection are provided below. This information is provided in both tabular format and on an airport drawing.

Pavement Project Identification Criteria

In order to utilize the calculated PCI and inspection process for estimating and developing M&R plans, the DOA has developed the following criteria; Pavement sections with a PCI lower than 55 will be considered for major repair and rehabilitation type projects (i.e. reconstruction, overlay, and certain surface treatments), and are eligible for state and federal funding. These projects are handled through DOA’s Airport Project Managers and DOA’s Grant Administration group. Pavements with a PCI between 55 and 75 will be considered for maintenance level repairs such as crack sealing, minor patching, and seal coating. These sections are eligible for the Division of Aviation’s Maintenance and Safety Preservation Program.

Any pavements with a PCI above 75 will not be considered for state funding at this time unless a safety issue is identified and needs to be addressed immediately. The pavements will continue to be evaluated during the normal inspection cycle, which is performed biennially. Each airport is encouraged to perform maintenance work on these pavements to extend the pavement life and ensure a safe operating surface.

It is recommended that, for any pavements eligible for major rehabilitation or maintenance activities, a project level inspection be performed in order to better define the project requirements. During the project level inspection, an optimum repair strategy and more detailed cost estimate can be determined in accordance with airport policy.

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JQF Pavement Condition Overview

Overall (Network) Airport Pavement Condition Index (PCI): 76 (Satisfactory)

Branch Use Condition Report

The following provides the area-weighted average PCI based on branch use for all airside pavements at JQF.

Runway: 73 (Satisfactory)
Aprons: 75 (Satisfactory)
Taxiways: 83 (Satisfactory)

Table 1 below breaks out the areas of pavement and how many sections qualify for each funding category.

Table 1: Pavement Inventory by Funding Category

PCI Range	Maintenance Funding Category	Area (SF)	Percent Area (%)	Sections	Percent Sections (%)
0 - 55	Major Rehab Funding	269,891	9	9	12
55 - 75	DOA Preventative Funding	628,890	20	16	22
75 - 100	Airport Preventative Funding	2,265,003	72	48	66

Prediction Modeling Report/Anticipated Annual Condition Plot

Based on past inspections and construction history data, prediction models were developed to estimate the future condition and deterioration of pavements at JQF. Figures 2 through 5 depict the estimated deterioration, as well as the past performance, of the pavements at JQF. Predicted PCIs should be used with care since all predictions are based on the accuracy of the construction history data and past inspections. The predicted PCIs are based on the assumption that no major M&R will be performed and the maintenance practices and traffic at the airport will remain constant.

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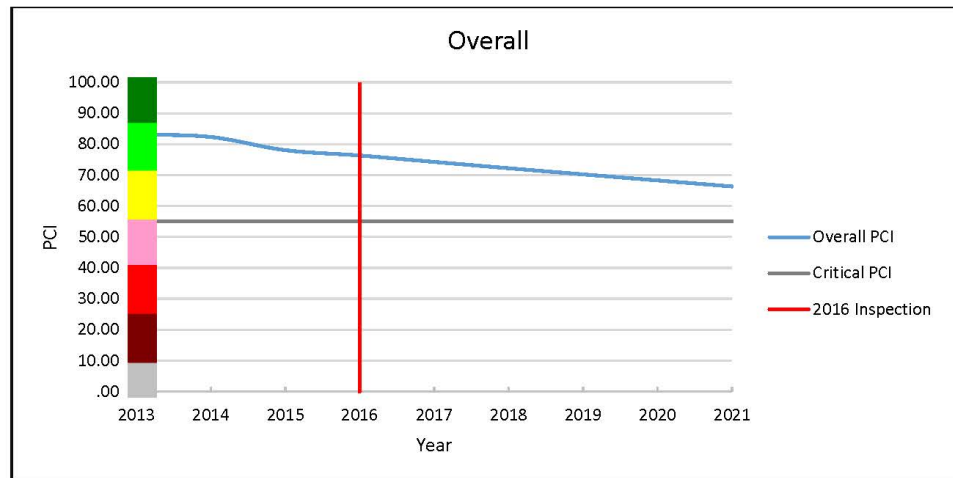


Figure 2: Estimated Annual Condition Plot (Overall)

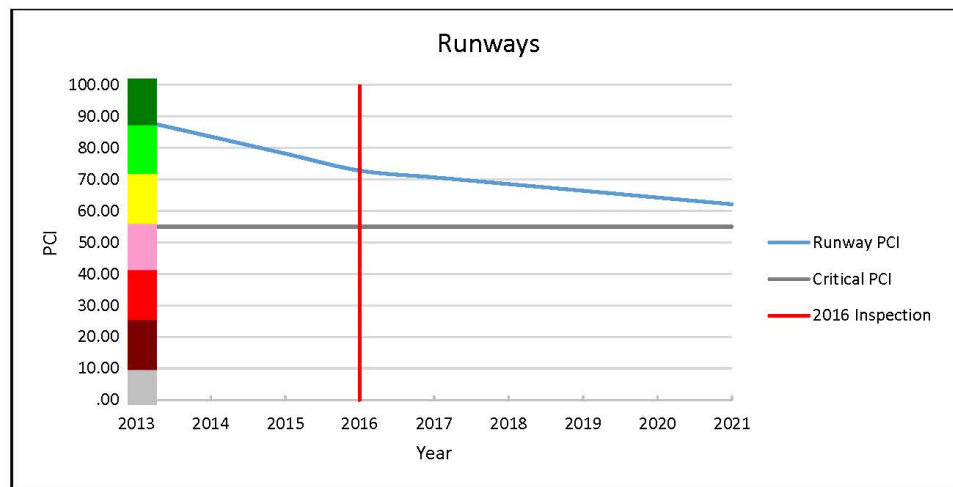


Figure 3: Estimated Annual Condition Plot (Runway)

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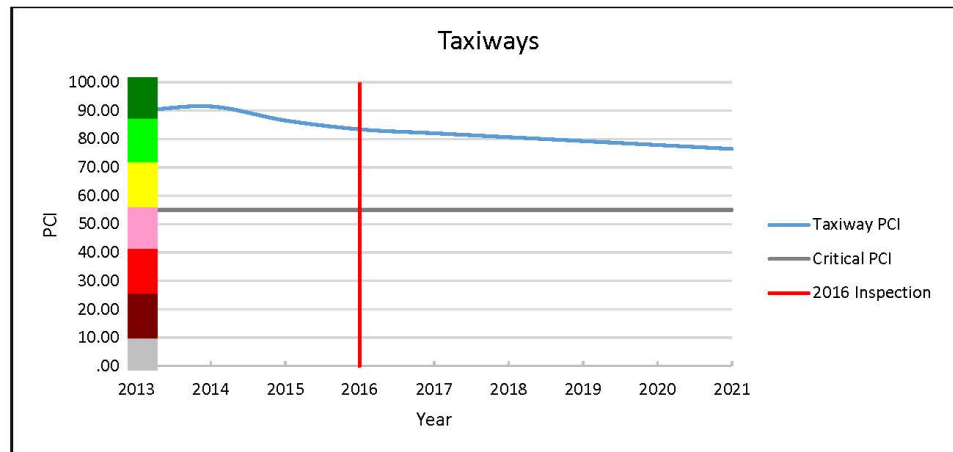


Figure 4: Estimated Annual Condition Plot (Taxiway)

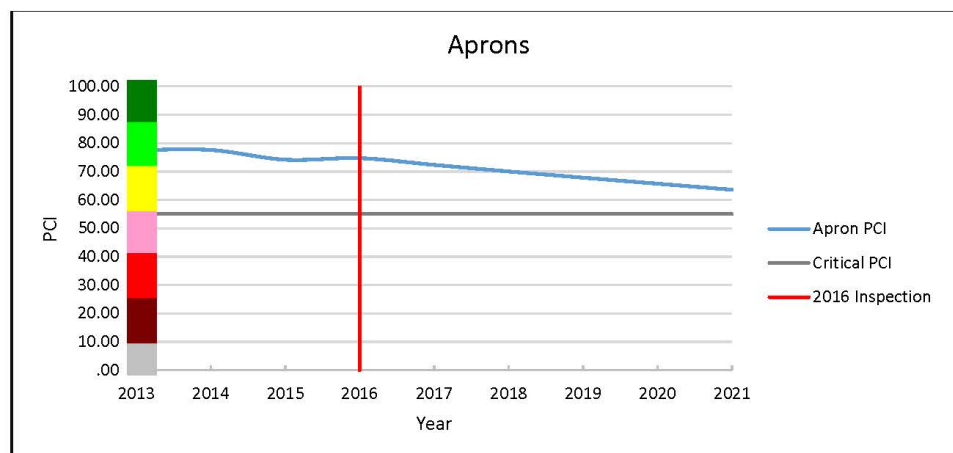


Figure 5: Estimated Annual Condition Plot (Aprons)

Table 2 shows the current and predicted PCI by pavement section. Figure 7 shows the current PCI in a color coded map of the airport. The overall condition of the pavements at JQF is anticipated to deteriorate from a current condition of 76 to 66 from the 2016 inspection to 2021 respectively.

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Table 2: Current and Predicted PCI Values

Branch ID	Section ID	Previous	Current	Predicted PCI				
		2013	2016	2017	2018	2019	2020	2021
General Aviation Apron								
APRGA	10	97	74	72	70	68	66	64
APRGA	20	100	90	87	84	82	79	77
APRGA	30	67	81	79	76	74	72	70
APRGA	40	0	97	94	91	88	85	82
APRGA	50	73	76	74	71	69	67	64
APRGA	60	81	73	71	69	67	65	63
APRGA	70	82	74	72	70	68	66	64
Hangar Apron								
APRHANG	10	62	45	43	40	38	35	32
APRHANG	100	43	50	48	46	43	41	38
APRHANG	110	100	97	94	91	88	85	82
APRHANG	120	60	57	55	53	51	49	47
APRHANG	130	60	61	59	57	55	53	51
APRHANG	140	52	47	45	42	40	37	35
APRHANG	150	1	0	0	0	0	0	0
APRHANG	160	10	8	4	0	0	0	0
APRHANG	170	19	97	94	91	88	85	82
APRHANG	180	19	92	89	86	83	81	79
APRHANG	190	19	97	94	91	88	85	82
APRHANG	20	97	81	79	76	74	72	69
APRHANG	30	98	83	81	78	76	74	71
APRHANG	40	96	88	86	83	81	79	76
APRHANG	50	48	37	34	31	28	25	21
APRHANG	60	98	79	77	74	72	70	67
APRHANG	70	77	72	70	68	66	64	62
APRHANG	80	77	40	38	35	33	31	28
APRHANG	90	52	49	47	45	42	40	37
Hangar Apron South								
APRHANGS	10	80	74	72	69	67	65	62
APRHANGS	20	91	82	80	77	75	73	70
South Apron								
APRSOUTH	10	-	100	98	95	93	91	88
Terminal Apron								
APRTERM	10	92	82	80	77	75	73	71
APRTERM	100	65	64	62	59	57	55	52
APRTERM	110	71	83	80	78	76	74	72
APRTERM	120	89	80	78	75	73	71	69
APRTERM	130	92	83	80	78	76	74	72
APRTERM	140	92	83	80	78	76	74	72
APRTERM	150	97	87	84	82	79	77	75
APRTERM	160	100	90	87	84	82	79	77
APRTERM	170	98	88	85	83	80	78	75
APRTERM	20	100	86	83	81	78	76	74
APRTERM	30	100	83	80	78	76	74	72
APRTERM	40	100	88	85	83	80	78	75
APRTERM	50	54	26	24	21	19	17	14
APRTERM	60	75	72	70	67	65	63	60
APRTERM	70	78	75	73	70	68	66	63
APRTERM	80	91	81	79	76	74	72	69
APRTERM	90	68	67	65	62	60	58	55

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Table 2 Cont.: Current and Predicted PCI Values

Branch ID	Section ID	Previous	Current	Predicted PCI				
		2013	2016	2017	2018	2019	2020	2021
Runway 2/20								
RW220	10C	89	63	61	59	57	54	52
RW220	10L	93	80	78	76	74	71	69
RW220	10R	83	80	78	76	74	71	69
RW220	20C	97	88	86	84	82	79	77
RW220	20L	100	87	85	83	81	78	76
RW220	20R	91	85	83	81	79	76	74
Taxiway Alpha								
TWA	10	67	58	57	55	54	52	51
TWA	20	94	84	83	81	80	78	77
TWA	30	87	78	77	75	74	72	71
Taxiway Alpha 1								
TWA1	10	92	75	74	72	71	69	68
TWA1	20	100	97	96	94	93	91	90
Taxiway Alpha 2								
TWA2	10	-	100	99	97	96	94	93
Taxiway Alpha 2B								
TWA2B	10	-	100	99	97	96	94	93
Taxiway Bravo								
TWB	10	83	83	82	80	79	77	76
TWB	20	94	97	96	94	93	91	90
Taxiway Charlie								
TWC	10	88	82	81	79	78	76	75
TWC	20	94	88	87	85	84	82	81
Taxiway Delta								
TWD	10	85	77	76	74	73	71	70
TWD	20	100	94	93	91	90	88	87
Taxiway Echo								
TWE	10	84	82	81	79	78	76	75
TWE	20	91	89	88	86	85	83	82
Taxiway Foxtrot								
TWF	10	89	83	82	80	79	77	76
TWF	20	71	81	80	78	77	75	74
Taxiway Golf								
TWG	10	78	76	75	73	72	70	69
TWG	20	94	86	85	83	82	80	79
Taxiway Hangar								
TWHANG	10	60	68	67	65	64	62	61
TWHANG	20	63	69	68	66	65	63	62

Pavement Marking Assessment

Since pavement markings are imperative to the safe operation of aircraft within an airport, the DOA includes pavement marking in their maintenance program. It is important that the DOA be able to easily determine airport features with pavement markings that can lead to safety concerns. In order to track and report the overall performance of pavement markings, the inspection team developed a numerical rating scale. The marking rating scale provides a subjective rating ranging from 1 to 5, with 1 representing pavement markings in very poor condition and 5 representing markings in exceptional condition (newly applied). The condition of the pavement markings were

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noted in several locations throughout each feature (branch), and an average rating was determined for each runway, taxiway, or apron. The rating system provides a general overall condition that allows the DOA to prioritize and allocate maintenance funding to address any concerns with the pavement markings. Figure 6 depicts the rating scale, condition and definitions. It should be noted that the pavement marking system was created to provide an average branch level condition of the airports markings for each pavement facility. The marking conditions may vary throughout a given facility and a detailed inspection to determine the optimum repair strategy is recommended.

Rating	Condition	Definition
1	Very Poor	Severe damage; paint missing/peeling/chipping
2	Poor	Moderate evidence of wearing/fading/chipping
3	Fair	Minor evidence of wearing/fading/chipping
4	Good	Recently applied markings, no signs of wear/tear
5	Exceptional	Newly applied markings

Figure 6: Marking Rating System

The pavement marking conditions were reported at the branch level and are shown on the airport map in Figure 8. Table 3 depicts the rating and condition of each branch in accordance with the developed rating scale. The overall area-weighted average pavement marking condition at JQF is 3.5 - Good.

Table 3: Branch Marking Condition

Branch ID	Name	Use	Rating	Condition	Comment
OVERALL (Area-Weighted)			3.5	Good	
APRGA	APRONS GENERAL AVIATION	APRON	3	Fair	Minor wear/tear
APRHANG	APRONS HANGARS	APRON	3	Fair	Minor wear/tear
APRHANGS	APRONS HANGARS SOUTH	APRON	2	Poor	Moderate wearing/fading
APRSOUTH	SOUTH APRON	APRON	5	Exceptional	New Markings
APRTERM	APRONS TERMINAL	APRON	3	Fair	Minor wear/tear
RW220	RUNWAY 2-20	RUNWAY	4	Good	No signs of wear/tear
TWA	TAXIWAY ALPHA	TAXIWAY	4	Good	No signs of wear/tear
TWA1	TAXIWAY ALPHA 1	TAXIWAY	2	Poor	Moderate wearing/fading
TWA2	TAXIWAY ALPHA 2	TAXIWAY	5	Exceptional	New Markings
TWA2B	Taxiway Alpha 2B	TAXIWAY	5	Exceptional	New Markings
TWB	TAXIWAY BRAVO	TAXIWAY	4	Good	No signs of wear/tear
TWC	TAXIWAY CHARLIE	TAXIWAY	4	Good	No signs of wear/tear
TWD	TAXIWAY DELTA	TAXIWAY	4	Good	No signs of wear/tear
TWE	TAXIWAY ECHO	TAXIWAY	4	Good	No signs of wear/tear
TWF	TAXIWAY FOXTROT	TAXIWAY	4	Good	No signs of wear/tear
TWHANG	TAXIWAY HANGARS	TAXIWAY	-	-	

