Appendix 1-A - Airport Pavement Management System Report (2017)

2017

AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

Kimley»Horn

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Executive Summary

The City of Salinas and Salinas Municipal Airport (SNS or Airport) make frequent decisions regarding the timing and type of maintenance and rehabilitation (M&R) activities that should be completed at the Airport to maintain an acceptable operational condition of the pavement network. In 2016, SNS retained Kimley-Horn and Associates, Inc. (Kimley-Horn) to perform an update to the Airport's existing Airport Pavement Management System (APMS). In order to make informed decisions in regard to a maintenance and rehabilitation (M&R) schedule and 5-year Capital Improvement Plan (CIP), SNS must know the relative condition of its pavements.

All airports participating with the Federal Aviation Administration (FAA) Airport Improvement Program (AIP) are required to comply with FAA Order 5100.38 AIP Handbook through the compliance with the Advisory Circulars 150/5380-7B "Airport Pavement Management Program (PMP)" and 150/5380-6C "Guidelines and Procedures for Maintenance of Airport Pavements". Kimley-Horn performed a Pavement Condition Index (PCI) survey at SNS in accordance with the *ASTM D5340-12 Standard Test Method for Airport Pavement Condition Index Surveys*.

A PCI survey is an objective methodology to assess pavement condition. During a PCI survey inspection, a qualified inspector assesses pavements on foot and identifies visual signs of deterioration. Pavement deterioration, in accordance with the ASTM D5340-12, is characterized in terms of distinct distress types, severity level of distress, and quantity of distress. This information is utilized to calculate a numeric PCI value, from 0 to 100, that represents the overall functional condition of the pavement. Each PCI value falls within a range, or a PCI Category, with 0 being a rating of "Failed" and 100 being a rating of "Good". The PCI methodology analyzes the visual and functional pavement condition and provides an indication of the degree of maintenance, repair or rehabilitation efforts that will be required to sustain functional pavement.

SNS's airfield pavement facilities were inspected in accordance with the ASTM D5340-12 in January and February 2017. The following tables and exhibits present the current and predicted pavement conditions at SNS, as well as planning parameters for a 5-year CIP.

Table ES-1
2017 PCI Summary

Network ID	Branch ID	Name	Branch Use	Section ID	Estimated Area (SF)	Surface Type	2017 PCI	PCI Category
SNS	AHGRNO	North Hangar Apron	Apron	10	227,416	AC	34	Very Poor
SNS	AHGRNO	North Hangar Apron	Apron	20	68,083	AC	39	Very Poor
SNS	AHGRNO	North Hangar Apron	Apron	30	32,301	AC	89	Good
SNS	AHGRSO	South Hangar Apron	Apron	10	71,137	AC	50	Poor
SNS	AHGRSO	South Hangar Apron	Apron	20	6,420	PCC	69	Fair
SNS	AHGRSO	South Hangar Apron	Apron	30	39,005	AC	94	Good
SNS	AHGRSO	South Hangar Apron	Apron	40	198,165	AC	63	Fair
SNS	AHGRSO	South Hangar Apron	Apron	50	25,264	AC	57	Fair
SNS	AHGRSO	South Hangar Apron	Apron	60	138,028	AC	78	Satisfactory
SNS	AHGRSO	South Hangar Apron	Apron	70	10,147	AC	86	Good
SNS	AHGRSO	South Hangar Apron	Apron	80	29,692	AC	74	Satisfactory
SNS	ATD	Tie Down Apron	Apron	10	316,479	AC	69	Fair
SNS	ATD	Tie Down Apron	Apron	20	59,373	PCC	62	Fair
SNS	ATD	Tie Down Apron	Apron	30	66,587	AC	49	Poor
SNS	ATERM	Terminal Apron	Apron	10	183,317	PCC	66	Fair
SNS	ATERM	Terminal Apron	Apron	20	120,440	PCC	46	Poor
SNS	ATERM	Terminal Apron	Apron	30	30,598	PCC	67	Fair
SNS	HELI	Helipad	Helipad	10	75,915	AC	70	Fair
SNS	HGCON	Hangar Connector	Taxiway	10	1,854	AC	94	Good
SNS	HGCON	Hangar Connector	Taxiway	20	2,622	AC	94	Good
SNS	HGCON	Hangar Connector	Taxiway	30	2,735	AC	94	Good
SNS	HGCON	Hangar Connector	Taxiway	40	4,321	AC	94	Good
SNS	R08	Runway 08/26	Runway	20	37,500	AC	94	Good
SNS	R08	Runway 08/26	Runway	10C	263,346	AC	75	Satisfactory
SNS	R08	Runway 08/26	Runway	10L	272,377	AC	78	Satisfactory
SNS	R08	Runway 08/26	Runway	10R	261,320	AC	81	Satisfactory
SNS	R13	Runway 13/31	Runway	10C	241,250	AC	90	Good
SNS	R13	Runway 13/31	Runway	10L	269,750	AC	89	Good
SNS	R13	Runway 13/31	Runway	10R	256,850	AC	91	Good
SNS	TWA	Taxiway A	Taxiway	10	21,686	AC	94	Good
SNS	TWA	Taxiway A	Taxiway	20	23,170	AC	94	Good
SNS	TWA	Taxiway A	Taxiway	30	122,877	AC	93	Good
SNS	TWA	Taxiway A	Taxiway	35	5,945	AC	60	Fair
SNS	TWA	Taxiway A	Taxiway	40	12,453	AC	94	Good
SNS	TWA	Taxiway A	Taxiway	50	95,193	AC	93	Good
SNS	TWA	Taxiway A	Taxiway	60	39,726	AC	94	Good

Table ES-1 (cont.)
2017 PCI Summary

Network ID	Branch ID	Name	Branch Use	Section ID	Estimated Area (SF)	Surface Type	2017 PCI	PCI Category
SNS	TWB	Taxiway B	Taxiway	10	100,734	AC	94	Good
SNS	TWB	Taxiway B	Taxiway	15	111,142	AC	93	Good
SNS	TWB	Taxiway B	Taxiway	20	19,031	AC	94	Good
SNS	TWB	Taxiway B	Taxiway	25	7,317	AC	86	Good
SNS	TWB	Taxiway B	Taxiway	30	75,583	AC	90	Good
SNS	TWB	Taxiway B	Taxiway	40	9,794	AC	94	Good
SNS	TWC	Taxiway C	Taxiway	10	270,996	AC	94	Good
SNS	TWC	Taxiway C	Taxiway	20	34,722	AC	89	Good
SNS	TWD	Taxiway D	Taxiway	10	11,918	AC	59	Fair
SNS	TWD	Taxiway D	Taxiway	20	110,232	AC	93	Good
SNS	TWD	Taxiway D	Taxiway	25	6,915	AC	70	Fair
SNS	TWD	Taxiway D	Taxiway	30	70,610	AC	40	Very Poor
SNS	TWE	Taxiway E	Taxiway	10	34,238	PCC	56	Fair
SNS	TWF	Taxiway F	Taxiway	10	49,134	PCC	65	Fair
SNS	TWF	Taxiway F	Taxiway	20	8,239	APC	73	Satisfactory
SNS	TWG	Taxiway G	Taxiway	10	14,894	AC	32	Very Poor
SNS	TWG	Taxiway G	Taxiway	20	17,589	AC	67	Fair
SNS	TWH	Taxiway H	Taxiway	10	17,990	PCC	73	Satisfactory
SNS	TWJ	Taxiway J	Taxiway	10	11,011	AC	67	Fair
SNS	TWJ	Taxiway J	Taxiway	20	6,117	AC	89	Good
SNS	TWK	Taxiway K	Taxiway	10	28,386	AC	94	Good
SNS	TWK	Taxiway K	Taxiway	20	11,147	AC	94	Good
SNS	TWL	Taxiway L	Taxiway	10	75,065	PCC	61	Fair
SNS	TWN	Taxiway N	Taxiway	10	9,443	AC	92	Good
SNS	TWP	Taxiway P	Taxiway	10	112,307	AC	61	Fair
SNS	TWP	Taxiway P	Taxiway	20	12,685	AC	56	Fair

Table ES-2
5-Year (2018-2022) Predicted PCI Summary

Network ID	Branch ID	Section ID	Use	2018	2019	2020	2021	2022
SNS	AHGRNO	10	Apron	33	31	29	28	26
SNS	AHGRNO	20	Apron	38	36	34	33	31
SNS	AHGRNO	30	Apron	88	86	84	83	81
SNS	AHGRSO	10	Apron	49	47	45	44	42
SNS	AHGRSO	20	Apron	68	67	66	65	64
SNS	AHGRSO	30	Apron	93	91	89	88	86
SNS	AHGRSO	40	Apron	62	60	58	57	55
SNS	AHGRSO	50	Apron	56	54	52	51	49
SNS	AHGRSO	60	Apron	77	75	73	72	70
SNS	AHGRSO	70	Apron	85	83	81	80	78
SNS	AHGRSO	80	Apron	73	71	69	68	66
SNS	ATD	10	Apron	68	66	64	63	61
SNS	ATD	20	Apron	61	60	59	58	57
SNS	ATD	30	Apron	48	46	44	43	41
SNS	ATERM	10	Apron	65	64	63	62	61
SNS	ATERM	20	Apron	45	44	43	42	41
SNS	ATERM	30	Apron	66	65	64	63	62
SNS	HELI	10	Helipad	69	67	65	64	62
SNS	HGCON	10	Taxiway	93	91	89	88	86
SNS	HGCON	20	Taxiway	93	91	89	88	86
SNS	HGCON	30	Taxiway	93	91	89	88	86
SNS	HGCON	40	Taxiway	93	91	89	88	86
SNS	R08	20	Runway	93	91	89	88	86
SNS	R08	10C	Runway	74	72	70	69	67
SNS	R08	10L	Runway	77	75	73	72	70
SNS	R08	10R	Runway	80	78	76	75	73
SNS	R13	10C	Runway	89	87	85	84	82
SNS	R13	10L	Runway	88	86	84	83	81
SNS	R13	10R	Runway	90	88	86	85	83
SNS	TWA	10	Taxiway	93	91	89	88	86
SNS	TWA	20	Taxiway	93	91	89	88	86
SNS	TWA	30	Taxiway	92	90	88	87	85
SNS	TWA	35	Taxiway	59	57	55	54	52
SNS	TWA	40	Taxiway	93	91	89	88	86
SNS	TWA	50	Taxiway	92	90	88	87	85
SNS	TWA	60	Taxiway	93	91	89	88	86

Table ES-2 (cont.)
5-Year (2018-2022) Predicted PCI Summary

Network ID	Branch ID	Section ID	Use	2018	2019	2020	2021	2022
SNS	TWB	10	Taxiway	93	91	89	88	86
SNS	TWB	15	Taxiway	92	90	88	87	85
SNS	TWB	20	Taxiway	93	91	89	88	86
SNS	TWB	25	Taxiway	85	83	81	80	78
SNS	TWB	30	Taxiway	89	87	85	84	82
SNS	TWB	40	Taxiway	93	91	89	88	86
SNS	TWC	10	Taxiway	93	91	89	88	86
SNS	TWC	20	Taxiway	88	86	84	83	81
SNS	TWD	10	Taxiway	58	56	54	53	51
SNS	TWD	20	Taxiway	92	90	88	87	85
SNS	TWD	25	Taxiway	69	67	65	64	62
SNS	TWD	30	Taxiway	39	37	35	34	32
SNS	TWE	10	Taxiway	55	54	53	52	51
SNS	TWF	10	Taxiway	64	63	62	61	60
SNS	TWF	20	Taxiway	72	70	68	67	65
SNS	TWG	10	Taxiway	31	29	27	26	24
SNS	TWG	20	Taxiway	66	64	62	61	59
SNS	TWH	10	Taxiway	72	71	70	69	68
SNS	TWJ	10	Taxiway	66	64	62	61	59
SNS	TWJ	20	Taxiway	88	86	84	83	81
SNS	TWK	10	Taxiway	93	91	89	88	86
SNS	TWK	20	Taxiway	93	91	89	88	86
SNS	TWL	10	Taxiway	60	59	58	57	56
SNS	TWN	10	Taxiway	91	89	87	86	84
SNS	TWP	10	Taxiway	60	58	56	55	53
SNS	TWP	20	Taxiway	55	53	51	50	48

Table ES-3
5-Year Capital Improvement Plan

Priority	Branch ID	Section ID	Estimated Area (SF)	Rehabilitation Type	Planning Cost
1	Runway 13/31		723,806	ACIP Maintenance	$1,125,000
1	TWD	25	6,915	AC Intermediate	$27,660
1	TWD	30	4,309	AC Reconstruction	$60,326
1	TWF	20	8,239	AC Intermediate	$32,956
2	HELI	10	75,915	ACIP Maintenance	$35,105
2	Runway 08/26		878,644	ACIP Maintenance	$1,349,000
2	TWA	35	5,945	AC Intermediate	$23,780
2	TWD	10	11,918	AC Intermediate	$47,672
2	TWG	20	17,589	AC Intermediate	$70,356
2	TWJ	10	11,011	AC Intermediate	$44,044
2	TWP	20	12,685	AC Intermediate	$50,740
3	AHGRNO	10	227,416	AC Reconstruction	$3,183,823
3	AHGRNO	20	68,083	AC Reconstruction	$953,162
4	AHGRSO	40	198,165	AC Intermediate	$792,659
4	AHGRSO	50	25,264	AC Intermediate	$101,056
5	AHGRSO	10	71,137	AC Intermediate	$321,539
5	AHGRSO	20	6,420	PCC Intermediate	$57,780
5	ATD	20	59,373	PCC Intermediate	$534,357
5	ATD	30	66,587	AC Intermediate	$367,560
5	TWD	30	44,349	AC Reconstruction	$620,886
6	ATD	10	316,479	AC Intermediate	$1,265,915
6	ATERM	10	183,317	PCC Intermediate	$1,649,853
6	ATERM	20	120,440	PCC Intermediate	$1,654,966
6	ATERM	30	30,598	PCC Intermediate	$275,382
6	TWE	10	34,238	PCC Intermediate	$308,142
6	TWF	10	49,134	PCC Intermediate	$442,206
6	TWG	10	14,894	AC Reconstruction	$208,516
7	TWD	30	21,952	AC Reconstruction	$307,328
7	TWP	10	112,307	AC Intermediate	$449,228

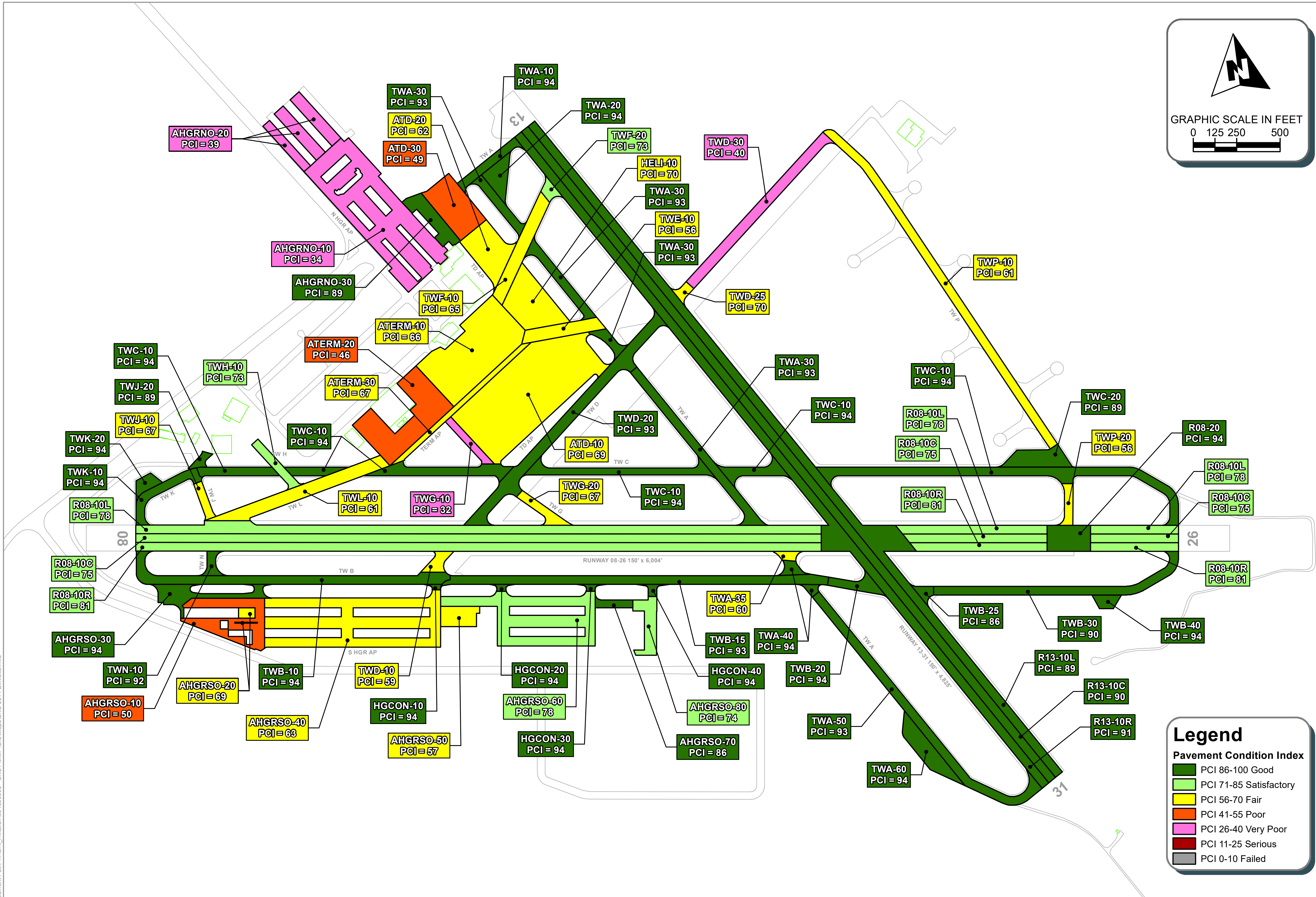

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EXHIBIT ES-1

2017 PAVEMENT CONDITION INDEX

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

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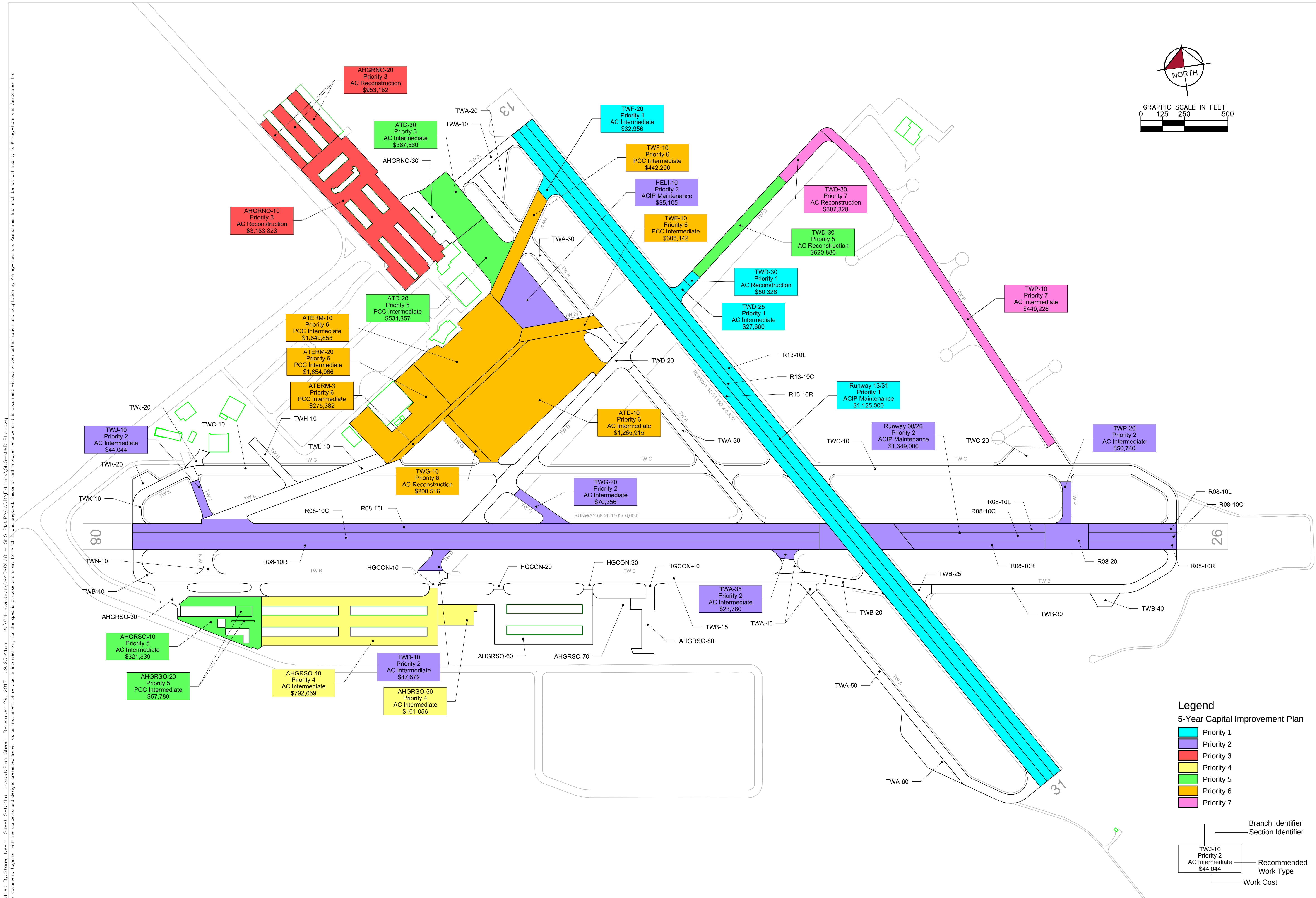


EXHIBIT ES-2

5-YEAR MAINTENANCE AND REHABILITATION

2017 **AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT**

Salinas Municipal Airport (SNS)

Kimley-Horn

SALINAS

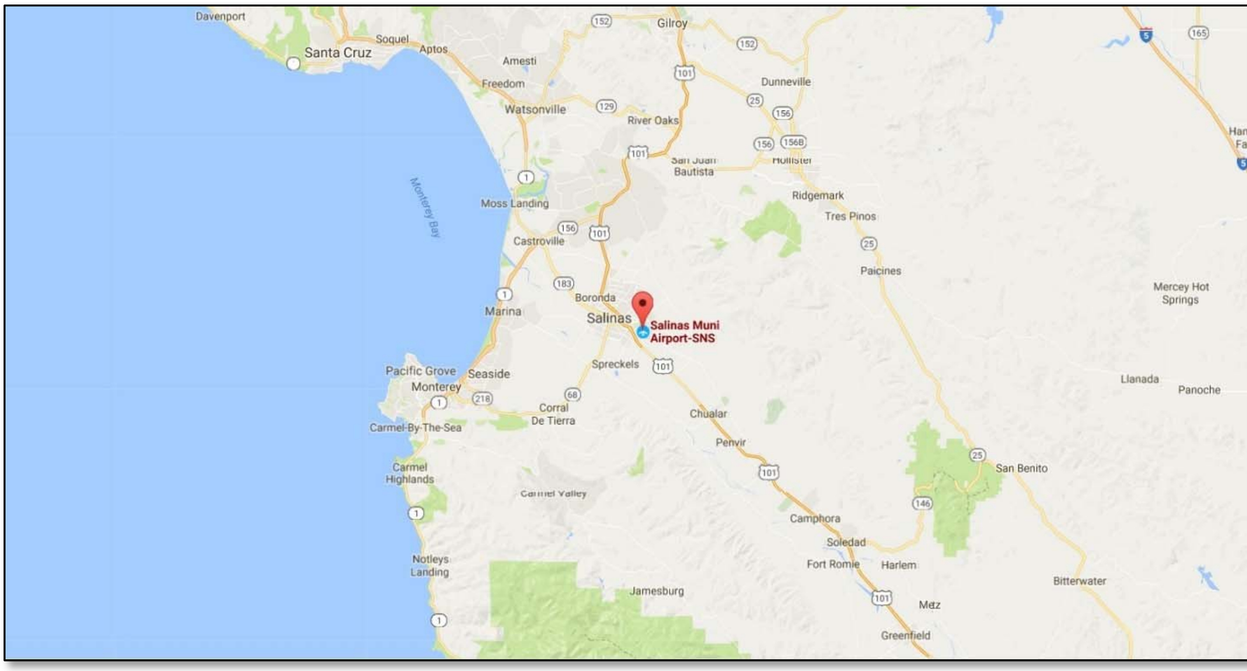
Chapter 1
Introduction

Chapter 1 - Introduction

1.1 Salinas Municipal Airport

The City of Salinas and SNS have long been committed to maintaining the integrity of the infrastructure that supports their airport operations on California's Central Coast. The Airport is owned and operated by the City of Salinas and occupies approximately 605 acres of land located roughly 3 miles southeast of Downtown Salinas. **Figure 1.1.a** shows the location of SNS in relation to Salinas and the surrounding area.

Figure 1.1.a
Location Map



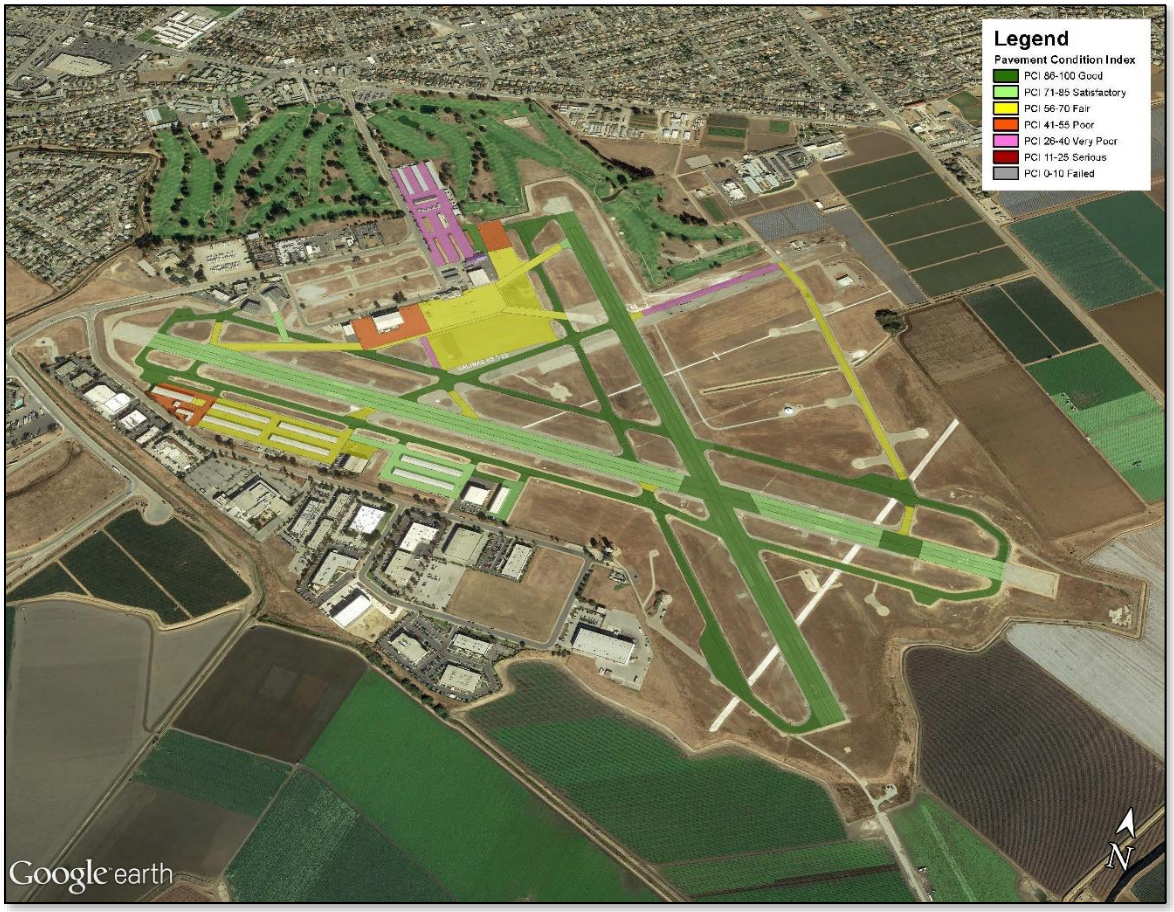
SNS has two asphalt runways. Runway 08/26 is 6,004 feet long and 150 feet wide, and Runway 13/31 is 4,825 feet long and 150 feet wide. The approximate elevation of the Airport is 84 feet above mean sea level. It also has one helipad that is 90 feet long by 90 feet wide.

SNS is a general aviation (GA) airport. It also serves military traffic, but it accounts for less than 1% of traffic annually, according the Federal Aviation Administration (FAA) operational statistics. The Airport is a leading destination for business aviation clients, and several corporate aviation businesses occupy facilities on the airfield.

1.2 Project Background

In 2016, the City of Salinas retained the firm of Kimley-Horn and Associates, Inc. to perform a study to evaluate the pavement condition on the airfield pavements at SNS and to update the existing APMS. This effort is intended to provide SNS updated PCI values; these can be used for the continuous cataloging of pavement condition data and for future analysis and project planning. **Figure 1.2.a** shows the 2017 APMS update pavement conditions at SNS overlaid on aerial imagery of the Airport.

Figure 1.2.a
Aerial Imagery with APMS PCI Data



Under the scope of this project, Kimley-Horn performed visual inspections of the condition of the pavement on all airfield pavements maintained by SNS in accordance with the *ASTM D5340-12 Standard Test Method for Airport Pavement Condition Index Surveys* and updated the existing computer based pavement management database using *PAVER*^{TM} software.

This technical report describes the steps taken in this project, the results of the field PCI surveys, and provides general guidance related to recommended maintenance and rehabilitation actions.

The Airport had previously participated in the 2011 Caltrans Statewide Airport Pavement Management System Updated (June 2012) and before then performed a PCI inspection in October 2006. From the existing APMS database, the Airport has maintained an active APMS for the airfield pavements since 2006. This active APMS consists of documentation of construction work history, inventory updates (using hard copy field drawings), and PCI inspections. This 2017 APMS update utilized the previous data as a basis for the overall network update.

1.3 Pavement Management

Pavement management is the practice of evaluating the pavement asset conditions and planning for pavement repairs and maintenance with the goal of maximizing the value and life of a pavement network. All airports participating in the FAA Airport Improvement Grant Program (AIP) must comply with FAA Order 5100.38 AIP Handbook through the adherence with the FAA Advisory Circulars 150/5380-7B Airport Pavement Management Program and 150/5380-6C Guidelines and Procedures for Maintenance of Airport Pavements.

To achieve this, SNS should regularly evaluate the pavement conditions and have several maintenance and repair techniques or “activities” and the knowledge to proactively implement them in a timely manner. SNS’s APMS is the realization of a system that compiles airfield pavement asset inventory, construction work history, condition records, maintenance and repair policies, unit cost considerations, and pavement performance models that SNS can use as an effective planning tool. This tool, really a database system, can be manipulated and updated with *PAVER*™ software that can model when to perform which repairs at an estimated opinion of probable construction cost within SNS’s entire pavement network. Of course, engineering judgement is required to further the project elements and finalize any list of airfield pavement repairs. There are several factors to be considered during project development such as economies of scale, non-pavement infrastructure needs, mobilization, and overall airport priorities. However, this tool can empower such decision makers at SNS with a systematically developed and objectively rated list of capital needs. This can be a great catalyst to help the Airport progress it’s CIP for each year and can aid in cataloguing repair and cost data. This APMS will provide SNS administrators, engineers, and maintenance personnel with the following:

- *The present condition of the SNS maintained airfield pavement network (runway, taxiway, and apron), as a whole and further subdivided into Branch, Section, and Sample;*
- *Forecast of future performance of SNS’s airfield pavement on the network and section level;*

The APMS should be a continuously growing and updated element of SNS’s infrastructure program to reflect changes in pavement condition, aircraft operational growth, new technologies, unit costs of materials, and maintenance strategies.

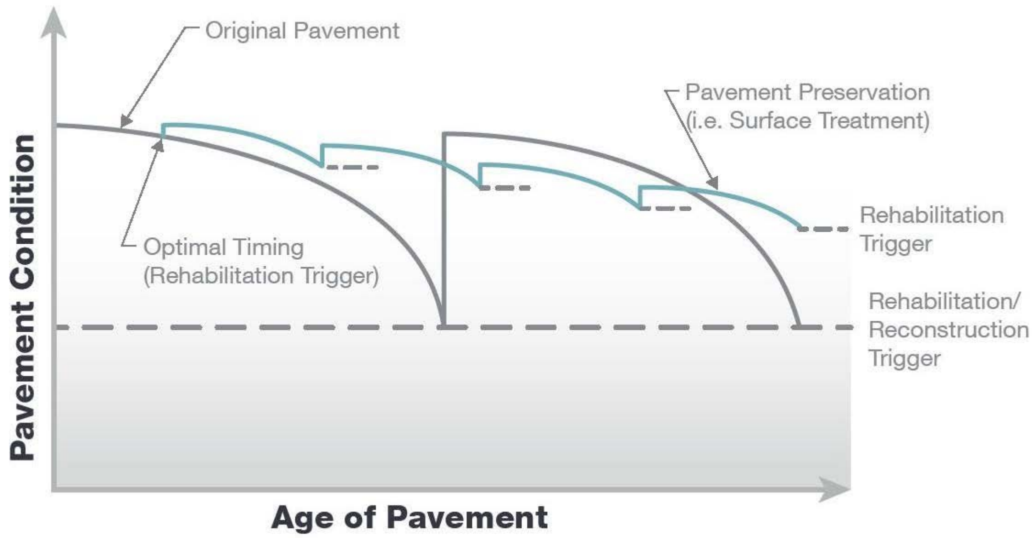
A substantial portion of any APMS involves the evaluation of airfield pavement distresses and infrastructure conditions in an objective and consistent manner. The *ASTM D5340-12* is the industry standard for the identification, measurement, and rating of pavement distresses that ensures a consistent and objective means of documenting and analyzing functional pavement condition as required by the FAA. The PCI is the result of systematically cataloguing distress data in manageable “samples” across the network as to calculate an index based on empirical knowledge of the performance and distress mechanisms of pavements. PCI is a numeric index ranging from 0 to 100, with 0 being a “FAILED” pavement and 100 being a “GOOD” newly constructed pavement.

1.3.1 Pavement Performance Model

Below is a model of how a typical airfield’s pavement deteriorates over time. In interpreting the curve of the model, a pavement typically starts with a “GOOD” condition rating when it is newly constructed. From the model, there is a limited duration of opportunity to perform low cost maintenance repairs before the airfield pavement, by virtue of further deterioration due to time, would need more substantial repairs such as larger section-area mill and overlay rehabilitation or reconstruction that costs significantly more per square foot. Midway through its infrastructure life, a low-cost repair such as crack seal, surface seal treatment, or select full depth patch activities will cost significantly less per square foot.

Performing timely maintenance can delay steep deterioration, thereby extending the life of the airfield pavement. **Figure 1.3.a Pavement Performance Model** is a graphical illustration of the concept.

Figure 1.3.a
Pavement Performance Model



To further elaborate; a traditional, moderately used airfield facility composed of a hot-mix asphalt concrete pavement section has an approximate design life of 20 years prior to needing to be reconstructed if no preventive maintenance is performed and no drastic alteration in traffic pattern occurs (i.e. increased aircraft traffic or substantial changes in aircraft fleet mix). As it will be further explained in this report, it may cost SNS substantially more per square foot to resurface or reconstruct pavement. Alternatively, it can cost SNS much less per square foot to do select or “localized” base repairs, such as crack-sealing, which may extend the life of the pavement section by 3 to 5 years.

This project scope consists of the development of pavement performance models to forecast PCI trends, as well as the development of cost indices associated with PCI values for SNS.

1.3.2 Maintenance, Repair, and Rehabilitation Strategies

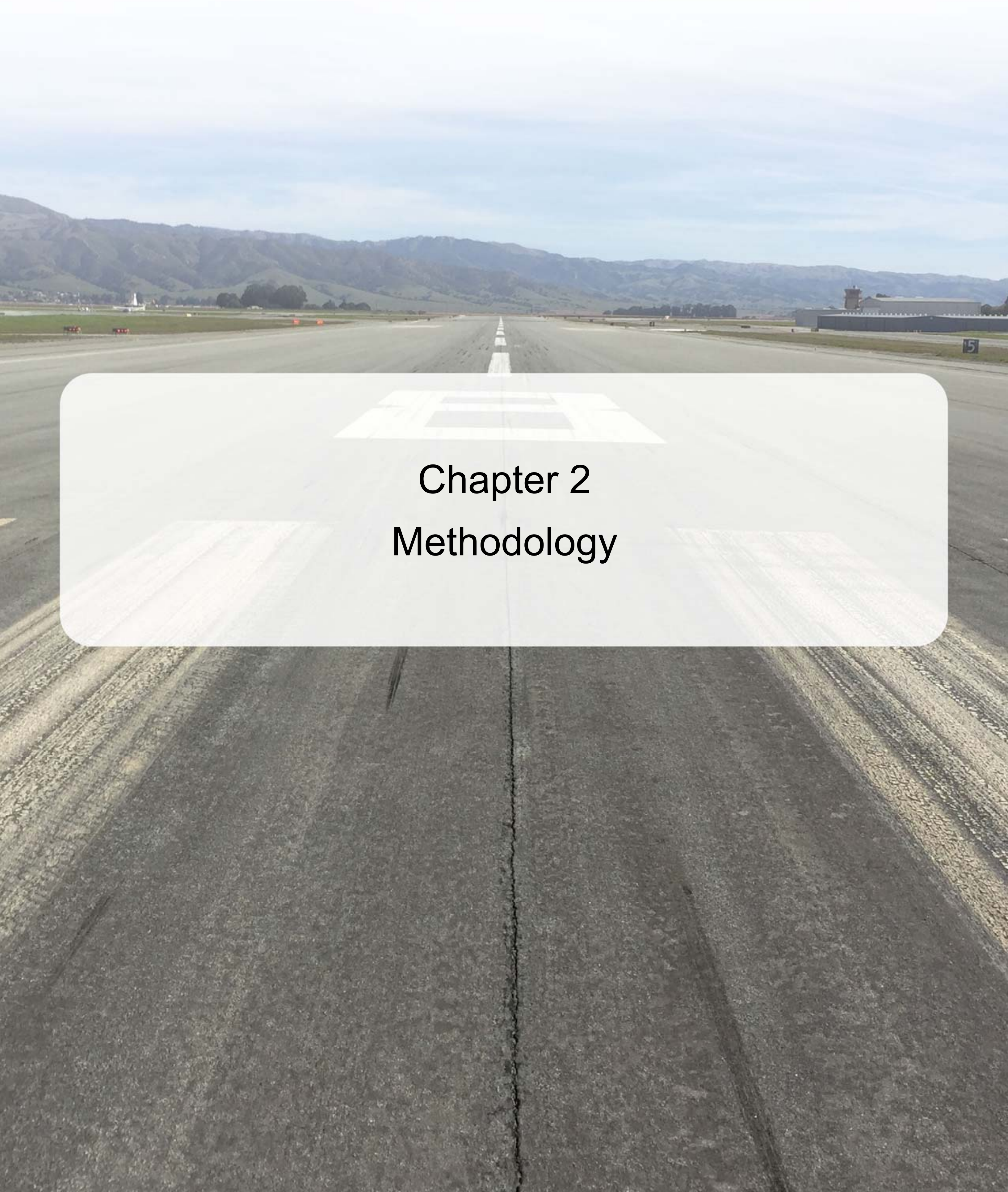
One of the key goals of an APMS is to develop an overall maintenance, repair, and rehabilitation program (M&R Program) that sustains pavement sections in the “GOOD” to “FAIR” (PCI range of 70 to 100) categories from deteriorating further. An APMS can establish appropriate and timely responses to pavement condition or even to specific pavement distresses as manifested by the M&R program that identifies section level maintenance activities. This information can be the basis for the evaluation of different budget scenarios and for developing a list of potential projects that SNS may choose to prioritize in their project planning process.

This scope includes the development of Maintenance, Repair, and Rehabilitation Strategies specific to SNS. FAA Advisory Circular 150/5380-6C was used to develop many of the policies established herein for SNS and has been included in **Appendix F** to help guide SNS in the development of M&R strategies.

1.4 Overall Project Objectives

The specific objectives of this project are as follows:

- Update the construction history from prior reports and record drawings of the existing pavements.
- Update the existing or develop a new airport network definition map which is used to divide the pavements into manageable units to be visually inspected.
- Perform field investigations of airside pavements to identify current functional conditions.
- Update the existing or develop a new APMS with PCI data gathered during the field investigations.
- Develop family curves for functional condition prediction.
- Establish M&R policies and costs.
- Prioritize rehabilitation projects (Phasing).
- Establish 5-year CIP for AIP including the development of an Overall Airport CIP which includes recommendations from other guiding documents.
- Determine PCN's for the airports two runways.
- Summarize the pavement study into a final report and executive summary.



Chapter 2
Methodology

Chapter 2 - Methodology

2.1 General Scope of Work

Kimley-Horn developed a scope of work to meet SNS's project objectives. A brief description of the general work items undertaken to update the APMS for SNS include:

- **Research and evaluation of existing record** documentation was conducted to identify construction projects that have taken place at SNS since the most recent major update of the APMS. This data is used to update the pavement inventory, network definition, and the PAVER™ database.
- **The Network Definition Map** was updated to reflect geometric changes, pavement composition updates, and section characterization. Furthermore, an update to the PCI Survey sample units were made to reflect the field investigation efforts.
- **Update to the PAVER™ database** that consisted of importing construction work history, inventory data, condition distress data, section customization and characterization, and performance models specific to SNS's pavement facilities. PAVER™ uses this information for a multi-functional database that can be utilized for a wide range of maintenance and management efforts, including pavement condition evaluation (PCI analysis and forecasting), and budgetary analysis.
- **A functional pavement evaluation with PCI Survey inspections** was performed on all airfield pavements maintained by SNS. The PCI Survey procedure, as defined by ASTM D5340-12, was used as the basis of the functional pavement evaluation. For this evaluation, the sample units defined by prior studies were inspected as to enhance the accuracy of performance models.
- **Condition Analysis** was performed based on the distress data observed, rated, measured, and recorded in accordance with the ASTM D5340-12 for the calculation of PCI values and ratings. The results of the current condition analysis were used in concert with the historic PCI data and construction work history to develop performance models to forecast 5-year future PCI values.
- **PAVER™ APMS customization** was performed including the critical PCI, prioritization guidelines, maintenance policies, unit costs for M&R activities, and budget expectations.
- **A 5-Year CIP** was developed using the results of the PAVER™ analysis in conjunction with other factors including adherence to FAA design advisory circulars, operational impacts and future airport plans.
- **Runway PCNs** were determined in accordance with the Using Aircraft Method described by *FAA Advisory Circular 150/5335-5C Standardized Method of Reporting Airport Pavement Strength – PCN.*
- **This report and documentation** summarizes all evaluation methodologies used during the APMS update at SNS. It incorporates preliminary field reports including visual evaluation results and provides various PAVER™ analysis results and standard reports.

2.2 Methodology

Kimley-Horn performed a visual condition evaluation of approximately 4.9 million square feet of the Airport-maintained airfield pavements (runways, taxiways, and aprons) to establish the basic elements of the APMS. The first step was to identify SNS's pavement assets, thereby comprising the airfield ***Pavement Inventory***; this effort catalogued pavement characteristics such as surface type, facility name, functional use, airport rank, and construction work history as made available by SNS. The second step was to further define each asset in the pavement inventory in a pavement management ***Network Definition***; this step typically defines the Branch, Section, and Samples. The third step was to perform ***Data Collection*** throughout the network; this consists of the categorizing, measuring, rating, and recording of record pavement distresses as defined by the ASTM D5340-12 based on a *Sample Plan* as to calculate PCI values. The fourth step was to ***analyze the collected distress data and calculate PCI values*** which are assigned to the defined pavement sections within the network. Next is the development of performance models that assess the PCI trends of the network based on estimated construction work history and current condition results based on the data collection. ***Pavement Performance Models*** are developed based on functional classification and surface type of the airfield pavements and are utilized to forecast the pavement performance, or predict PCI, over a 5-year period on an annual basis. The next step is the development of a customized airfield pavement maintenance, repair, and rehabilitation policies; known as a Maintenance and Rehabilitation Program, or ***M&R Program***. An M&R Program provides maintenance and major rehabilitation recommendations based on present distresses and the overall condition of the pavement sections inspected. Using the data gathered and developed in the previous steps, as well as other considerations such as construction phasing, operational impacts, and currently planned rehabilitation projects, a detailed ***5-year CIP*** can be developed. This CIP is strictly intended to provide planning-level recommendations and does not preclude design-level investigations for future projects.

This section describes the methodology and approach taken to collect the required customization, construction history, and condition information for the APMS update.

2.2.1 Pavement System Inventory

The pavement inventory for SNS is a complete collection of existing pavement network facilities. General geometry characteristics, estimated length, width, functional classification, pavement surface type, and operational function are among the characteristics identified at this initial phase in the pavement management process. The development of a pavement inventory that reasonably reflects SNS's airfield pavement facilities provides a defined scope of the inspection and analysis efforts. **Figure 2.2.a** depicts the pavement system inventory surface type overlaid on an aerial image of the airport.

Figure 2.2.a
Aerial Imagery with Pavement Surface Type

A critical input to the pavement inventory and network definition in the development of the APMS is the date of last major rehabilitation/construction performed on the pavement assets that would set the asset at a PCI of 100 ("Good"). These activities include; pavement overlays, mill and replace, mill and overlay, and/or complete reconstruction.

2.2.2 Network Definition

The airfield pavement network definition is primarily based upon use, construction history, and aircraft traffic. As part of the initial implementation, airfield pavements were divided into "branches", "sections", and "sample units". Kimley-Horn utilized remote sensing with aerial imagery as a reference for determining approximate pavement locations. The procedures outlined in the ASTM D5340-12 were utilized to develop SNS's Pavement Network Definition Map update.

A "branch" is any identifiable part of a pavement network that has a distinct function. Each runway, taxiway, and apron within the network is defined as its own branch. For this effort, common airfield designators define the Branch.

A "section" is a subdivision of a branch that has consistent characteristics throughout its designated length or area. These characteristics include but are not limited to; pavement composition (layer type, thickness, and/or soil type), construction history, aircraft traffic, functional class and pavement condition records. A section is the basic management unit of a pavement network and is the level at which M&R Projects are likely to be recommended and/or consolidated. Sections are intended to be homogenous areas of pavement that usually exhibit similar distress type manifestations throughout. A runway, taxiway, or apron may be a single section, or it may be a collection of multiple sections; this is dependent on the pavement composition and construction work history. **Table 2.2.a Pavement Asset Identifiers** provides asset identification term definitions for the APMS.

Further pavement identifiers, or characteristics, are used to describe a branch or section's function, importance, and construction. These characteristics may consist of pavement rank, surface type, section limits, section length, section width, section approximate area, traffic level association, last inspection date, age at inspection date, and pavement condition. Of special note, pavement rank refers to the relative importance assigned to pavement facilities which is typically based on input provided by SNS.

Sections are further subdivided into "sample units" in order to create practical area units to inspect as part of the PCI Survey procedure in the Data Collection efforts. Sample units for flexible asphalt concrete pavement (AC), asphalt overlaid on asphalt (AAC), and asphalt overlaid on Portland Cement Concrete (APC) are defined to be 5,000 square feet in area ±2,000 square feet. Sample Units for rigid Portland Cement Concrete (PCC) pavement are defined to be 20 slabs ±8 slabs.

Table 2.2.a
Pavement Asset Identifiers

APMS Network Level	Common Definition	Airport Example
Network	Overall pavement assets maintained by the Airport	"Salinas Municipal Airport – Airfield Pavements"
Branch Name	Commonly defined asset name as established by Airport and by use	"Runway 08/26"
Branch ID	Codified shorthand name for commonly defined asset name established by Airport for database identification	"R08"
Section ID	Codified identification for pavement asset that is distinct by the following: ▪ Pavement Composition ▪ Construction Work History ▪ Aircraft Traffic ▪ Condition Records	"R08-10L"
Sample Unit	A numeric identification of an area of pavement (5,000±2,000 SF of AC or 20±8 slabs of PCC)	"01"

2.2.3 Data Collection

The PCI procedure is a visual statistical sampling of pavements to record primary distress types (e.g. cracking and deformation), associated severity, and quantity. This effort is the primary means of obtaining and recording pavement distress data. The survey inspection consists primarily of visual inspection of pavement surfaces for signs of distress and deterioration resulting from loading (aircraft) and environmental influences.

A visual PCI survey provides an indication of the cause and rate of deterioration of a pavement section from a functional perspective and can be an indication of structural distress. A visual PCI survey does not predict the remaining structural life of a pavement section, nor its ability to support loads. The functional condition can provide a meaningful and cost effective indication of the maintenance needs to extend life of individual pavement sections or identify projects for major rehabilitation.

For each section, the severity and quantity of defined distresses are recorded and then analyzed. The ASTM identifies 17 distinct flexible AC distress types and 16 distinct rigid PCC distress types.

2.2.4 PCI Analysis and Performance Models

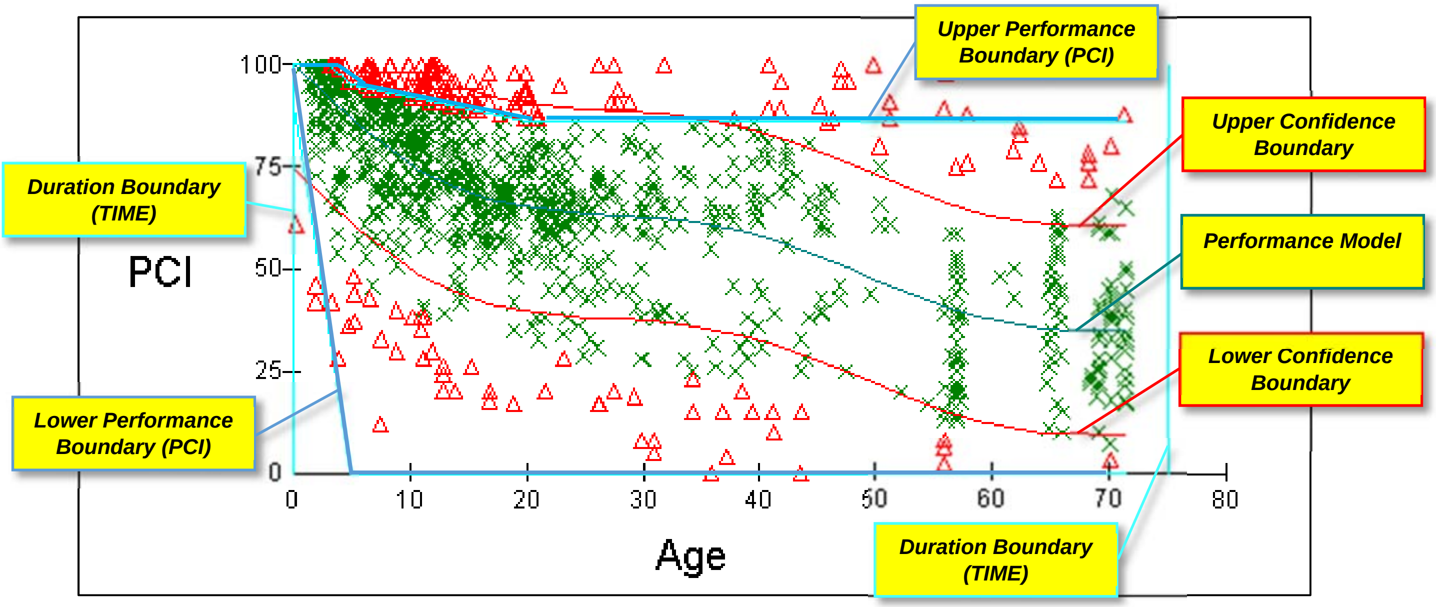
The current PCI is calculated from the distress data collected and analyzed at the four network levels; sample, section, branch, and network. The historic pavement condition, or performance trend, were compiled with data from the inception of the APMS comprising of original and last construction dates and prior PCI Survey inspections to develop the performance models for SNS.

Each model has been developed based on the following criteria:

- FACILITY USE (Runway, Taxiway, or Apron)
- FACILITY SURFACE TYPE (AC, AAC, APC, or PCC)

Figure 2.2.a is an example performance model with annotation of the statistical boundaries and trends developed from historic pavement condition and construction work data points.

Figure 2.2.a
Pavement Performance Model



✖ **PCI Data included in Model**

∆ **PCI Data <u>excluded</u> in Model**

The performance models developed are refined based on engineering judgment of pavement performance and data integrity using statistical filters and boundaries. The performance modeling process identifies and groups pavements of similar construction (airport function and pavement type), that are subjected to similar traffic patterns (airport function and branch use), weather and other factors that affect pavement life. The deterioration rates of the pavement sections since the last construction dates are used to predict the future performance of a group of pavements with similar attributes, also known as a "family" or model grouping.

The following are some factors that influence the life of a pavement within the performance model: original construction type/date, maintenance, weather, and traffic. The performance model is designed to allow users to blend unique knowledge about their pavements and measured local condition information to plan for project development.

2.2.5 M&R Customization

One of the key aspects of an APMS is an overall maintenance, repair, and rehabilitation program (M&R Program) that sustains pavement sections in the "GOOD" to "FAIR" (PCI range of 100 to 70) categories from deteriorating further. Furthermore, an APMS can establish appropriate and timely responses to pavement condition and in certain cases specific pavement distresses as manifested by the M&R program that identifies section level activities.

The first step in developing a plan for M&R is the research effort into local unit construction costs and bid documents. The compilation of this data can be linked to different recommended M&R activities to develop costs per activity and cost by pavement condition. Using present PCI information, a list of recommended immediate activities by section can be produced to assist the client in identifying areas of concern that may otherwise be left to deteriorate further. The PAVER™ software is powerful in attaching these different recommendations to all the varying pavement conditions and distresses observed across an entire airport, or system of airports. This information can be the basis of the evaluation of budget scenarios that lead to the development of a recommended CIP.

2.2.6 5-Year CIP

One of the main goals for an Airport when implementing an APMS is the development of a CIP. Typically, a CIP is a short-term plan, 5 years in this case, that identifies M&R recommendations and a planning schedule for SNS to make informed decisions in maintaining the quality of their airfield pavements.

While the PAVER™ software can be utilized to develop a baseline for CIP development, limitations are apparent. Best engineering judgement is critical when developing an effective CIP to best advise the client's needs. It is important for Kimley-Horn to consider other factors such as adherence to FAA design advisory circulars, operational impacts, and future airport plans when developing a logical and cost effective CIP.

2.2.7 PCN Determination

A PCN, as defined by FAA Advisory Circular 150/5335-5C Standardized Method of Reporting Airport Pavement Strength – PCN, is a number that expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load. It is important to note that the PCN value is for reporting relative pavement strength, so airport operators can evaluate acceptable operations of aircraft. The PCN should not be used for pavement design or to evaluate a given pavement structure.

AC 150/5335-5C requires all public-use paved runways at airports serving air carrier aircraft be assigned a PCN. The AC is mandatory for all projects funded with Federal grant monies through the AIP and with revenue from the Passenger Facility Charge (PFC) Program. The detailed results of the PCN determination can be found in **Chapter 8 – Pavement Classification Number Determination**.

2.3 References

The following reference documents were referenced as specific guidelines and procedures for maintaining airport pavements; establishing an effective pavement maintenance program, and identifying specific pavement distresses, probable cause of distress, inspection guidelines, and recommended method of repair:

- ASTM D5340-12 Standard Test Method for Airport Pavement Condition Index Surveys
- FAA Advisory Circular 150/5380-7B 150/5380-7B Airport Pavement Management Program
- FAA Advisory Circular 150/5380-6C Guidelines and Procedures for Maintenance of Airport Pavements
- FAA Advisory Circular 150/5335-5C Standardized Method of Reporting Airport Pavement Strength – PCN

Appendix F – References contains a copy of each reference.

Chapter 3
Pavement System Inventory

Chapter 3 – Pavement System Inventory

3.1 History

Salinas Municipal Airport, formerly known as Salinas Army Air Field (AAF) first opened in late 1941. As a military base, it was used by the US Army Air Force during World War II as a sub post to neighboring Ford Ord. The base was closed in 1946, and the land was transferred to the City of Salinas.

Today, SNS is a regional general aviation airport that services over 80,000 flight operations annually. It's close proximity to both Monterey Bay and Silicon Valley make Salinas a leading destination for business aviation. It has complete landing and navigation systems which makes it ideal for landing in all-weather conditions. Additionally, SNS is home to the annual California International Airshow.

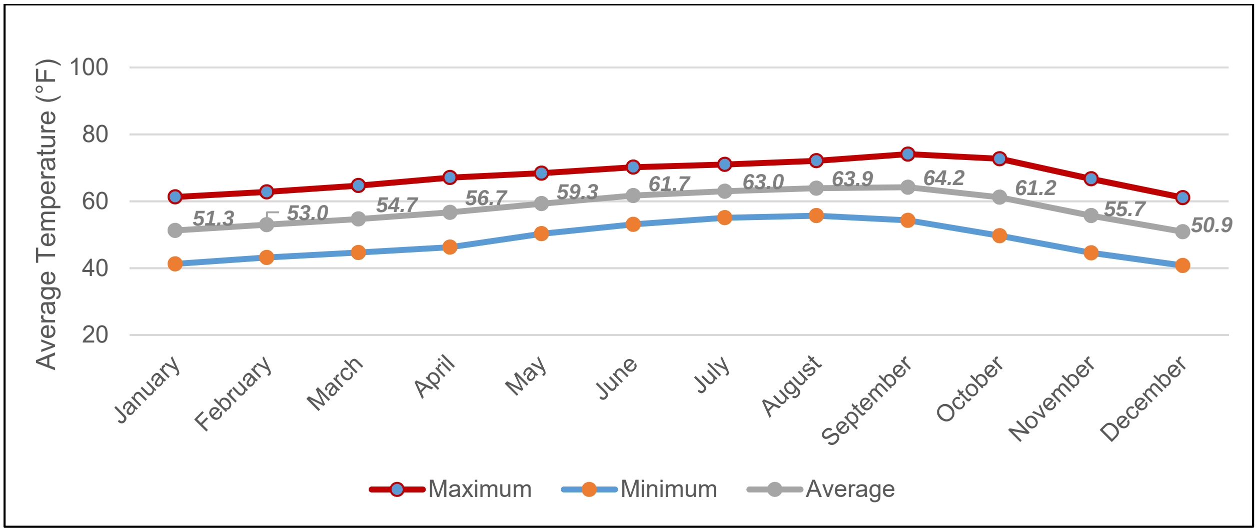
3.2 Climatological Data

Climatological data for Salinas has been assembled from information published by the National Oceanic and Atmospheric Administration (NOAA) Climate Data Online System. The referenced weather station is located at the Airport and is identified as ***SALINAS MUNICIPAL AIRPORT, CA US GHCND: USW00023233.*** The following **Table 3.2.a** presents the monthly maximum, minimum, and average temperatures from the historic analysis period from 1981 through 2010. **Figure 3.2.a** presents a line chart representation of the Table 3.2.a.

Table 3.2.a
Historic Average Temperatures

Month	Historic Average Temperatures (Fº) 1981-2010			Precipitation (inches)
	Maximum	Minimum	Average	
January	61.3	41.3	51.3	2.6
February	62.8	43.2	53.0	2.5
March	64.7	44.7	54.7	2.3
April	67.1	46.3	56.7	0.9
May	68.4	50.3	59.3	0.4
June	70.2	53.1	61.7	0.1
July	71.0	55.1	63.0	0.0
August	72.1	55.7	63.9	0.0
September	74.1	54.3	64.2	0.2
October	72.7	49.7	61.2	0.6
November	66.7	44.6	55.7	1.4
December	61.1	40.8	50.9	1.9
Average	**67.7**	**48.3**	**58.0**	**1.1**

Figure 3.2.a
Historic Average Temperatures



3.3 Network Definition

The airfield pavements are separated into manageable units within the APMS PAVER™ database system, organizing pavement data by similar use and construction history. The Network excludes any pavements not maintained by SNS (tenant maintained lease pavements) or not subject to aircraft loading (shoulders, blast pads, access roads, etc.).

3.3.1 Branch Identification

Each Airport's airfield pavement network is generally subdivided into separate branches (runways, taxiways, aprons/ramps, or others) that have distinctly different functional identifications and uses. **Table 3.3.a** summarizes the network definition at the branch level.

Table 3.3a
Branch Level Summary

Network ID	Name	Branch ID	Branch Use	Sections	Estimated Area (SF)
SNS	North Hangar Apron	AHGRNO	Apron	3	327,800
SNS	South Hangar Apron	AHGRSO	Apron	8	517,858
SNS	Tie Down Apron	ATD	Apron	3	442,439
SNS	Terminal Apron	ATERM	Apron	3	334,355
SNS	Helipad	HELI	Helipad	1	75,915
SNS	Hangar Connector	HGCON	Taxiway	4	11,532
SNS	Runway 08/26	R08	Runway	4	834,543
SNS	Runway 13/31	R13	Runway	3	767,850
SNS	Taxiway A	TWA	Taxiway	7	321,050
SNS	Taxiway B	TWB	Taxiway	6	323,601
SNS	Taxiway C	TWC	Taxiway	2	305,718
SNS	Taxiway D	TWD	Taxiway	4	199,675
SNS	Taxiway E	TWE	Taxiway	1	34,238
SNS	Taxiway F	TWF	Taxiway	2	57,373
SNS	Taxiway G	TWG	Taxiway	2	32,483
SNS	Taxiway H	TWH	Taxiway	1	17,990
SNS	Taxiway J	TWJ	Taxiway	2	17,128
SNS	Taxiway K	TWK	Taxiway	2	37,533
SNS	Taxiway L	TWL	Taxiway	1	75,065
SNS	Taxiway N	TWN	Taxiway	1	9,443
SNS	Taxiway P	TWP	Taxiway	2	124,992

3.3.2 Section Identification

Each branch is further subdivided into sections as defined by pavement location, composition, and construction history. A section is typically understood to be a project level subdivision within a branch feature. Sections are manageable units to organize data collection and are typically treated individually during the maintenance and major rehabilitation planning process. A pavement rank (primary, secondary, or tertiary) is assigned to each section based on its importance and type of use to airport operations. The pavement rankings designated for each section at this airport were defined by Kimley-Horn, unless changes were communicated by SNS.

Aerial imagery was obtained through the United States Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center. This spatially projected imagery was utilized with computer aided drafting software AutoCAD in concert with geographical information system software ArcGIS to develop a planning level representative model that reasonably reflects the pavement assets at SNS. This information was used to develop a spatially referenced dataset in AutoCAD (.dwg) format.

3.4 Pavement System Inventory Results

Based on the review of record documentation and field validation efforts; the **Pavement System Inventory** has been summarized at the section level in **Table 3.4.a**. **Exhibit 001 Pavement System Inventory** depicts the section boundaries with the appropriate identification details.

Table 3.4.a
Pavement System Inventory Summary

Network ID	Name	Branch ID	Branch Use	Section ID	Length	Width	Estimated Area	Section Rank	Surface Type	Estimated Last Construction Date
SNS	North Hangar Apron	AHGRNO	Apron	10	915	300	227,416	P	AC	1/1/1990
SNS	North Hangar Apron	AHGRNO	Apron	20	352	287	68,083	P	AC	1/1/1990
SNS	North Hangar Apron	AHGRNO	Apron	30	368	112	32,301	P	AC	8/1/2005
SNS	South Hangar Apron	AHGRSO	Apron	10	483	238	71,137	P	AC	7/1/1998
SNS	South Hangar Apron	AHGRSO	Apron	20	60	94	6,420	P	PCC	7/1/1998
SNS	South Hangar Apron	AHGRSO	Apron	30	80	607	39,005	P	AC	12/25/2009
SNS	South Hangar Apron	AHGRSO	Apron	40	1,013	284	198,165	P	AC	7/1/1992
SNS	South Hangar Apron	AHGRSO	Apron	50	208	118	25,264	P	AC	7/1/1992
SNS	South Hangar Apron	AHGRSO	Apron	60	100	1,000	138,028	P	AC	1/1/2001
SNS	South Hangar Apron	AHGRSO	Apron	70	216	46	10,147	P	AC	12/25/2010
SNS	South Hangar Apron	AHGRSO	Apron	80	71	409	29,692	P	AC	7/17/2004
SNS	Tie Down Apron	ATD	Apron	10	860	382	316,479	P	AC	1/1/1990
SNS	Tie Down Apron	ATD	Apron	20	288	200	59,373	P	PCC	1/1/1990
SNS	Tie Down Apron	ATD	Apron	30	344	192	66,587	P	AC	1/1/1990
SNS	Terminal Apron	ATERM	Apron	10	600	320	183,317	P	PCC	1/1/1968
SNS	Terminal Apron	ATERM	Apron	20	500	320	120,440	P	PCC	1/1/1968
SNS	Terminal Apron	ATERM	Apron	30	1,017	30	30,598	P	PCC	1/1/1968
SNS	Helipad	HELI	Helipad	10	301	239	75,915	P	AC	1/1/1990
SNS	Hangar Connector	HGCON	Taxiway	10	47	31	1,854	P	AC	12/25/2009
SNS	Hangar Connector	HGCON	Taxiway	20	52	40	2,622	P	AC	12/25/2010
SNS	Hangar Connector	HGCON	Taxiway	30	51	40	2,735	P	AC	12/25/2010
SNS	Hangar Connector	HGCON	Taxiway	40	70	50	4,321	P	AC	12/25/2010
SNS	Runway 08/26	R08	Runway	20	250	150	37,500	P	AC	12/25/2009

Table 3.4.a (cont.)
Pavement System Inventory Summary

Network ID	Name	Branch ID	Branch Use	Section ID	Length	Width	Estimated Area	Section Rank	Surface Type	Estimated Last Construction Date
SNS	Runway 08/26	R08	Runway	10C	5,267	50	263,346	P	AC	8/1/2005
SNS	Runway 08/26	R08	Runway	10L	5,307	50	272,377	P	AC	8/1/2005
SNS	Runway 08/26	R08	Runway	10R	5,227	50	261,320	P	AC	8/1/2005
SNS	Runway 13/31	R13	Runway	10C	4,825	50	241,250	P	AC	4/1/2006
SNS	Runway 13/31	R13	Runway	10L	4,825	50	269,750	P	AC	4/1/2006
SNS	Runway 13/31	R13	Runway	10R	4,825	50	256,850	P	AC	4/1/2006
SNS	Taxiway A	TWA	Taxiway	10	425	50	21,686	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	20	229	107	23,170	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	30	2,259	50	122,877	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	35	53	75	5,945	P	AC	8/1/2005
SNS	Taxiway A	TWA	Taxiway	40	149	70	12,453	P	AC	12/25/2010
SNS	Taxiway A	TWA	Taxiway	50	1,807	50	95,193	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	60	450	98	39,726	P	AC	12/25/2013
SNS	Taxiway B	TWB	Taxiway	10	1,914	50	100,734	P	AC	12/25/2009
SNS	Taxiway B	TWB	Taxiway	15	2,175	50	111,142	P	AC	12/25/2010
SNS	Taxiway B	TWB	Taxiway	20	305	50	19,031	P	AC	9/1/2006
SNS	Taxiway B	TWB	Taxiway	25	88	70	7,317	P	AC	4/1/2006
SNS	Taxiway B	TWB	Taxiway	30	1,494	50	75,583	P	AC	9/1/2006
SNS	Taxiway B	TWB	Taxiway	40	125	71	9,794	P	AC	9/1/2006
SNS	Taxiway C	TWC	Taxiway	10	5,085	50	270,996	P	AC	12/25/2013
SNS	Taxiway C	TWC	Taxiway	20	100	100	34,722	P	AC	12/25/2013
SNS	Taxiway D	TWD	Taxiway	10	133	60	11,918	P	AC	1/1/1968
SNS	Taxiway D	TWD	Taxiway	20	1,585	60	110,232	P	AC	12/25/2009

Table 3.4.a (cont.)
Pavement System Inventory Summary

Network ID	Name	Branch ID	Branch Use	Section ID	Length	Width	Estimated Area	Section Rank	Surface Type	Estimated Last Construction Date
SNS	Taxiway D	TWD	Taxiway	25	99	60	6,915	P	AC	4/1/2006
SNS	Taxiway D	TWD	Taxiway	30	1,166	60	70,610	P	AC	1/1/1968
SNS	Taxiway E	TWE	Taxiway	10	457	75	34,238	P	PCC	1/1/1968
SNS	Taxiway F	TWF	Taxiway	10	655	75	49,134	P	PCC	1/1/1968
SNS	Taxiway F	TWF	Taxiway	20	80	104	8,239	P	APC	4/1/2006
SNS	Taxiway G	TWG	Taxiway	10	345	42	14,894	P	AC	7/1/1999
SNS	Taxiway G	TWG	Taxiway	20	299	50	17,589	P	AC	7/1/1999
SNS	Taxiway H	TWH	Taxiway	10	351	50	17,990	P	PCC	1/1/1968
SNS	Taxiway J	TWJ	Taxiway	10	220	50	11,011	P	AC	8/1/1999
SNS	Taxiway J	TWJ	Taxiway	20	107	43	6,117	P	AC	8/1/1999
SNS	Taxiway K	TWK	Taxiway	10	505	50	28,386	P	AC	12/25/2013
SNS	Taxiway K	TWK	Taxiway	20	149	79	11,147	P	AC	12/25/2013
SNS	Taxiway L	TWL	Taxiway	10	995	75	75,065	P	PCC	1/1/1968
SNS	Taxiway N	TWN	Taxiway	10	141	50	9,443	P	AC	12/25/2009
SNS	Taxiway P	TWP	Taxiway	10	2,252	50	112,307	P	AC	8/1/1999
SNS	Taxiway P	TWP	Taxiway	20	240	50	12,685	P	AC	6/1/1990

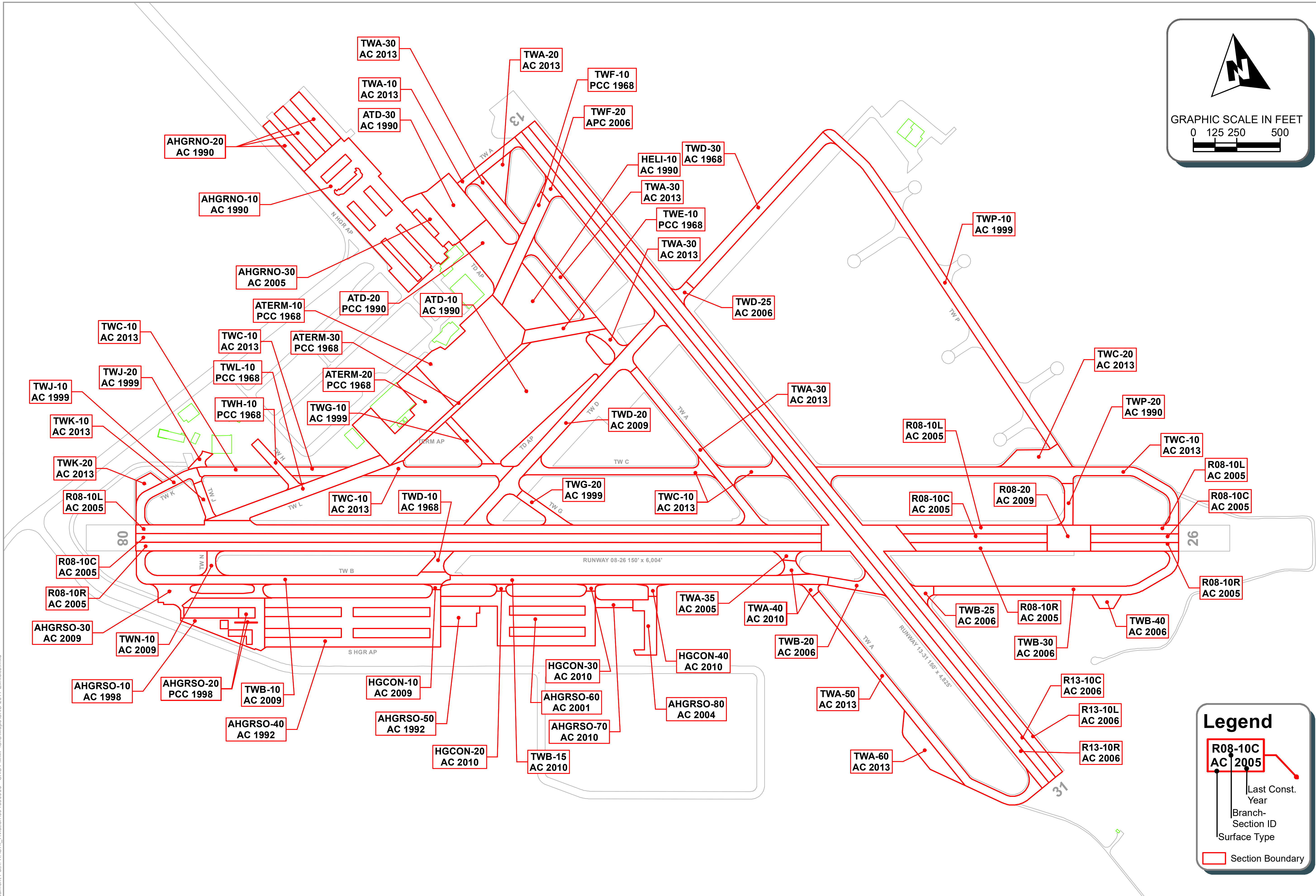


EXHIBIT 001

Kimley»Horn

PAVEMENT SYSTEM INVENTORY

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

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Based on the analysis of the defined Section functional use within the airfield, the following **Figure 3.4.a** summarizes the **Pavement Use by Area** and **Figure 3.4.b** summarizes the **Pavement Use by Age**.

Figure 3.4.a
Pavement Use by Area

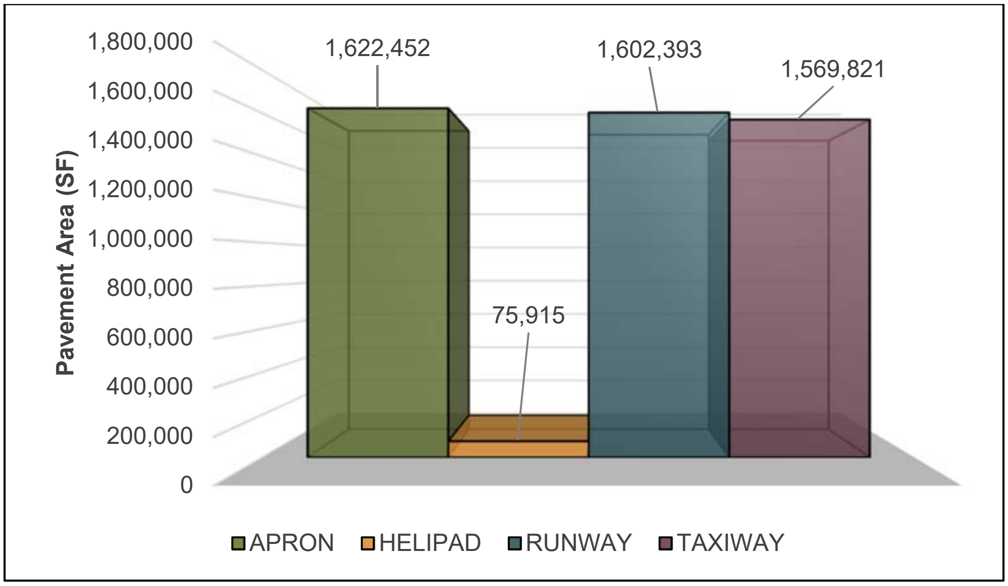
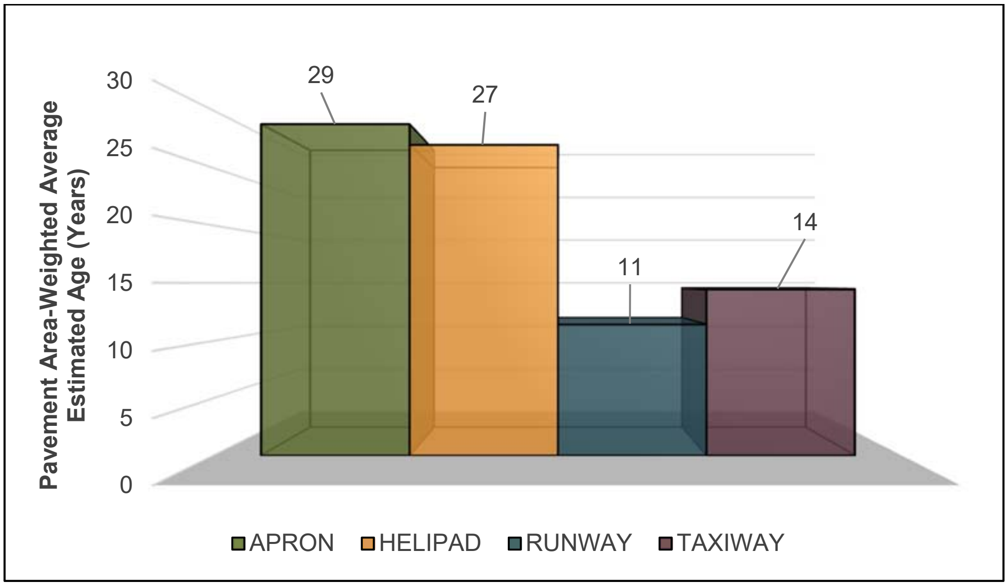


Figure 3.4.b
Pavement Use by Age



The functional use for each airfield pavement asset is graphically depicted on **Exhibit 002 Pavement Functional Use**.

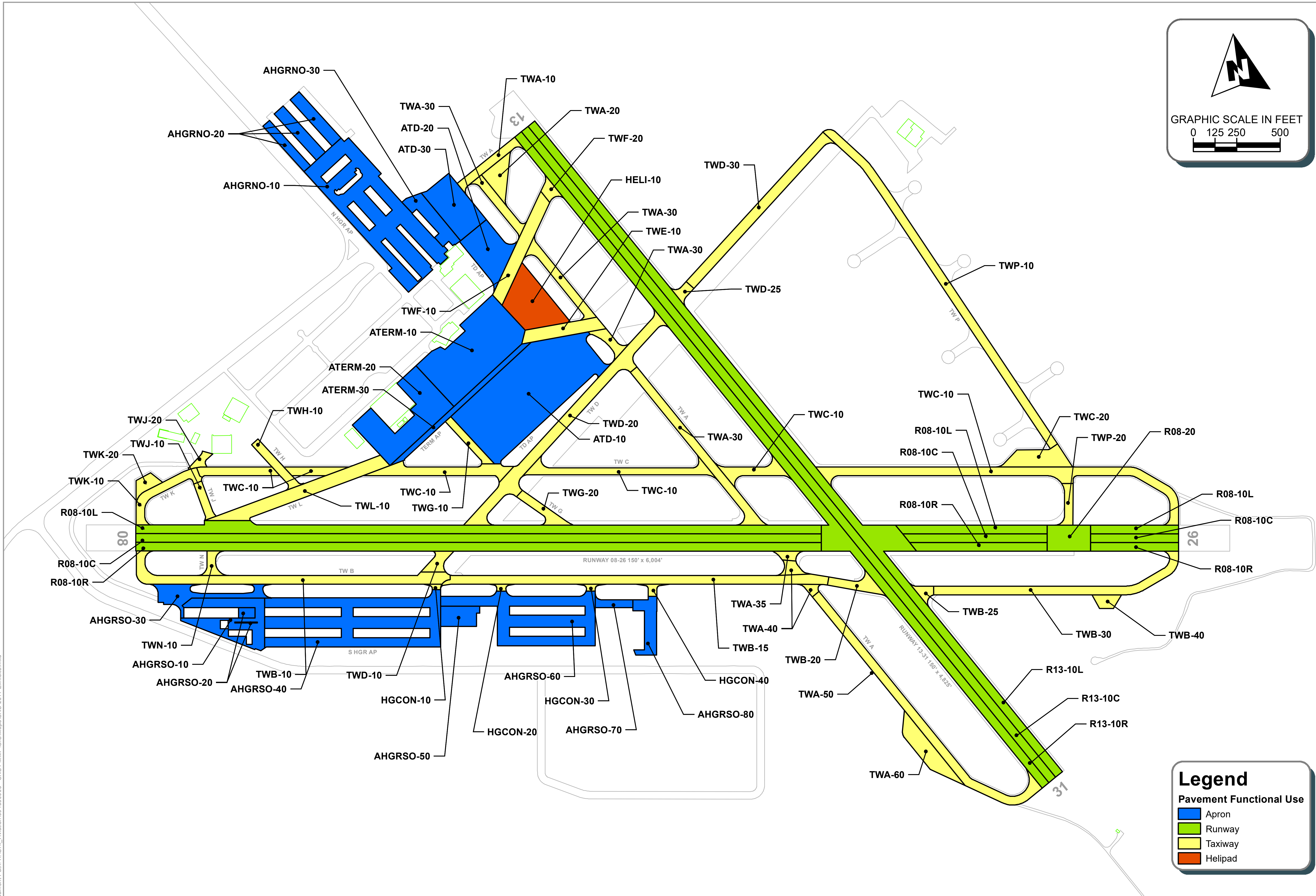


EXHIBIT 002

PAVEMENT FUNCTIONAL USE

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

Kimley-Horn

SALINAS

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The Airport's pavement facility surface types include three common types of pavement: Portland cement concrete (PCC) and asphalt concrete (AC), and asphalt concrete overlaid on Portland cement concrete (APC).

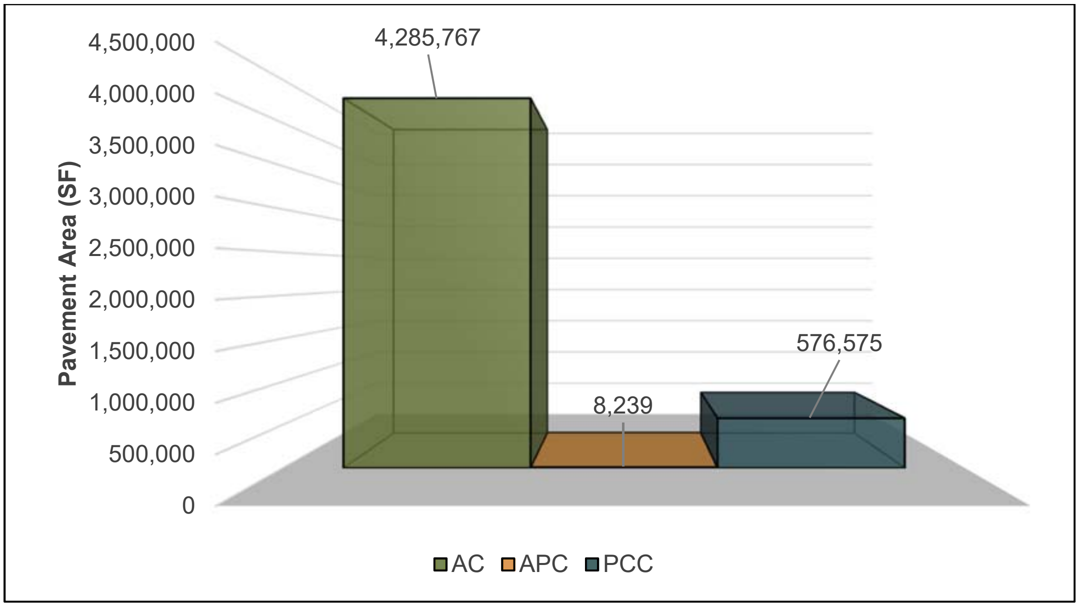
Portland Cement Concrete Pavement (PCC) – rigid pavements for airports are composed of Portland cement concrete placed on a granular or treated base course that is supported on a compacted subgrade. The concrete surface must provide a texture of nonskid qualities, prevent the infiltration of surface water into the subgrade, and provide structural support to the airplanes. Rigid pavement construction requires the layout of appropriately designed joint spacing. The quality of the concrete, acceptance and control tests, methods of construction and handling, and quality of workmanship are covered in Item P-501, Portland Cement Concrete Pavement.

Asphalt Concrete (AC) – a flexible pavement consisting of hot mix asphalt wearing surface placed on base course and, when required by subgrade conditions, a subbase. The entire flexible pavement structure is ultimately supported by the subgrade. The hot mix asphalt surface or wearing course must prevent the penetration of surface water to the base course; provide a smooth, well-bonded surface free from loose particles which might endanger airplanes or persons; resist the shearing stresses induced by airplane wheel loads; and furnish a texture of nonskid qualities, yet not cause undue wear on tires. To successfully fulfill these requirements, the surface must be composed of mixtures of aggregates and bituminous binders which will produce a uniform surface of suitable texture possessing maximum stability and durability. Since control of the mixture is of paramount importance, these requirements can best be achieved by use of a central mixing plant where proper control can be most readily obtained. The quality of the concrete, acceptance and control tests, methods of construction and handling, and quality of workmanship are covered in Item P-401/403, Hot Mix Asphalt (HMA) Pavements.

Asphalt Concrete Overlaid on Portland Cement Concrete (APC) – a composite flexible pavement section consisting of hot mix asphalt concrete that has been placed over an existing rigid PCC pavement section. This composite pavement section is subject to Joint Reflection Cracking due to the differing materials' coefficients of thermal expansion that cause varying rates of expansion and contraction between the upper AC layer and the lower PCC material.

Based on the record documentation incorporated within the APMS database throughout the years, the pavement surface types have been assigned to the various pavement sections at SNS in accordance with its work history composition. The following **Figure 3.4.c** summarizes the pavement types observed at the Airport. **Exhibit 003 Pavement Surface Type** illustrates the various pavement surface types on the airfield.

Figure 3.4.c
Pavement Surface Type by Area



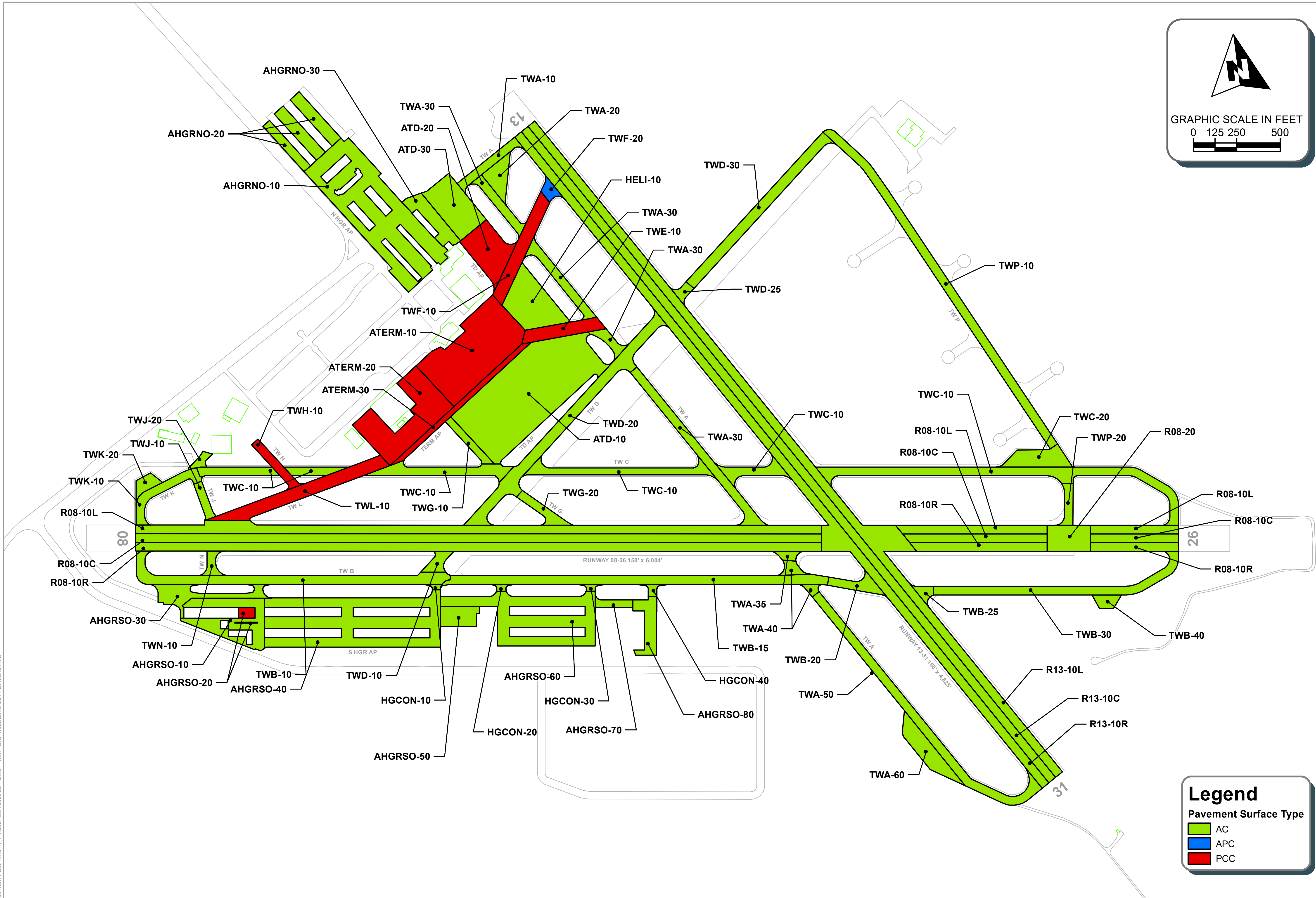


EXHIBIT 003

Kimley»Horn

PAVEMENT SURFACE TYPE

2017
AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT
Salinas Municipal Airport (SNS)

SALINAS

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These Sections are further subdivided into sample units, which is shown on **Exhibit 004 Network Definition Map** in the following **Chapter 4 – Data Collection**.

The results of the estimated age of pavements at SNS are summarized in **Figure 3.4.d.**

Figure 3.4.d
Pavement Sections vs. Age

Table 3.4.b Pavement Inventory Attributes provides a brief synopsis of basic pavement inventory attributes for SNS.

Table 3.4.b
Pavement Inventory Attributes

Airfield Pavement System Inventory		
Number of Branches	21	
Number of Sections	62	
Sample Units	261	
Airfield Pavement Functional Use		
Use	**Area (SF)**	**Relative Area (%)**
Apron	1,622,452	33%
Helipad	75,915	2%
Runway	1,602,393	33%
Taxiway	1,569,821	32%
Total	**4,870,581**	**100%**
Airfield Pavement Surface Type		
Type	**Area (SF)**	**Relative Area (%)**
Asphalt Concrete (AC)	4,285,767	88%
AC over PCC (APC)	8,239	<1%
Portland Cement Concrete (PCC)	576,575	12%

Chapter 4
Data Collection

Chapter 4 – Data Collection

The continuous quality data collection of pavement condition information is the cornerstone of any APMS. The comprehensive data records for work history and condition data will contribute to a high integrity database that can be relied upon for future updates.

4.1 PCI Field Inspection

The week of January 30, 2017 Kimley-Horn performed a visual condition survey for SNS's airfield pavement facilities. During a visual condition survey, random samples of a pavement network are taken to provide a statistical reliability as outlined in the ASTM D5340-12. **Table 4.1.a Network Level Sampling Criteria** shows the recommended minimum number of sample units to be inspected based on the total number of sample units in a section. **Exhibit 004 Network Definition Map** identifies the branches, sections and sample units.

Table 4.1.a
Network Level Sampling Criteria

PCC Pavement		Asphalt Pavement	
No. of Sample Units in Section (N)	No. of Sample Units to Be Inspected (n)	No. of Sample Units in Section (N)	No. of Sample Units to Be Inspected (n)
1-3	All	1-3	All
4	3	4	3
5-7	4	5-9	4
8-10	5	10-20	5
11-16	6	21-30	6
17-28	7	31-70	7
29-64	8	>70	10%, but < 17
65-90	9		
>90	10%, but < 32		

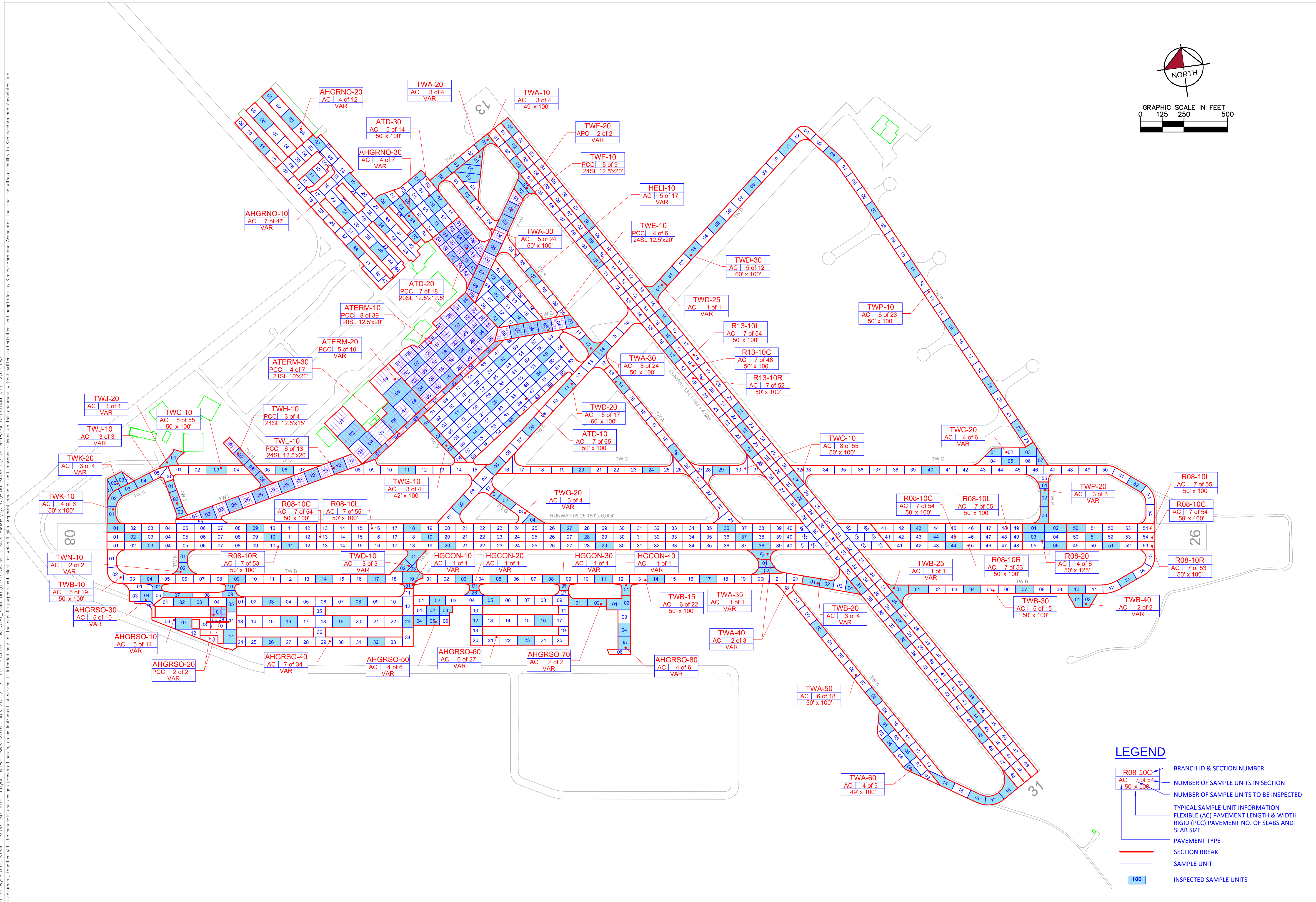

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EXHIBIT 004

Kimley»Horn

NETWORK DEFINITION MAP

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

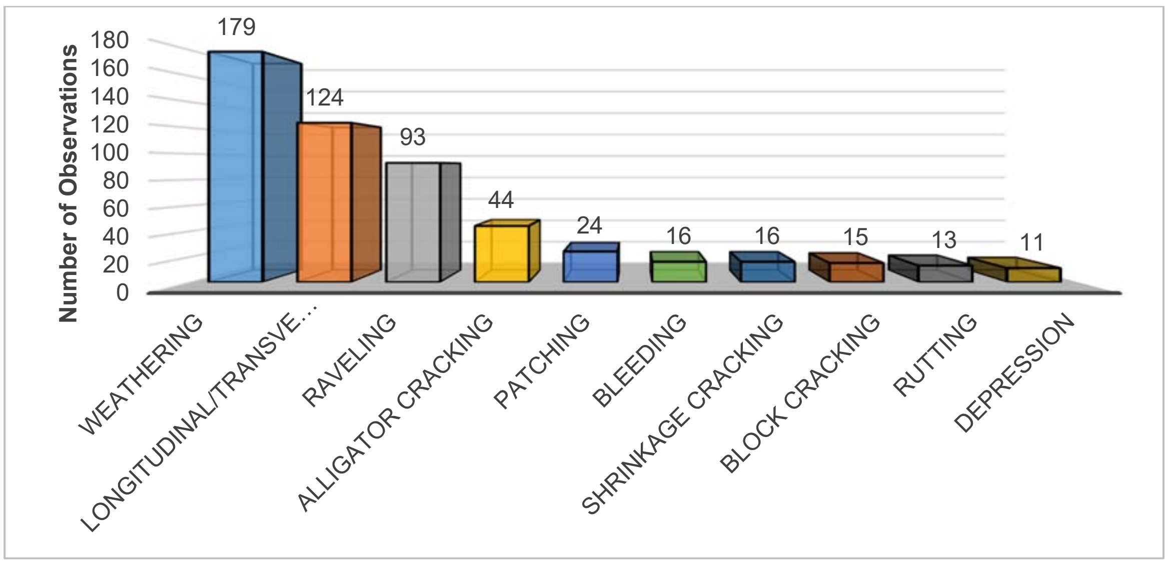
SALINAS

4.2 Common Pavement Distresses Observed at SNS

Overall, most of the pavements that have exhibited deterioration had manifested distress types primarily attributed to both load- and climate-related distress mechanisms. Structural distresses consisted of alligator cracking and rutting which were both observed in multiple locations within the AC pavement. These forms of AC pavement distresses are a result of repeated dynamic loading on the AC surface that leads to fatigue failure of the asphalt, along with foundation settlement. In areas that weren't as subject to repeated traffic loading, significant amounts of age-related distresses were observed consisting of longitudinal and transverse (L&T) cracking, weathering, raveling, and block cracking.

The following **Figure 4.2.a** summarizes the commonly occurring distress types as defined by the ASTM D5340-12 that were observed within the pavements inspected.

Figure 4.2.a
Commonly Observed Distress Types



4.2.1 Flexible Asphalt Concrete Pavement Distress Inventory

The specific distresses recorded during the inspection process of the assessment are documented in **Appendix D – Inspection Report 2017**.

The following **Table 4.2.a** identifies all of the distress types defined by the ASTM D5340-12 for AC pavements.

Table 4.2.a
AC Pavement Distress Types

Code	Distress	Distress Mechanisms
41	Alligator Cracking	Load
42	Bleeding	Construction Quality/ Mix Design
43	Block Cracking	Climate / Age
44	Corrugation	Load / Construction Quality
45	Depression	Subgrade Quality
46	Jet Blast	Aircraft
47	Joint Reflection Cracking	Climate / Prior Pavement
48	L&T Cracking	Climate / Age
49	Oil Spillage	Aircraft / Vehicle
50	Patching	Utility / Pavement Repair
51	Polished Aggregate	Repeated Traffic Loading
52	Raveling	Climate / Load
53	Rutting	Repeated Traffic Loading
54	Shoving	PCC Pavement Growth / Movement
55	Slippage Cracking	Load / Pavement Bond
56	Swelling	Climate / Subgrade Quality
57	Weathering	Climate

Source: U.S. Army CERL

The following **Table 4.2.b** and **Table 4.2.c** further classifies the AC pavement distresses by possible cause and possible effects, respectively.

Table 4.2.b
AC Pavement Possible Distress Causes

Classification by Possible Cause			
Load	**Climate / Durability**	**Moisture / Drainage**	**Others**
Alligator Cracking	Bleeding	Alligator Cracking	Oil Spillage
Corrugation	Block Cracking	Depression	Jet Blast Erosion
Depression	Joint Reflection Cracking	Patching of moisture / drainage caused distress	Polished Aggregate
Patching of Load - based distress	L&T Cracking	Swelling	
Polished Aggregate	Patching of climate / durability-caused distresses	Raveling	
Rutting	Shoving from PCC	Weathering	
Slippage Cracking	Raveling		
	Weathering		
	Swelling		

Table 4.2.c
AC Pavement Possible Distress Effects

Classification by Possible Effects			
Roughness	**Skid / Hydroplaning Potential**	**FOD Potential**	**Rate of Deterioration and Maintenance Requirements**
Corrugation	Bleeding	Block Cracking	All distresses
Depression	Depression	Joint Reflection Cracking	
Rutting	Polished Aggregate	L&T Cracking	
Shoving of asphalt pavement	Rutting	Slippage Cracking	
Swelling			
Raveling			
Weathering			

The common AC pavement distresses that were identified at SNS are defined as follows:

Longitudinal and Transverse Cracking: was identified on a number of investigated pavements at SNS. Longitudinal cracks are parallel to the facility centerline or lay down direction. These manifestations may be caused by poorly-constructed pavement lane joint or shrinkage of the asphalt surface due to temperature cycling or asphalt hardening. Transverse cracks extend across the pavement at approximately right angles to the facility centerline or paving direction. These cracks typically occur when the AC shrinks due to temperature cycling or hardening of the asphalt binder. They are typically not load-associated.

Alligator Cracking: was observed on several AC sections at SNS. This distress type manifests as a series of interconnecting cracks and is caused by fatigue failure of the asphalt concrete surface under repeated traffic loading. Alligator cracking is considered a major structural, or load-associated, distress.

Block Cracking: was identified on multiple pavement sections at SNS. Block cracking is a climate or age-related distress that is primarily caused by the shrinkage of the AC caused by daily temperature cycling. Typically, block cracking occurs over a significant pavement area where cracks are interconnected creating a network of rectangular pieces that range in size from 1-ft by 1-ft to 10-ft to 10-ft.

Raveling: is the dislodging of coarse aggregate particles from the pavement surface. Particular attention must be paid to the predominate coarse aggregate sizes when recording raveling in dense mixes. Raveling was recorded at SNS in areas of obvious coarse aggregate loss.

Weathering: occurred on almost every AC pavement section at SNS, and was recorded when appropriate. Weathering differs from raveling in the sense that weathering is the wearing away of asphalt binder or fine aggregate matrix from the asphalt surface. Weathering is generally caused by age- and climate-related deterioration and can be recorded in relatively new pavements, as new as 6-months old, when discoloration begins and edges of the coarse aggregate pieces are beginning to be exposed.

4.2.2 PCC Pavement Distress Inventory

Common distresses observed in the PCC sections at SNS were; ***Shrinkage Cracking, Joint Spalling, Patching, and Joint Seal Damage.*** The specific distresses recorded during the inspection process of the assessment are documented in **Appendix D – Inspection Report 2017**.

The following **Table 4.2.d** identifies all of the distress types defined by the ASTM D5340-12 for PCC pavements.

Table 4.2.d
PCC Pavement Distress Types

Code	Distress	Distress Mechanisms
61	Blow-up	Climate
62	Corner Break	Load Repetition / Curling Stresses
63	Linear (LTD) Cracking	Load Repetition / Curling Stresses / Shrinkage Stresses
64	Durability Cracking	Freeze-Thaw Cycling
65	Joint Seal Damage	Material Deterioration / Construction Quality
66	Small Patch	Pavement Repair
67	Large Patch/Utility Cut	Utility / Pavement Repair
68	Popout	Freeze-Thaw Cycling
69	Pumping	Load Repetition / Poor Joint Sealant
70	Scaling/Crazing	Construction Quality / Freeze-Thaw Cycling
71	Faulting	Subgrade Quality
72	Shattered Slab	Overloading
73	Shrinkage Cracking	Construction Quality / Load
74	Joint Spalling	Load Repetition / Infiltration of Incompressible Material
75	Corner Spalling	Load Repetition / Infiltration of Incompressible Material
76	Alkali-Silica Reaction (ASR)	Construction Quality / Climate

Source: U.S. Army CERL

The following **Table 4.2.e and Table 4.2.f** further classifies the rigid Portland cement concrete pavement distresses by possible cause and possible effects, respectively.

Table 4.2.e
PCC Pavement Possible Distress Causes

Classification by Possible Cause			
Load	**Climate / Durability**	**Moisture / Drainage**	**Others**
Corner Break Shattered Slab LTD Cracking Pumping Patching of Load associated distress Spallings	Blowup "D" Cracking Joint Seal Damage Popouts Scaling Patch of Climate/Durablity-associated distress Shrinkage Cracking Spalling LTD Cracking	Corner Break Shattered Slab Pumping Patching of Moisture/Drainage-associated distress	Settlement / Faulting

Table 4.2.f
PCC Pavement Possible Distress Effects

Classification by Possible Effects			
Roughness	**Skid / Hydroplaning Potential**	**FOD Potential**	**Rate of Deterioration and Maintenance Requirements**
Blowup Corner Break LTD Cracking Shattered Slab Settlement / Faulting Spalling	Settlement / Faulting Spalling	Corner Break LTD Cracking "D" Cracking Joint Seal Damage Shattered Slab Popouts Scaling	All distresses

The common PCC pavement distresses that were identified at SNS are defined as follows:

Shrinkage Cracking: manifest as hairline cracks that are usually a few feet long and do not completely extend across the entire slab (joint edge to joint edge). They occur during the setting and curing of the concrete and usually do not extend through the full depth of the slab. Shrinkage cracking is typically categorized in two forms; drying shrinkage, that occurs over time as moisture leaves the pavement, and plastic shrinkage, that occurs shortly after the pavement is placed and rapid drying of the surface occurs while the pavement is still plastic. Drying shrinkage cracks occur when a hardened pavement continues to shrink as excess water not needed for cement hydration evaporates. They form when subsurface resistance to the shrinkage is present and may extend through the entire depth of the slab. Plastic shrinkage occurs when there is a rapid loss of water in the surface of a recently placed pavement caused by evaporation.

Spalling: is the breakdown of the slab edges and results from excessive stresses at the joint or crack. Spalling is caused by infiltration of incompressible materials, traffic loads, or by weak concrete at the joint combined with traffic loads. A **joint spall** usually does not extend vertically through the slab but intersects the joint at an angle. A **corner spall** is the raveling or the breakdown of the slab within approximately 2-feet of the corner.

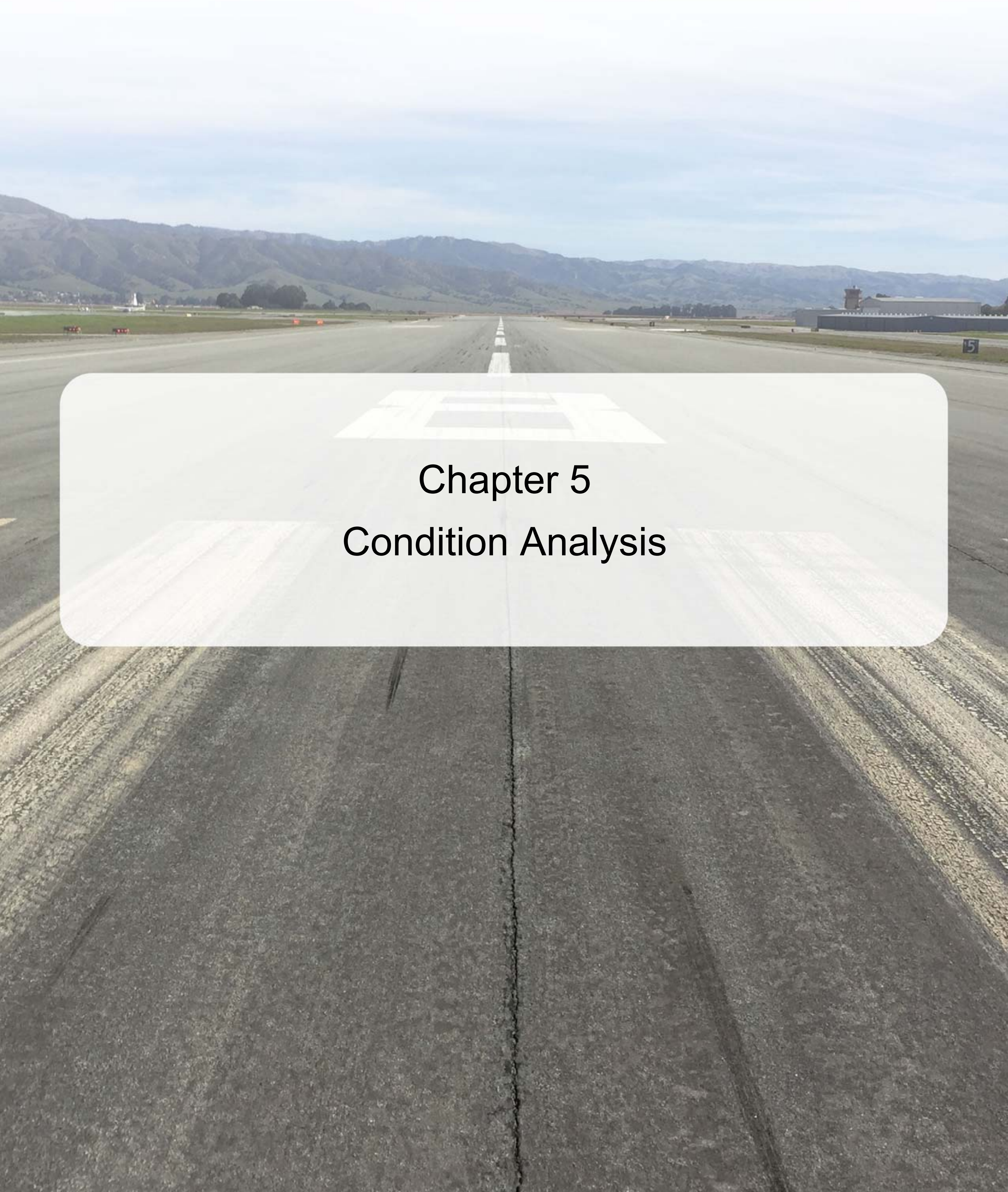
Patching (Small Patch) and Utility Cuts (Large Patch): are areas where the original pavement has been removed and replaced by a filler material. A utility cut is a patch that has replaced the original pavement to allow for the installation or maintenance of underground utility infrastructure such as stormwater/drainage pipes or electrical conduit.

Joint Seal Damage: is any condition that enables incompressible materials (such as soil, sand, or rocks) to accumulate in the joints, or any condition that allows significant infiltration of water into the joints. Accumulation of incompressible materials prevents pavement slabs from expanding and may result in buckling, shattering, or spalling of the slab. Typical types of joint seal damage are stripping of joint sealant, extrusion of joint sealant, growth of weeds, hardening of the filler (oxidation), loss of bond to the slab edges, and lack or absence of sealant in the joint.

4.3 Prior PCI Survey Inspections

In review of the prior inspection records in the APMS records database, the following observations were made:

- General trend and deterioration of pavements have been tracked with consistent distress observations and deterioration of distresses to higher severity levels.
- General alignment of current inspection with minor variances in distress quantities that are acceptable by the standards of practice as defined by the methodology.



Chapter 5
Condition Analysis

Chapter 5 – Condition Analysis

The examination of specific distress types (with causes attributed to load, climate, or other defined distress mechanism), determination of the severity of distress, and determination of the quantity of distress manifestation are required in the computation of a PCI value. The PCI provides valuable information that can be used to determine the existing condition of the pavement, possible cause of the pavement deterioration, and eventually aid in the planning of the rehabilitation of pavements. It should be noted that the PCI method of pavement condition evaluation is strictly a visual and functional evaluation. Further evaluation of the pavement condition may be necessary for design and/or project-level determination of pavement rehabilitation.

5.1 PAVER™ Software Program and Database Update

5.1.1 Software Background

PAVER™ (formerly MicroPAVER™) was developed by the United States Army Corps of Engineers Construction Engineering Research Laboratory (CERL) and uses the guidelines contained in the FAA Advisory Circular 150/5380-7B. This APMS update utilized PAVER™ version 6.5.7 for Pavement System Inventory, Distress Data Entry, and PCI Condition Analysis. The program is a Windows operating system based software that can store information related to pavement infrastructure that includes, but is not limited to; pavement composition type (layer and material characteristics), construction work history, distress inspection records, pavement condition data (PCI, distress mechanisms, and statistical information), traffic data, and maintenance records. Using the data developed within a PAVER™ database for an airport's pavement network, Airport staff can be provided with many analytical capabilities that consist of: evaluating current condition, forecasting future pavement condition, determining planning-level maintenance and rehabilitation needs (quantities and estimated budgets), scheduling of future inspections, and identifying budgetary needs based on analysis of various budget scenario simulations.

5.1.2 Database Update Process

The following steps were completed to update the database for SNS:

- Imported the existing APMS database to PAVER™ Version 6.5.7
- Collected data and entered distresses
- Updated Pavement System Inventory (use of aerial imagery and newly developed CAD Model to better reflect geometric conditions of airfield pavement network)
- Checked Data integrity (analysis of ASTM D5340 updates and calibration of Section and Sample Unit definition)
- Developed Performance Models / Pavement Deterioration Curves
- Developed M&R Policies and Family Assignments
- Performed Condition Analysis (determination of Current PCI and forecasting of future PCI)

5.2 Calculating the PCI

Visual condition data collected during the PCI inspections was entered into the PAVER database. PAVER™ was then used to calculate the current PCI for each sample unit and section. Pavement Condition Ratings, or PCI Categories, are associated with PCI ranges, and these ratings range from "Failed" to "Good". **Figure 5.2.a Pavement Condition Ratings and Maintenance** depicts the standard PCI Condition Rating and typical maintenance category.

To calculate a PCI for a given sample unit, each distress type observed is assigned a deduct value based on its density (frequency of occurrence) and severity within that sample area. All deducts are summed and subsequently adjusted (or corrected) for the number of different distresses found. This corrected deduct value is subtracted from 100, to arrive at the PCI for that particular sample unit. The PCI for a pavement section is the mean PCI value of all sample units evaluated within that section.

Figure 5.2.a
Pavement Condition Ratings and Maintenance

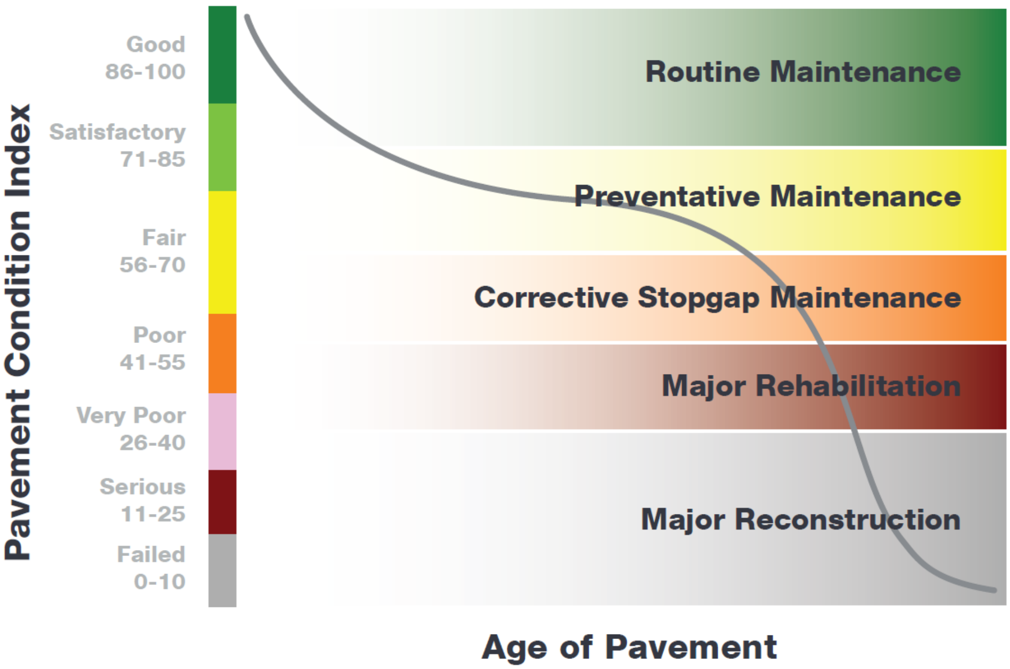


Figure 5.2.b and **Figure 5.2.c** depict broad PCI ranges and the associated maintenance activity with general photographs of pavement conditions for AC and PCC pavements, respectively.

Figure 5.2.b
AC Pavement Maintenance Activities

	PCI	PCI	REPRESENTATIVE PAVEMENT SURFACE	REPAIR ACTIVITIES
ROUTINE MAINTENANCE	86 - 100	90		Pavements with PCI indexes above 85, or 'Good' may require periodic joint/crack sealing and local patching.
PAVEMENT PRESERVATION	65 - 85	70		Pavements with PCI conditions ranging from 'Satisfactory' to 'Good' may require surface treatments (seal coat), thin overlays, and/or joint/crack sealing.
MAJOR REHABILITATION	40 - 64	40		Pavements that have deteriorated below a PCI 64, or within the range of 'Poor' to 'Fair' conditions may require major rehabilitation such as pavement mill and overlay or PCC restoration activity.
MAJOR RECONSTRUCTION	0 - 39	15		Pavements that have deteriorated below a PCI 40, or within the range of 'Failed' to 'Very Poor' conditions may require major reconstruction.

Figure 5.2.c
PCC Pavement Maintenance Activities

	PCI	PCI	REPRESENTATIVE PAVEMENT SURFACE	REPAIR ACTIVITIES
ROUTINE MAINTENANCE	86 - 100	90		Pavements with PCI indexes above 85, or 'Good' may require periodic joint/crack sealing and local patching.
PAVEMENT PRESERVATION	65 - 85	70		Pavements with PCI conditions ranging from 'Satisfactory' to 'Good' may require surface treatments, patches, and/or joint/crack sealing.
MAJOR REHABILITATION	40 - 64	40		Pavements that have deteriorated below a PCI 64, or within the range of 'Poor' to 'Fair' conditions may require major rehabilitation such as Slab replacement and PCC restoration activity.
MAJOR RECONSTRUCTION	0 - 39	15		Pavements that have deteriorated below a PCI 40, or within the range of 'Failed' to 'Very Poor' conditions may require major reconstruction.

5.3 2017 PCI Summary

5.3.1 Current Pavement Condition Index 2017

The following **Table 5.3.a** provides a summary for each pavement section of its PCI and the percent of distress which is load-, climate-, or other-related. The amount of distress attributed to the various causes provides insight into M&R needs. Load-related distress indicates that pavements are reaching the end of their structural design life, and for those pavements exhibiting a significant amount of these distress types, rehabilitation should be planned to strengthen or reconstruct the pavement. Detailed individual distresses that were observed are detailed in **Appendix D – Inspection Report 2017**.

Table 5.3a
Current Pavement Condition Index 2017

Network ID	Branch ID	Name	Branch Use	Section ID	Estimated Area (SF)	Surface Type	2017 PCI	PCI Category	Percent Climate	Percent Load	Percent Other	Inspection Date	Sample Units Inspected	Total Sample Units in Section
SNS	AHGRNO	North Hangar Apron	Apron	10	227,416	AC	34	Very Poor	47	46	7	1/31/2017	7	47
SNS	AHGRNO	North Hangar Apron	Apron	20	68,083	AC	39	Very Poor	59	20	21	1/31/2017	4	12
SNS	AHGRNO	North Hangar Apron	Apron	30	32,301	AC	89	Good	79	0	21	1/31/2017	4	7
SNS	AHGRSO	South Hangar Apron	Apron	10	71,137	AC	50	Poor	35	65	0	1/31/2017	5	14
SNS	AHGRSO	South Hangar Apron	Apron	20	6,420	PCC	69	Fair	28	45	27	1/31/2017	2	2
SNS	AHGRSO	South Hangar Apron	Apron	30	39,005	AC	94	Good	100	0	0	1/30/2017	5	10
SNS	AHGRSO	South Hangar Apron	Apron	40	198,165	AC	63	Fair	38	62	0	1/31/2017	7	34
SNS	AHGRSO	South Hangar Apron	Apron	50	25,264	AC	57	Fair	47	43	10	1/31/2017	4	6
SNS	AHGRSO	South Hangar Apron	Apron	60	138,028	AC	78	Satisfactory	100	0	0	2/1/2017	6	27
SNS	AHGRSO	South Hangar Apron	Apron	70	10,147	AC	86	Good	100	0	0	2/1/2017	2	2
SNS	AHGRSO	South Hangar Apron	Apron	80	29,692	AC	74	Satisfactory	100	0	0	2/1/2017	4	6
SNS	ATD	Tie Down Apron	Apron	10	316,479	AC	69	Fair	100	0	0	1/31/2017	7	65
SNS	ATD	Tie Down Apron	Apron	20	59,373	PCC	62	Fair	12	38	50	1/31/2017	7	18
SNS	ATD	Tie Down Apron	Apron	30	66,587	AC	49	Poor	53	31	16	1/31/2017	5	14
SNS	ATERM	Terminal Apron	Apron	10	183,317	PCC	66	Fair	5	68	27	1/31/2017	8	39
SNS	ATERM	Terminal Apron	Apron	20	120,440	PCC	46	Poor	2	64	34	1/31/2017	5	10
SNS	ATERM	Terminal Apron	Apron	30	30,598	PCC	67	Fair	6	58	36	1/31/2017	4	7
SNS	HELI	Helipad	Helipad	10	75,915	AC	70	Fair	86	14	0	1/31/2017	5	17
SNS	HGCON	Hangar Connector	Taxiway	10	1,854	AC	94	Good	100	0	0	1/30/2017	1	1
SNS	HGCON	Hangar Connector	Taxiway	20	2,622	AC	94	Good	100	0	0	1/30/2017	1	1
SNS	HGCON	Hangar Connector	Taxiway	30	2,735	AC	94	Good	100	0	0	1/30/2017	1	1
SNS	HGCON	Hangar Connector	Taxiway	40	4,321	AC	94	Good	100	0	0	1/30/2017	1	1
SNS	R08	Runway 08/26	Runway	20	37,500	AC	94	Good	100	0	0	1/30/2017	4	6
SNS	R08	Runway 08/26	Runway	10C	263,346	AC	75	Satisfactory	100	0	0	1/30/2017	7	54
SNS	R08	Runway 08/26	Runway	10L	272,377	AC	78	Satisfactory	100	0	0	1/30/2017	7	55
SNS	R08	Runway 08/26	Runway	10R	261,320	AC	81	Satisfactory	100	0	0	1/30/2017	7	53
SNS	R13	Runway 13/31	Runway	10C	241,250	AC	90	Good	100	0	0	1/30/2017	7	48
SNS	R13	Runway 13/31	Runway	10L	269,750	AC	89	Good	100	0	0	1/30/2017	7	54
SNS	R13	Runway 13/31	Runway	10R	256,850	AC	91	Good	100	0	0	1/30/2017	7	52
SNS	TWA	Taxiway A	Taxiway	10	21,686	AC	94	Good	100	0	0	1/30/2017	3	4
SNS	TWA	Taxiway A	Taxiway	20	23,170	AC	94	Good	100	0	0	1/30/2017	3	4
SNS	TWA	Taxiway A	Taxiway	30	122,877	AC	93	Good	100	0	0	1/30/2017	5	24

Table 5.3a (cont.)
Current Pavement Condition Index 2017

Network ID	Branch ID	Name	Branch Use	Section ID	Estimated Area (SF)	Surface Type	2017 PCI	PCI Category	Percent Climate	Percent Load	Percent Other	Inspection Date	Sample Units Inspected	Total Sample Units in Section
SNS	TWA	Taxiway A	Taxiway	35	5,945	AC	60	Fair	80	0	20	1/30/2017	1	1
SNS	TWA	Taxiway A	Taxiway	40	12,453	AC	94	Good	100	0	0	1/30/2017	2	3
SNS	TWA	Taxiway A	Taxiway	50	95,193	AC	93	Good	100	0	0	1/30/2017	6	18
SNS	TWA	Taxiway A	Taxiway	60	39,726	AC	94	Good	100	0	0	1/30/2017	4	9
SNS	TWB	Taxiway B	Taxiway	10	100,734	AC	94	Good	100	0	0	1/30/2017	5	19
SNS	TWB	Taxiway B	Taxiway	15	111,142	AC	93	Good	100	0	0	1/30/2017	6	22
SNS	TWB	Taxiway B	Taxiway	20	19,031	AC	94	Good	100	0	0	1/30/2017	3	4
SNS	TWB	Taxiway B	Taxiway	25	7,317	AC	86	Good	41	0	59	1/30/2017	1	1
SNS	TWB	Taxiway B	Taxiway	30	75,583	AC	90	Good	100	0	0	1/30/2017	5	15
SNS	TWB	Taxiway B	Taxiway	40	9,794	AC	94	Good	100	0	0	1/30/2017	2	2
SNS	TWC	Taxiway C	Taxiway	10	270,996	AC	94	Good	100	0	0	1/30/2017	8	55
SNS	TWC	Taxiway C	Taxiway	20	34,722	AC	89	Good	100	0	0	1/30/2017	4	6
SNS	TWD	Taxiway D	Taxiway	10	11,918	AC	59	Fair	89	0	11	1/30/2017	3	3
SNS	TWD	Taxiway D	Taxiway	20	110,232	AC	93	Good	81	0	19	1/30/2017	5	17
SNS	TWD	Taxiway D	Taxiway	25	6,915	AC	70	Fair	33	0	67	1/30/2017	1	1
SNS	TWD	Taxiway D	Taxiway	30	70,610	AC	40	Very Poor	56	41	3	1/30/2017	5	12
SNS	TWE	Taxiway E	Taxiway	10	34,238	PCC	56	Fair	4	67	29	1/31/2017	4	6
SNS	TWF	Taxiway F	Taxiway	10	49,134	PCC	65	Fair	5	62	33	1/30/2017	5	9
SNS	TWF	Taxiway F	Taxiway	20	8,239	APC	73	Satisfactory	100	0	0	1/30/2017	2	2
SNS	TWG	Taxiway G	Taxiway	10	14,894	AC	32	Very Poor	73	14	13	1/31/2017	3	4
SNS	TWG	Taxiway G	Taxiway	20	17,589	AC	67	Fair	88	0	12	1/30/2017	3	4
SNS	TWH	Taxiway H	Taxiway	10	17,990	PCC	73	Satisfactory	6	33	61	1/30/2017	3	4
SNS	TWJ	Taxiway J	Taxiway	10	11,011	AC	67	Fair	25	57	18	1/30/2017	3	3
SNS	TWJ	Taxiway J	Taxiway	20	6,117	AC	89	Good	100	0	0	1/30/2017	1	1
SNS	TWK	Taxiway K	Taxiway	10	28,386	AC	94	Good	100	0	0	1/30/2017	4	6
SNS	TWK	Taxiway K	Taxiway	20	11,147	AC	94	Good	100	0	0	1/30/2017	3	4
SNS	TWL	Taxiway L	Taxiway	10	75,065	PCC	61	Fair	4	56	40	1/30/2017	6	13
SNS	TWN	Taxiway N	Taxiway	10	9,443	AC	92	Good	77	0	23	1/30/2017	2	2
SNS	TWP	Taxiway P	Taxiway	10	112,307	AC	61	Fair	95	0	5	1/31/2017	6	23
SNS	TWP	Taxiway P	Taxiway	20	12,685	AC	56	Fair	91	0	9	1/30/2017	3	3

The current PCI at SNS is represented in **Exhibit 005 2017 Pavement Condition Index** in accordance with the condition categories of the PCI ratings. Further detail is provided in **Figures 5.3.a** through **Figure 5.3.d** which summarize the breakdown of the airfield pavements by functional use. As illustrated in these figures 87% of the airfield pavements range from Fair to Good condition ratings. The remaining 13% of pavements that range from Failed to Poor condition ratings are likely candidates for major rehabilitation planning.

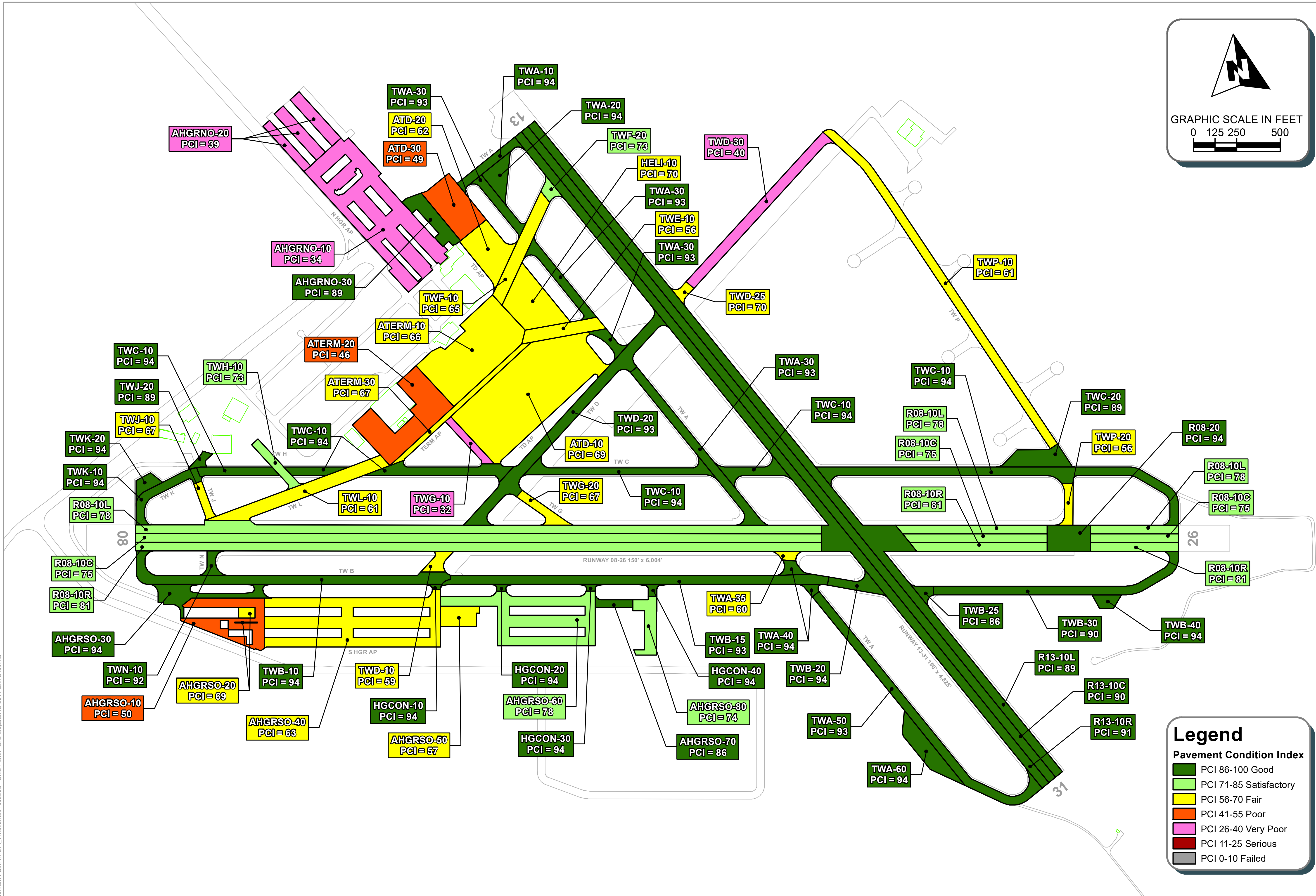


EXHIBIT 005

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2017 PAVEMENT CONDITION INDEX

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

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Figure 5.3.a
Current PCI Rating Distribution - Airfield

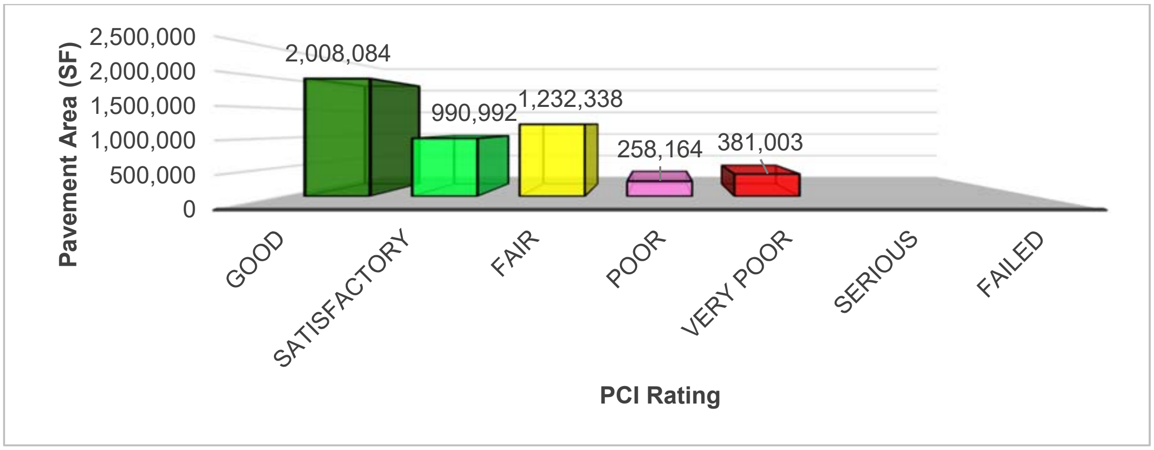


Figure 5.3.b
Current PCI Rating Distribution - Runways

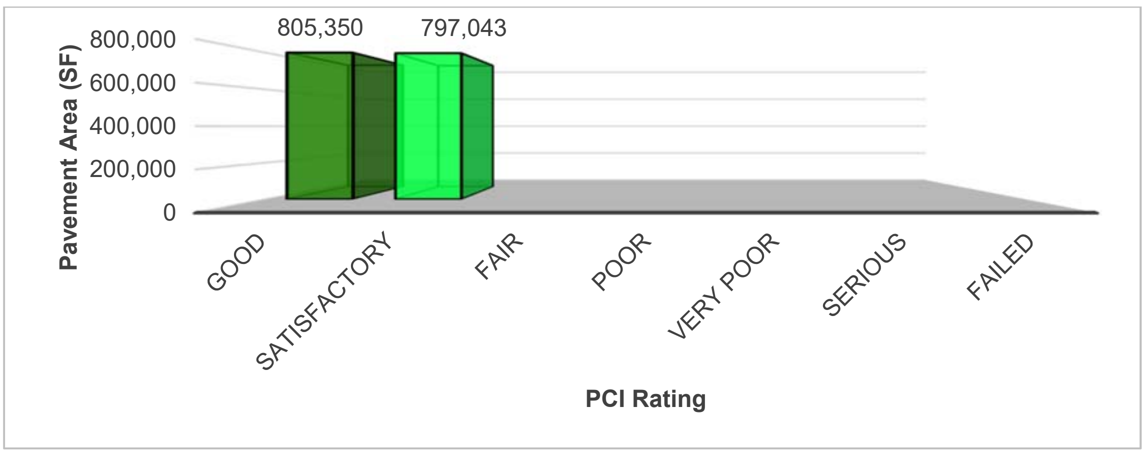


Figure 5.3.c
Current PCI Rating Distribution - Taxiways

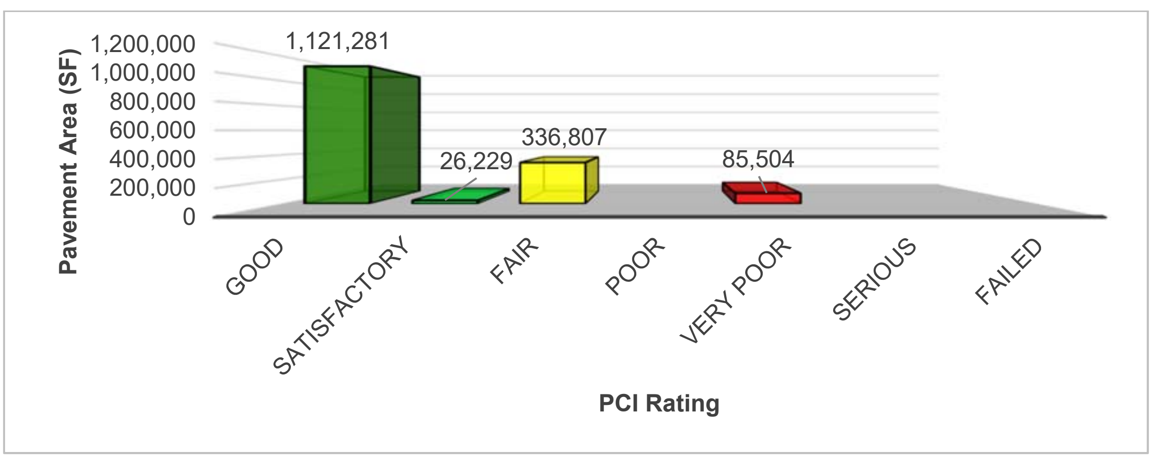


Figure 5.3.d
Current PCI Rating Distribution - Aprons

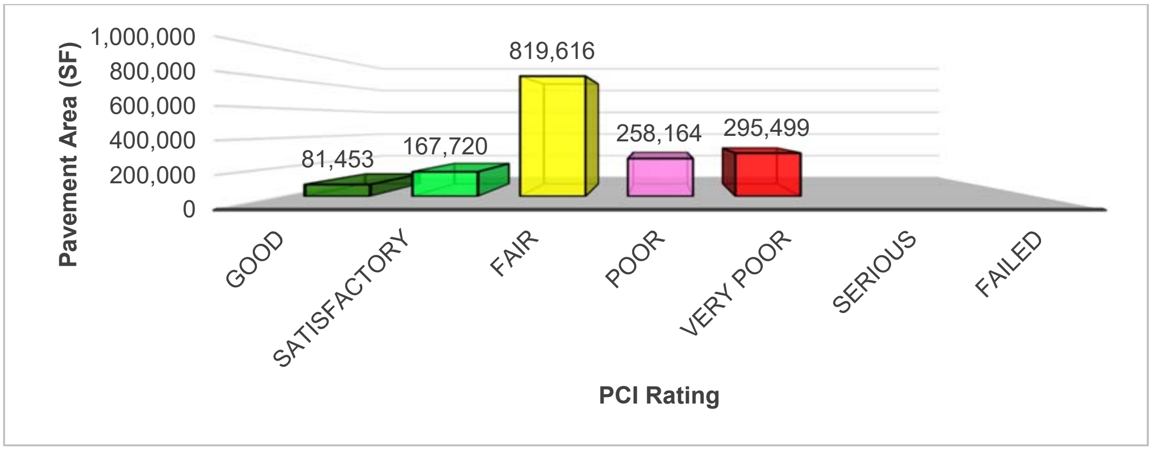
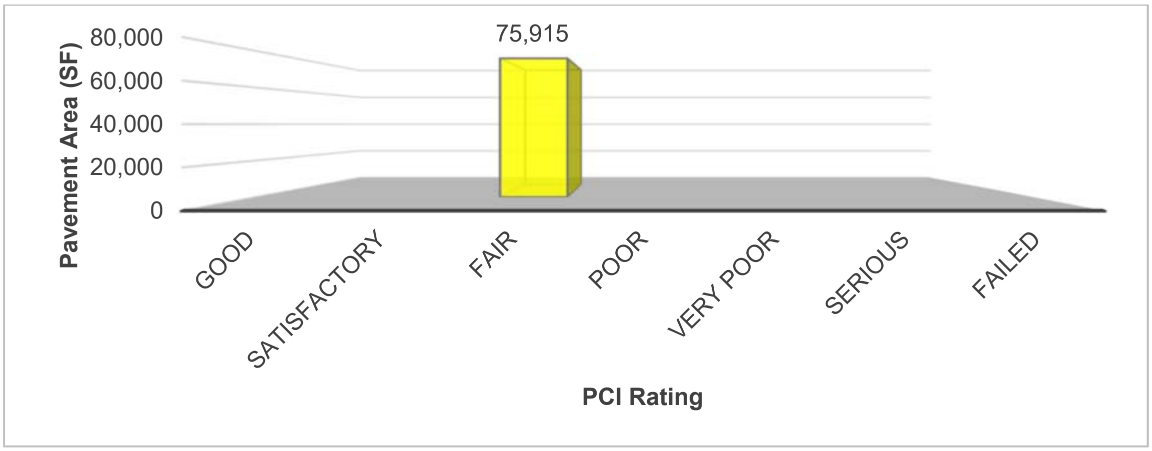


Figure 5.3.e
Current PCI Rating Distribution - Helipad



5.3.2 Network Level Pavement Condition Discussion

A total of approximately 4.9 million square feet of airfield pavement consisting of runways, taxiways, and aprons were inspected at SNS during the week of January 30. A total of 62 pavement sections were identified based on the prior APMS update and recent construction records. Generally speaking, the airfield pavements at SNS are in Satisfactory condition with an overall network area-weighted average PCI of 75. The area weighted PCIs of the runways, taxiways, and aprons are 83, 84, and 60 respectively.

The following sections provide a detailed discussion of the visual pavement condition observed in both runways as well as several of the more critical areas in terms of pavement condition at SNS. Discussions will include details on general conditions, areas of concern, distress types and severities.

5.3.3 Runway 08/26 Pavement Condition

Overall Runway 08/26 (Branch R08), which consists of four AC pavement sections, had a branch level area-weighted PCI of 79. The majority of the runway consists of sections R08-10C, R08-10L, R08-1010R, which are composed of AC pavement estimated to be 12 years old and exhibited a minor amount of age-caused deterioration. The commonly found asphalt concrete distress types observed include L&T cracking, raveling and weathering. Section R08-20 is a 37,500 square feet section of AC that was milled and overlaid in 2009. This only distress that was observed in this section was weathering.

The current condition represents an average deterioration rate of approximately 2 PCI points per year. If this rate of deterioration continues it is not anticipated that Runway 08/26 will reach its critical PCI value of 65 within the near term. However, it is recommended that the deterioration rate be tracked throughout subsequent APMS updates to confirm if the current deterioration rate does in fact remain consistent. **Figure 5.3.f** shows an example of the L&T cracking observed on Runway 08/26.

Figure 5.3.f
Runway 08/26

5.3.4 Runway 13/31 Pavement Condition

Overall Runway 13/31 (Branch R13), which consists of three AC pavement sections estimated to be 11 years old, had a branch level area-weighted PCI of 90. The distress types observed include L&T cracking and weathering.

The current condition represents an average deterioration rate of approximately 1 PCI point per year. If this rate of deterioration continues it is not anticipated that Runway 13/31 will reach its critical PCI value of 65 within the near term. However, it is recommended that the deterioration rate be tracked throughout subsequent APMS updates to confirm if the current deterioration rate does in fact remain consistent. **Figure 5.3.g** shows an example of the L&T cracking observed on Runway 13/31.

Figure 5.3.g
Runway 13/31

5.3.5 North Hangar Apron Pavement Condition

Overall branch AHGRNO, which consists of three AC pavement sections, had a branch area-weighted PCI of 40. Two of the pavement sections, AHGRNO-21 and AHGRNO-20, were estimated to be 27 years old at the time of inspection, and had PCI values of 34 and 39, respectively. These pavement sections exhibited varying severities of alligator cracking, block cracking, L&T cracking and raveling. This pavement has deteriorated beyond its serviceable life and is prone to rideability issues and FOD potential. These pavement sections are ideal candidates for full depth pavement reconstruction. **Figure 5.3.5h** shows an example of alligator cracking and depression observed in Section AHGRNO-10.

Figure 5.3.h
Section AHGRNO-10

5.3.6 TWG-10 Pavement Condition

Section TWG-10 of Taxiway Golf (Branch TWG) had a section area-weighted PCI of 32, a condition rating of Very Poor. The pavement section exhibited varying severities of alligator cracking, block cracking, L&T cracking, and raveling. This pavement section has deteriorated beyond its serviceable life and is prone to rideability issues and FOD potential. This pavement section is a candidate for full depth pavement reconstruction. **Figure 5.3.i** shows an example of block cracking observed on section TWG-10.

Figure 5.3.i
Section TWG-10

5.3.7 TWD-30 Pavement Condition

Section TWD-30 of Taxiway Delta (Branch TWD) has a section area-weighted PCI of 32, a condition rating of Very Poor. The pavement section exhibited varying severities of L&T cracking, rutting, depressions and raveling. Like Taxiway Golf, this pavement section has gone beyond its serviceable life and is prone to rideability issues and FOD potential.

This pavement section is a candidate for full depth pavement reconstruction. However, it was observed during the pavement investigation that sections TWD-25, TWD-30 and TWP-10 appeared to not be currently servicing aircraft traffic, although no pavement markings were present signifying closure. They were instead being utilized by the local police force for training exercises. Depending on plans for future use, it will be at the discretion of SNS if they wish to perform any maintenance on this section of pavement. **Figure 5.3.j** shows an example of a depression and L&T cracking observed on section TWD-30.

Figure 5.3.j
Section TWD-30

5.4 Predicted Pavement Condition

5.4.1 Pavement Performance Models

A key of any APMS is accurately estimating the forecasted condition of the pavement with the use of performance models. Performance models are developed from the distress data and historic construction records collected for APMS. This data is consolidated in a database and organized by inspection/construction date, pavement type, age, and pavement use. The performance model curves are utilized to developed forecasted PCI values based on historic trends and statistical models.

To develop performance models, SNS's airfield pavements were first divided into pavement sections with similar characteristics. Typically, sections with similar pavement type, traffic, and functional use are grouped into "families". Due to the distribution of pavement types and functional use present at SNS, families were formed based purely on pavement type to produce more accurate models for analysis. An example is CAL_SNS_ALL_PCC; a performance model for all PCC pavements. **Table 5.4.a** identifies the two performance models used for this APMS update.

Table 5.4.a
Performance Models

Pavement Performance Model Name	Description
CAL_SNS_ALL_AC/APC	All pavements composed of flexible asphalt concrete; AC and APC
CAL_SNS_ALL_PCC	All pavements composed of rigid Portland cement concrete; PCC

Based on the amount and distribution of data points present in a performance model, the "curves" may be best modeled as a linear relationship, as is the case for SNS. The following **Figures 5.4.a and 5.4.b** depict the performance models used for SNS.

Figure 5.4.a
Performance Model – AC & APC Pavements

CAL_SNS_ALL_AC/APC

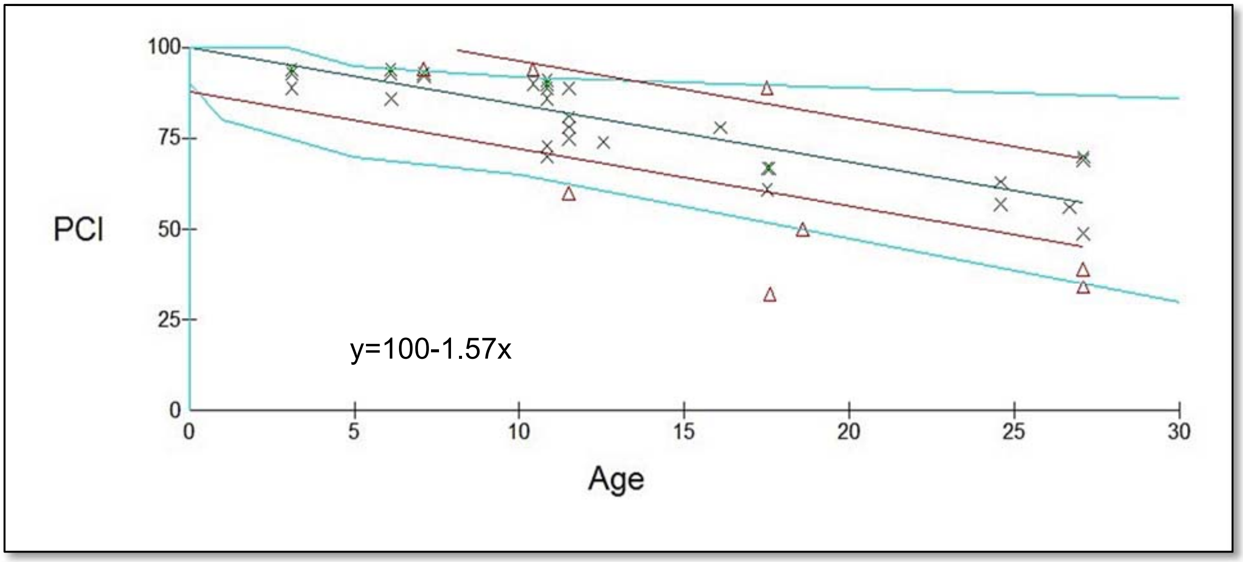
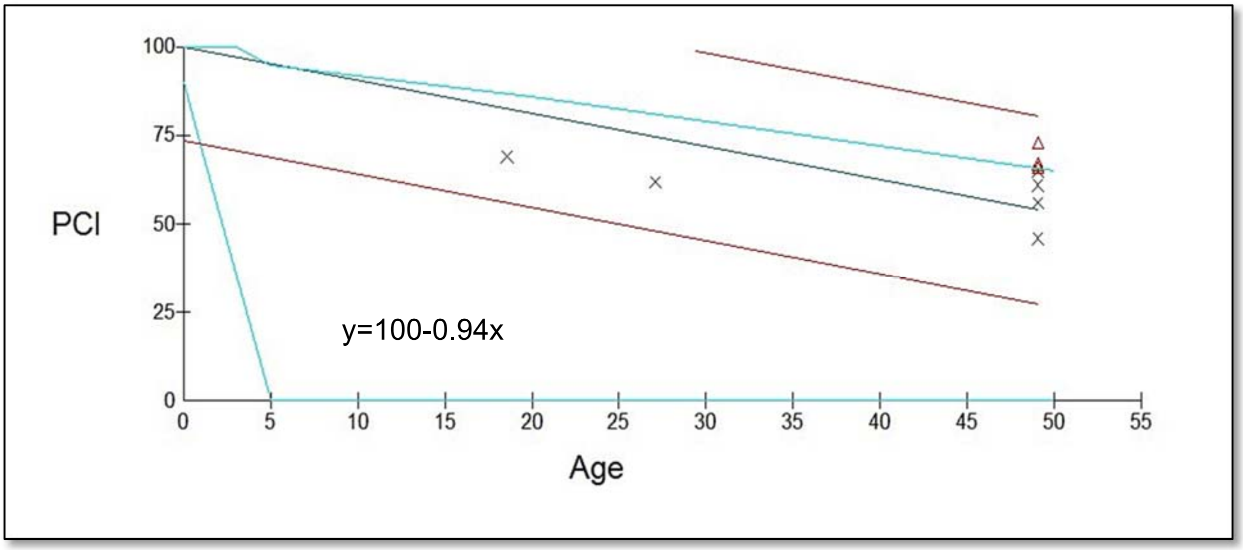


Figure 5.4.b
Performance Model – PCC Pavements

CAL_SNS_ALL_PCC



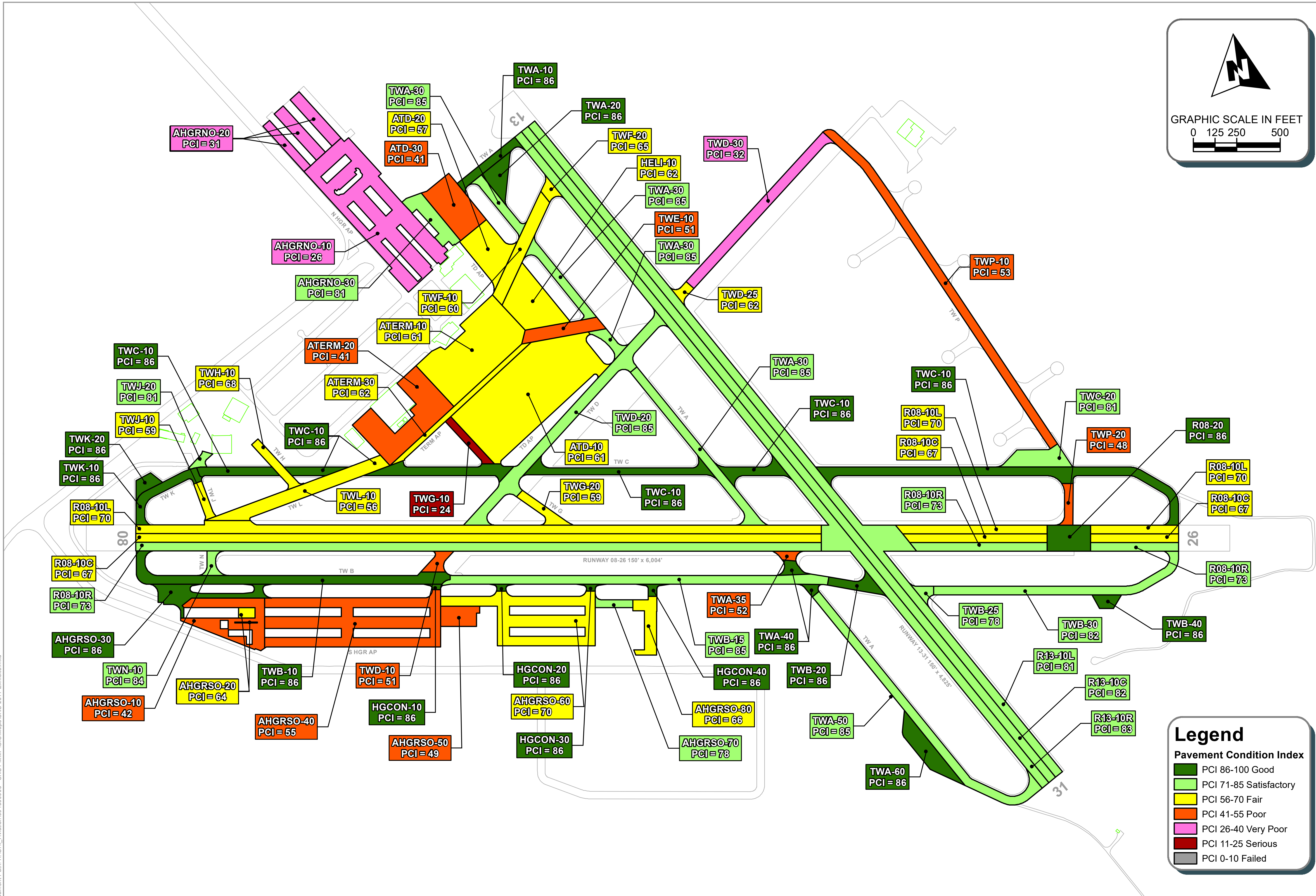
5.5 Airport 5-Year Predicted Pavement Condition Index

This section describes the predicted pavement condition which is expected to result should no maintenance, repair, or major rehabilitation be performed. **Exhibit 006** illustrates the predicted PCI in year 5 (2022) of the 5-year planning period should no major rehabilitation be completed on the airfield during that time.

As shown, a higher percentage of pavement area will fall into the Fair to Poor condition ratings in five years.

EXHIBIT 006

2022 PREDICTED PAVEMENT CONDITION INDEX



2017
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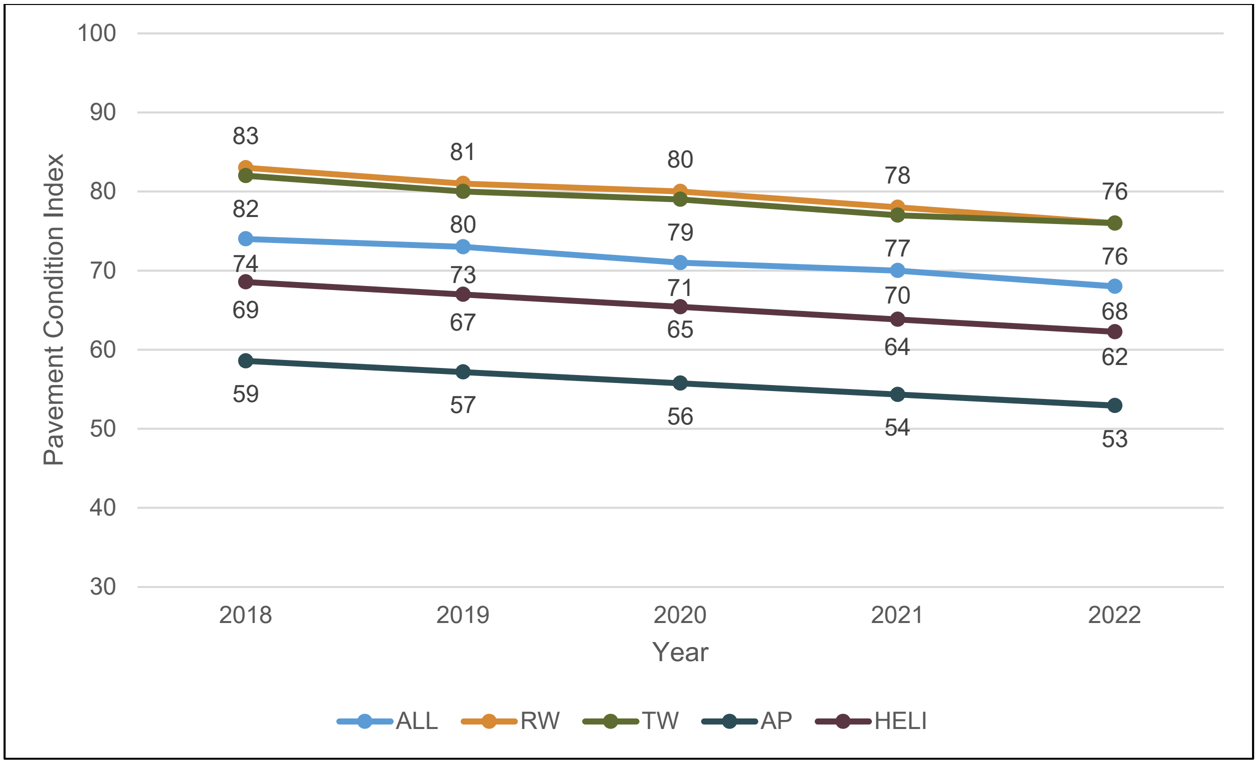
5.5.1 Network and Branch Level Predicted Pavement Condition

Figure 5.5.a depicts the predicted PCI trend of the overall pavement network at SNS by use (runway, taxiway, and apron).

Figure 5.5.a
Pavement Performance by Functional Use



5.5.2 Section Level Predicted PCIs

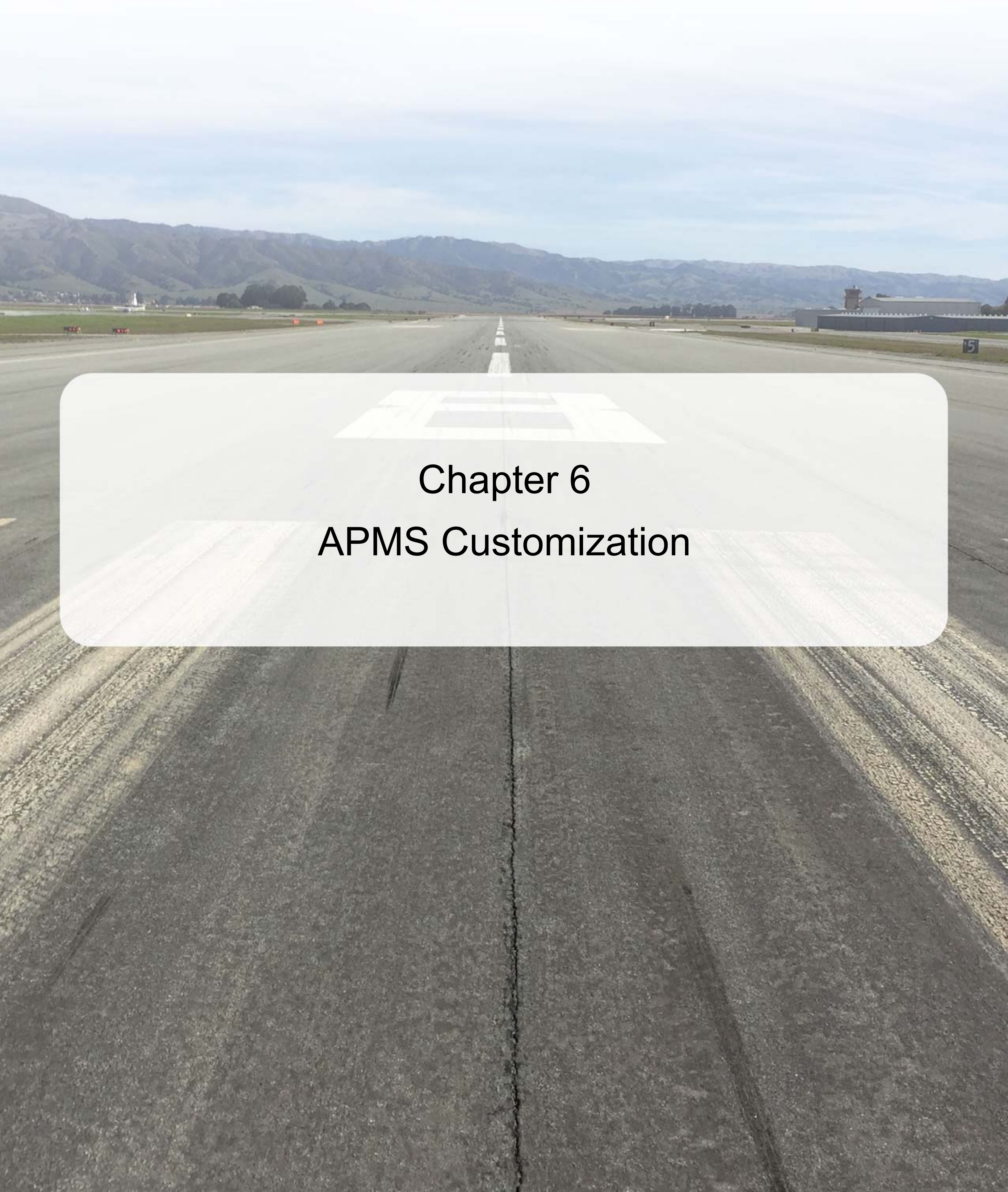
Table 5.5.a summarizes the predicted PCIs for the 5-year analysis period at SNS for each individual pavement section.

Table 5.5.a
5-Year (2018-2022) Predicted PCI Summary

Network ID	Branch ID	Section ID	Use	2018	2019	2020	2021	2022
SNS	AHGRNO	10	Apron	33	31	29	28	26
SNS	AHGRNO	20	Apron	38	36	34	33	31
SNS	AHGRNO	30	Apron	88	86	84	83	81
SNS	AHGRSO	10	Apron	49	47	45	44	42
SNS	AHGRSO	20	Apron	68	67	66	65	64
SNS	AHGRSO	30	Apron	93	91	89	88	86
SNS	AHGRSO	40	Apron	62	60	58	57	55
SNS	AHGRSO	50	Apron	56	54	52	51	49
SNS	AHGRSO	60	Apron	77	75	73	72	70
SNS	AHGRSO	70	Apron	85	83	81	80	78
SNS	AHGRSO	80	Apron	73	71	69	68	66
SNS	ATD	10	Apron	68	66	64	63	61
SNS	ATD	20	Apron	61	60	59	58	57
SNS	ATD	30	Apron	48	46	44	43	41
SNS	ATERM	10	Apron	65	64	63	62	61
SNS	ATERM	20	Apron	45	44	43	42	41
SNS	ATERM	30	Apron	66	65	64	63	62
SNS	HELI	10	Helipad	69	67	65	64	62
SNS	HGCON	10	Taxiway	93	91	89	88	86
SNS	HGCON	20	Taxiway	93	91	89	88	86
SNS	HGCON	30	Taxiway	93	91	89	88	86
SNS	HGCON	40	Taxiway	93	91	89	88	86
SNS	R08	20	Runway	93	91	89	88	86
SNS	R08	10C	Runway	74	72	70	69	67
SNS	R08	10L	Runway	77	75	73	72	70
SNS	R08	10R	Runway	80	78	76	75	73
SNS	R13	10C	Runway	89	87	85	84	82
SNS	R13	10L	Runway	88	86	84	83	81
SNS	R13	10R	Runway	90	88	86	85	83
SNS	TWA	10	Taxiway	93	91	89	88	86
SNS	TWA	20	Taxiway	93	91	89	88	86
SNS	TWA	30	Taxiway	92	90	88	87	85
SNS	TWA	35	Taxiway	59	57	55	54	52
SNS	TWA	40	Taxiway	93	91	89	88	86
SNS	TWA	50	Taxiway	92	90	88	87	85

Table 5.5.a (cont.)
5-Year (2018-2022) Predicted PCI Summary

Network ID	Branch ID	Section ID	Use	2018	2019	2020	2021	2022
SNS	TWA	60	Taxiway	93	91	89	88	86
SNS	TWB	10	Taxiway	93	91	89	88	86
SNS	TWB	15	Taxiway	92	90	88	87	85
SNS	TWB	20	Taxiway	93	91	89	88	86
SNS	TWB	25	Taxiway	85	83	81	80	78
SNS	TWB	30	Taxiway	89	87	85	84	82
SNS	TWB	40	Taxiway	93	91	89	88	86
SNS	TWC	10	Taxiway	93	91	89	88	86
SNS	TWC	20	Taxiway	88	86	84	83	81
SNS	TWD	10	Taxiway	58	56	54	53	51
SNS	TWD	20	Taxiway	92	90	88	87	85
SNS	TWD	25	Taxiway	69	67	65	64	62
SNS	TWD	30	Taxiway	39	37	35	34	32
SNS	TWE	10	Taxiway	55	54	53	52	51
SNS	TWF	10	Taxiway	64	63	62	61	60
SNS	TWF	20	Taxiway	72	70	68	67	65
SNS	TWG	10	Taxiway	31	29	27	26	24
SNS	TWG	20	Taxiway	66	64	62	61	59
SNS	TWH	10	Taxiway	72	71	70	69	68
SNS	TWJ	10	Taxiway	66	64	62	61	59
SNS	TWJ	20	Taxiway	88	86	84	83	81
SNS	TWK	10	Taxiway	93	91	89	88	86
SNS	TWK	20	Taxiway	93	91	89	88	86
SNS	TWL	10	Taxiway	60	59	58	57	56
SNS	TWN	10	Taxiway	91	89	87	86	84
SNS	TWP	10	Taxiway	60	58	56	55	53
SNS	TWP	20	Taxiway	55	53	51	50	48



Chapter 6

APMS Customization

Chapter 6 – APMS Customization

6.1 Background

A certain level of customization was required in the PAVER™ software to perform the desired M&R planning scenarios outlined in the scope of the APMS at SNS. Kimley-Horn defined that information to consider actual conditions including, but not limited to: use, priority and typical maintenance procedures.

6.2 Typical Pavement Sections

The following typical pavement sections were considered in the development of the per square foot unit costs for major rehabilitation activities that are being recommended.

Asphalt Concrete
Surface – 6” Asphalt (P-401)
Base – 13” Aggregate (P-209)
Subgrade – 18” Lime-Treated Subgrade (P-155)

Portland Cement Concrete
Surface – 14” PCC (P-501)
Base – 6” Aggregate (P-209)
Subgrade – 8” Scarified and Compacted Subgrade (P-152)

These standard sections are intended for planning purposes and are not intended to be a design level section. SNS is advised to develop a specific pavement section in accordance with the procedures set forth in AC 150/5320-6F during project level design and in consideration of project level subsurface investigation.

6.3 Preventive and Stopgap Maintenance Policies

Preventive maintenance policies are applied in PAVER™ when a pavement section is above the critical PCI identified. The intention is to continually maintain a pavement section above the critical PCI through preventive maintenance activities to extend its pavement life. Stopgap Maintenance Policies are applied when a pavement has deteriorated beyond the critical PCI identified to keep the pavement usable when the funds to perform major rehabilitation activities are not available. Stopgap maintenance, also referred to as reactive maintenance, should be viewed as a temporary fix and should not be relied upon as the primary measure to maintain the quality of airport pavement. **Tables 6.3.a** through **6.3.d** outline the preventive and stopgap maintenance policies developed for this APMS. It should be noted that the application of these treatments is most valid in year 1 of the analysis as it utilizes actual distresses observed at the time of inspection. The costs associated with preventive and stopgap maintenance activities are presented in **Section 6.5.1.**

Table 6.3.a
AC Pavement Preventive Maintenance Policies

Distress	Distress Severity	Description	Work Type
41	Low	Alligator Cracking	Monitor
41	Medium	Alligator Cracking	Patching - AC Full Depth
41	High	Alligator Cracking	Patching - AC Full Depth
42	N/A	Bleeding	Monitor
43	Low	Block Cracking	Monitor
43	Medium	Block Cracking	Crack Sealing - AC
43	High	Block Cracking	Patching - AC Partial Depth
44	Low	Corrugation	Monitor
44	Medium	Corrugation	Milling AC
44	High	Corrugation	Patching - AC Full Depth
45	Low	Depression	Monitor
45	Medium	Depression	Patching - AC Full Depth
45	High	Depression	Patching - AC Full Depth
46	N/A	Jet Blast	Patching - AC Partial Depth
47	Low	Joint Reflection Cracking	Monitor
47	Medium	Joint Reflection Cracking	Crack Sealing - AC
47	High	Joint Reflection Cracking	Crack Sealing - AC
48	Low	L & T Cracking	Monitor
48	Medium	L & T Cracking	Crack Sealing - AC
48	High	L & T Cracking	Crack Sealing - AC
49	N/A	Oil Spillage	Patching - AC Partial Depth
50	Low	Patching	Monitor
50	Medium	Patching	Patching - AC Full Depth
50	High	Patching	Patching - AC Full Depth
51	N/A	Polished Aggregate	Surface Seal
52	Low	Raveling	Monitor
52	Medium	Raveling	Patching - AC Partial Depth
52	High	Raveling	Patching - AC Partial Depth
53	Low	Rutting	Monitor
53	Medium	Rutting	Patching - AC Full Depth
53	High	Rutting	Patching - AC Full Depth
54	Low	Shoving	Monitor
54	Medium	Shoving	Patching - AC Full Depth
54	High	Shoving	Patching - AC Full Depth
55	N/A	Slippage Cracking	Patching - AC Partial Depth
56	Low	Swelling	Monitor
56	Medium	Swelling	Patching - AC Full Depth
56	High	Swelling	Patching - AC Full Depth
57	Low	Weathering	Monitor
57	Medium	Weathering	Surface Seal
57	High	Weathering	Patching - AC Partial Depth

Table 6.3.b
PCC Pavement Preventive Maintenance Policies

Distress	Distress Severity	Description	Work Type
61	Low	Blow-Up	Monitor
61	Medium	Blow-Up	Patching - PCC Full Depth
61	High	Blow-Up	Slab Replacement - PCC
62	Low	Corner Break	Monitor
62	Medium	Corner Break	Patching - PCC Full Depth
62	High	Corner Break	Patching - PCC Full Depth
63	Low	Linear Cracking	Monitor
63	Medium	Linear Cracking	Crack Sealing - PCC
63	High	Linear Cracking	Patching - PCC Partial Depth
64	Low	Durability Cracking	Monitor
64	Medium	Durability Cracking	Patching - PCC Full Depth
64	High	Durability Cracking	Slab Replacement - PCC
65	Low	Joint Seal Damage	Joint Seal - PCC
65	Medium	Joint Seal Damage	Joint Seal - PCC
65	High	Joint Seal Damage	Joint Seal - PCC
66	Low	Small Patch	Monitor
66	Medium	Small Patch	Patching - PCC Partial Depth
66	High	Small Patch	Patching - PCC Partial Depth
67	Low	Large Patch	Monitor
67	Medium	Large Patch	Patching - PCC Full Depth
67	High	Large Patch	Patching - PCC Full Depth
68	N/A	Popouts	Monitor
69	N/A	Pumping	Slab Replacement - PCC
70	Low	Scaling	Monitor
70	Medium	Scaling	Patching - PCC Partial Depth
70	High	Scaling	Slab Replacement - PCC
71	Low	Faulting	Monitor
71	Medium	Faulting	Grinding (Localized)
71	High	Faulting	Grinding (Localized)
72	Low	Shattered Slab	Monitor
72	Medium	Shattered Slab	Slab Replacement - PCC
72	High	Shattered Slab	Slab Replacement - PCC
73	N/A	Shrinkage Cracking	Monitor
74	Low	Joint Spall	Monitor
74	Medium	Joint Spall	Patching - PCC Partial Depth
74	High	Joint Spall	Patching - PCC Partial Depth
75	Low	Corner Spall	Monitor
75	Medium	Corner Spall	Patching - PCC Partial Depth
75	High	Corner Spall	Patching - PCC Partial Depth
76	Low	ASR	Monitor
76	Medium	ASR	Patching - PCC Full Depth
76	High	ASR	Slab Replacement - PCC

Table 6.3.c
AC Pavement Stopgap Maintenance Policies

Distress	Distress Severity	Description	Work Type
41	Low	Alligator Cracking	Monitor
41	Medium	Alligator Cracking	Monitor
41	High	Alligator Cracking	Patching - AC Full Depth
42	N/A	Bleeding	Monitor
43	Low	Block Cracking	Monitor
43	Medium	Block Cracking	Monitor
43	High	Block Cracking	Patching - AC Partial Depth
44	Low	Corrugation	Monitor
44	Medium	Corrugation	Monitor
44	High	Corrugation	Patching - AC Full Depth
45	Low	Depression	Monitor
45	Medium	Depression	Monitor
45	High	Depression	Patching - AC Full Depth
46	N/A	Jet Blast	Monitor
47	Low	Joint Reflection Cracking	Monitor
47	Medium	Joint Reflection Cracking	Monitor
47	High	Joint Reflection Cracking	Crack Sealing - AC
48	Low	L & T Cracking	Monitor
48	Medium	L & T Cracking	Monitor
48	High	L & T Cracking	Crack Sealing - AC
49	N/A	Oil Spillage	Monitor
50	Low	Patching	Monitor
50	Medium	Patching	Monitor
50	High	Patching	Patching - AC Full Depth
51	N/A	Polished Aggregate	Monitor
52	Low	Raveling	Monitor
52	Medium	Raveling	Monitor
52	High	Raveling	Patching - AC Partial Depth
53	Low	Rutting	Monitor
53	Medium	Rutting	Monitor
53	High	Rutting	Patching - AC Full Depth
54	Low	Shoving	Monitor
54	Medium	Shoving	Monitor
54	High	Shoving	Patching - AC Full Depth
55	N/A	Slippage Cracking	Monitor
56	Low	Swelling	Monitor
56	Medium	Swelling	Monitor
56	High	Swelling	Patching - AC Full Depth
57	Low	Weathering	Monitor
57	Medium	Weathering	Monitor
57	High	Weathering	Patching - AC Partial Depth

Table 6.3.d
PCC Pavement Stopgap Maintenance Policies

Distress	Distress Severity	Description	Work Type
61	Low	Blow-Up	Monitor
61	Medium	Blow-Up	Monitor
61	High	Blow-Up	Slab Replacement - PCC
62	Low	Corner Break	Monitor
62	Medium	Corner Break	Monitor
62	High	Corner Break	Patching - PCC Full Depth
63	Low	Linear Cracking	Monitor
63	Medium	Linear Cracking	Monitor
63	High	Linear Cracking	Patching - PCC Partial Depth
64	Low	Durability Cracking	Monitor
64	Medium	Durability Cracking	Monitor
64	High	Durability Cracking	Slab Replacement - PCC
65	Low	Joint Seal Damage	Monitor
65	Medium	Joint Seal Damage	Monitor
65	High	Joint Seal Damage	Joint Seal - PCC
66	Low	Small Patch	Monitor
66	Medium	Small Patch	Monitor
66	High	Small Patch	Patching - PCC Partial Depth
67	Low	Large Patch	Monitor
67	Medium	Large Patch	Monitor
67	High	Large Patch	Patching - PCC Full Depth
68	N/A	Popouts	Monitor
69	N/A	Pumping	Monitor
70	Low	Scaling	Monitor
70	Medium	Scaling	Monitor
70	High	Scaling	Slab Replacement - PCC
71	Low	Faulting	Monitor
71	Medium	Faulting	Monitor
71	High	Faulting	Grinding (Localized)
72	Low	Shattered Slab	Monitor
72	Medium	Shattered Slab	Monitor
72	High	Shattered Slab	Slab Replacement - PCC
73	N/A	Shrinkage Cracking	Monitor
74	Low	Joint Spall	Monitor
74	Medium	Joint Spall	Monitor
74	High	Joint Spall	Patching - PCC Partial Depth
75	Low	Corner Spall	Monitor
75	Medium	Corner Spall	Monitor
75	High	Corner Spall	Patching - PCC Partial Depth
76	Low	ASR	Monitor
76	Medium	ASR	Monitor
76	High	ASR	Slab Replacement - PCC

6.4 Major Rehabilitation and Critical PCI Value

A pavement is considered to have reached the end of its functional life when its rideability, skid characteristics, or surface condition have deteriorated to the point where action is required to correct the deficiency. This is a point where applying preventive maintenance activities is no longer cost effective and major rehabilitation is required to return the pavement to safe operational condition. Determination of when functional failure has occurred is usually based on the results of the visual condition survey.

To estimate functional remaining life, a minimum allowable level of PCI was set for the pavements within SNS (i.e. critical PCI value). This minimum value (threshold value) was established by evaluating current pavement conditions at SNS and estimating at what condition the pavements should be rehabilitated. The available condition data, combined with the team's pavement evaluation experience at other airports, were used to establish the threshold PCI value of 65. The costs associated with major rehabilitation are assigned on a by-PCI basis, and are presented in **Section 6.5.2 Major Rehabilitation Costs**.

6.5 Unit Costs

Kimley-Horn conducted a detailed review of recent bid tabulations that encompassed a variety of airport construction projects at SNS and the surrounding areas, in an effort to develop representative planning level unit costs for M&R activities. A review of cost trends and cost factors have been incorporated to assist SNS in planning for project budgets. Kimley-Horn does not have control over the cost of labor, materials, equipment, the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable construction costs provided herein are based on the information known to the Kimley-Horn at this time and represent only the engineer's judgment as a design professional familiar with the construction industry. This report cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable construction costs.

6.5.1 Preventive and Stopgap Maintenance Costs

Table 6.5.a summarizes the unit costs applied for the preventive and stopgap maintenance activities at SNS.

Table 6.5.a
Unit Costs for Preventive and Stopgap Maintenance

Code	Work Type	Cost/Units	Units
PA-AF	Patching - AC Full Depth	$ 5.00	SqFt
PA-AP	Patching - AC Partial Depth	$ 2.50	SqFt
PA-PF	Patching - PCC Full Depth	$ 17.60	SqFt
PA-PP	Patching - PCC Partial Depth	$ 9.25	SqFt
SL-PC	Slab Replacement - PCC	$ 25.00	SqFt
CS-AC	Crack Sealing - AC	$ 1.75	Ft
CS-PC	Crack Sealing - PCC	$ 3.50	Ft
SS-LO	Surface Seal	$ 0.45	SqFt
JS-PC	Joint Seal - PCC	$ 3.00	Ft
ML-AC	Milling AC	$ 2.00	SqFt
GR-PP	Grinding (Localized)	$ 0.85	Ft
MO-PV	Monitor	$ -	-

6.5.2 Major Rehabilitation Costs

The PAVER™ software utilizes a cost by PCI relationship when determining the anticipated costs for major rehabilitation activities. The costs per square foot for major rehabilitation presented in **Table 6.5.b** were developed using the typical pavement sections outlined in **Section 6.2**. All pavement sections with a PCI value between 40 and 50 are assigned an extrapolated unit cost between the intermediate and reconstruction unit cost for the respective pavement type.

Table 6.5.b
Unit Costs and Section Assumptions for Major Rehabilitation

Rehabilitation Type	PCI Range	Cost/SF	Assumptions
AC Intermediate	50 to 65	$4.00	**75% Mill and Overlay** P-101 AC Milling (3") P-603 Bituminous Tack P-401 HMA Surface Course (3") **25% AC Reconstruction** P-101 Pavement Removal (6") P-152 Unclassified Excavation (31") P-155 Lime-Treated Subgrade (18") P-209 Aggregate Base (13") P-602 Bituminous Prime P-603 Bituminous Tack P-401 HMA Surface Course (6")
AC Reconstruction	40 or less	$14.00	P-101 Pavement Removal (6") P-152 Unclassified Excavation (31") P-155 Lime-Treated Subgrade (18") P-209 Aggregate Base (13") P-602 Bituminous Prime P-603 Bituminous Tack P-401 HMA Surface Course (6")
PCC Intermediate	50 to 65	$9.00	**25% PCC Reconstruction** P-101 PCC Pavement Removal (14") P-152 Unclassified Excavation (14") P-152 Subgrade Stabilization (8") P-209 Aggregate Base (6") P-501 Rigid PCC Pavement (14") P-605 PCC Joint Seal **75% PCC Joint Seal** **7.5% Localized PCC Crack Seal** **2% Localized Partial Depth PCC Patch** P-101 PCC Pavement Removal (6") P-501 Rigid PCC (6") P-605 PCC Joint Seal
PCC Reconstruction	40 or less	$20.00	P-101 PCC Pavement Removal (14") P-152 Unclassified Excavation (14") P-152 Subgrade Stabilization (8") P-209 Aggregate Base (6") P-501 Rigid PCC Pavement (14") P-605 PCC Joint Seal

Chapter 7

Rehabilitation Recommendations

Chapter 7 – Rehabilitation Recommendations

This chapter will address typical questions related to M&R activities: how much money is needed in the coming years to maintain the pavements; which pavements will be maintained each year; and what type of M&R should be applied.

As part of the APMS development at SNS, Kimley-Horn was asked to present M&R recommendations by analyzing various budget scenarios. These scenarios are outlined in **Section 7.1**, and they include: unlimited budget, no funding budget, limited condition budget, eliminated backlog budget, and two constrained budget scenarios.

Decision makers need to understand the impact on budgetary needs based on current and predicted conditions. Annual budgetary needs can be established within PAVER™ to maintain the pavements in an acceptable condition. The needs are estimated on the section level by predicting the year at which each individual section will deteriorate below the critical PCI and then multiplying the section area by the unit M&R cost relationship (refer to **Table 6.5.b** shown in the previous Chapter).

The assumption is that the PCI will return to 100 after an overlay or reconstruction activity is completed and that the PCI will only slightly increase after a preventive or global maintenance activity is applied.

PAVER™ utilizes the preventive and stopgap maintenance policies presented in **Chapter 6** to estimate budget requirements for maintenance activities in the first year of the work plan. The budget for subsequent years is based on the unit M&R cost relationship as described in **Chapter 6**.

The results of the different PAVER™ analysis scenarios will be used as the basis for developing the recommended 5-year CIP presented in **Section 7.2**.

7.1 Budget Scenario Simulation

M&R plans can be developed within PAVER™ for various scenarios. The following scenarios have been developed to represent major rehabilitation plans for a 5-year period starting on January 2018:

- Scenario 1 – Unlimited Budget
  - This scenario illustrates an unlimited annual budget. In this case, all pavements currently below a critical PCI of 65 are subject to major rehabilitation in the first year. Under this scenario, the area-weighted average PCI increases from 74 to 85, condition ratings of Satisfactory, during the five-year planning period. At the end of the analysis period all pavement sections will have a PCI value greater than the critical PCI value identified thus eliminating all major rehabilitation backlog.

- Scenario 2 – No funding
  - This scenario illustrates deterioration of pavements assuming that no funds are made available for M&R activities during the analysis period. Under this worst-case scenario, the area-weighted PCI decreases from 74 to 68, condition rating of Satisfactory to Fair, during the five-year planning period. There is a backlog of approximately $16.4 million at the end of year five.

- Scenario 3 – Maintaining an area-weighted PCI of 75
  - This scenario illustrates the minimum amount of work that will need to be completed annually to maintain an area-weighted PCI of 75 over a five-year planning period. Under this scenario, the area-weighted PCI increases from 74 to 77, condition ratings of Satisfactory, during the five-year planning period. There is a backlog of approximately $9.7 million at the end of year five.

- Scenario 4 – Cost per year to eliminate backlog of major rehabilitation
  - This scenario identifies all pavement sections requiring major rehabilitation during the five-year analysis period and addresses them using an iterative process to identify a level budget requirement over the planning period. Under this scenario, the area-weighted PCI increases from 74 to 86, condition rating of Satisfactory to Good, at the end of the five-year planning period. At the end of the analysis period all pavement sections will have a PCI value greater than the critical PCI value identified thus eliminating all major rehabilitation backlog.

- Scenario 5 – $2,500,000 annual maximum budget
  - This constrained budget scenario considers limited funding of $2.5 Million annually as well as prioritization and optimization of limited funding. It assumes that SNS has a limited budget to maintain and rehabilitate its pavements, which is generally the case with most airports. Under this scenario, the area-weighted PCI increases from 74 to 81, condition ratings of Satisfactory, at the end of the five-year planning period. There is a backlog of approximately $5.0 million at the end of year five.

- Scenario 6 – $1,500,000 annual maximum budget
  - This constrained budget scenario considers limited funding of $1.5 Million annually as well as prioritization and optimization of limited funding. Under this scenario, the area-weighted PCI increases from 74 to 77, condition ratings of Satisfactory, at the end of the five-year planning period. There is a backlog of approximately $9.7 million at the end of year five.

A summary of these scenarios is depicted in **Table 7.1.a.**

Table 7.1.a
Budget Scenario Summary

Scenario	Start of Program Weighted Average PCI	Projected Weighted Average PCI (End of 2022)	Annual Budget (Millions)					Rehabilitation Backlog at end of Year 2022
			2018	2019	2020	2021	2022	
1	74	85	$11.35	$1.72	$1.54	$0.33	$0.06	$0.00
2	74	68	$0.00					$16,402,689.74
3	74	77	$1.49	$1.46	$1.26	$1.12	$1.32	$9,694,898.62
4	74	86	$3.34	$3.05	$2.79	$3.39	$3.24	$0.00
5	74	81	$2.35	$2.39	$2.15	$1.98	$2.28	$4,984,636.85
6	74	77	$1.49	$1.46	$1.26	$1.12	$1.32	$9,694,898.62

Note: Dollar amounts are in 2017 dollars and do not account for inflation.

7.2 Recommended 5-Year CIP

This section is a culmination of what has been evaluated and used in the development of the recommended CIP plan for SNS. The results as presented in this section will vary from what is presented in the previous section as they are also based on other considerations including additional costs necessary to account for total project costs, project packaging to optimize funding dollars, overall operations and construction logistics throughout SNS. The recommended CIP, as outlined, should enable SNS to maintain the existing airport infrastructure at an acceptable condition, properly allocate funding, and apply M&R activities in a timely manner in the upcoming years. It should be noted that the recommendations outlined in the CIP are meant to be planning-level only and do not preclude the need for future design-level considerations.

7.2.1 Project Packaging and CIP Development Considerations

The PAVER™ analysis results presented previously provide a good baseline for the development of a 5-year CIP; however, such a program has limitations. For example, in the first scenario rehabilitation projects are recommended based only on functional pavement condition under an unlimited budget scenario. Oftentimes this results in adjacent pavement sections being recommended for rehabilitation in different years requiring multiple mobilizations and multiple operational disruptions. In addition, PAVER™ only takes into account the cost of the pavements and not the overall projects. In an effort to provide the most logical CIP recommendations and costs it is necessary to consider other factors such as construction phasing, operational impacts, and currently planned rehabilitation projects when developing the recommended CIP.

A recently developed CIP (11/15/2016) was provided to Kimley-Horn by SNS. The Airport expressed the desire to have these maintenance projects, referred to herein as ACIP

Maintenance, incorporated into the updated CIP for this APMS Report. Additionally, discussions were held between Kimley-Horn and the Airport during which an optimal format for outlining the M&R recommendations was chosen. Based on future budgetary uncertainties, the M&R activities recommended at SNS are presented in order of priority, as opposed to the more traditional annual planning format. It should be noted, however, that the prioritized maintenance activities being recommended here are all candidates for major M&R within the next 5 years based on forecasted PCI values, and it is recommended that they be addressed within that time frame.

SNS's recommended CIP is simplified and presented in **Table 7.2.a** and **Exhibit 007**.

The M&R recommendations made thus far are the "ideal" solution for the Airport to maintain their airfield pavement assets. However, a more cost-efficient alternative may be preferred. The Airport has expressed the need to complete all work within the runway safety areas during the same time as the work being performed on the respective runways. In order to still provide some value to maintaining the connecting taxiways which cross through the runway safety areas, but alleviate some of the spending associated with a major M&R activity, an alternative plan has been presented in which for these areas the same ACIP Maintenance activities that are being performed on the adjacent runways (crack seal and slurry seal) are being recommended. This alternative will not completely renew the applicable pavement sections; however, it will provide a value added temporary solution to maintain the pavement condition until a major M&R activity can be performed.

SNS's alternative CIP is simplified and presented in **Table 7.2.b.**

Table 7.2.a
5-Year Maintenance and Rehabilitation

Priority	Branch ID	Section ID	Estimated Area (SF)	Rehabilitation Type	Planning Cost
1	Runway 13/31		723,806	ACIP Maintenance	$1,125,000
1	TWD	25	6,915	AC Intermediate	$27,660
1	TWD	30	4,309	AC Reconstruction	$60,326
1	TWF	20	8,239	AC Intermediate	$32,956
2	HELI	10	75,915	ACIP Maintenance	$35,105
2	Runway 08/26		878,644	ACIP Maintenance	$1,349,000
2	TWA	35	5,945	AC Intermediate	$23,780
2	TWD	10	11,918	AC Intermediate	$47,672
2	TWG	20	17,589	AC Intermediate	$70,356
2	TWJ	10	11,011	AC Intermediate	$44,044
2	TWP	20	12,685	AC Intermediate	$50,740
3	AHGRNO	10	227,416	AC Reconstruction	$3,183,823
3	AHGRNO	20	68,083	AC Reconstruction	$953,162
4	AHGRSO	40	198,165	AC Intermediate	$792,659
4	AHGRSO	50	25,264	AC Intermediate	$101,056
5	AHGRSO	10	71,137	AC Intermediate	$321,539
5	AHGRSO	20	6,420	PCC Intermediate	$57,780
5	ATD	20	59,373	PCC Intermediate	$534,357
5	ATD	30	66,587	AC Intermediate	$367,560
5	TWD	30	44,349	AC Reconstruction	$620,886
6	ATD	10	316,479	AC Intermediate	$1,265,915
6	ATERM	10	183,317	PCC Intermediate	$1,649,853
6	ATERM	20	120,440	PCC Intermediate	$1,654,966
6	ATERM	30	30,598	PCC Intermediate	$275,382
6	TWE	10	34,238	PCC Intermediate	$308,142
6	TWF	10	49,134	PCC Intermediate	$442,206
6	TWG	10	14,894	AC Reconstruction	$208,516
7	TWD	30	21,952	AC Reconstruction	$307,328
7	TWP	10	112,307	AC Intermediate	$449,228

Table 7.2.b
5-Year Maintenance and Rehabilitation - Alternative

Priority	Branch ID	Section ID	Estimated Area (SF)	Rehabilitation Type	Planning Cost
1	Runway 13/31		723,806	ACIP Maintenance	$1,125,000
1	TWD	25	6,915	ACIP Maintenance	$3,593
1	TWD	30	4,309	ACIP Maintenance	$2,050
1	TWF	20	8,239	ACIP Maintenance	$4,120
2	HELI	10	75,915	ACIP Maintenance	$35,105
2	Runway 08/26		878,644	ACIP Maintenance	$1,349,000
2	TWA	35	5,945	ACIP Maintenance	$3,157
2	TWD	10	11,918	ACIP Maintenance	$5,363
2	TWG	20	17,589	ACIP Maintenance	$8,321
2	TWJ	10	11,011	ACIP Maintenance	$4,955
2	TWP	20	12,685	ACIP Maintenance	$5,904
3	AHGRNO	10	227,416	AC Reconstruction	$3,183,823
3	AHGRNO	20	68,083	AC Reconstruction	$953,162
4	AHGRSO	40	198,165	AC Intermediate	$792,659
4	AHGRSO	50	25,264	AC Intermediate	$101,056
5	AHGRSO	10	71,137	AC Intermediate	$321,539
5	AHGRSO	20	6,420	PCC Intermediate	$57,780
5	ATD	20	59,373	PCC Intermediate	$534,357
5	ATD	30	66,587	AC Intermediate	$367,560
5	TWD	30	44,349	AC Reconstruction	$620,886
6	ATD	10	316,479	AC Intermediate	$1,265,915
6	ATERM	10	183,317	PCC Intermediate	$1,649,853
6	ATERM	20	120,440	PCC Intermediate	$1,654,966
6	ATERM	30	30,598	PCC Intermediate	$275,382
6	TWE	10	34,238	PCC Intermediate	$308,142
6	TWF	10	49,134	PCC Intermediate	$442,206
6	TWG	10	14,894	AC Reconstruction	$208,516
7	TWD	30	21,952	AC Reconstruction	$307,328
7	TWP	10	112,307	AC Intermediate	$449,228

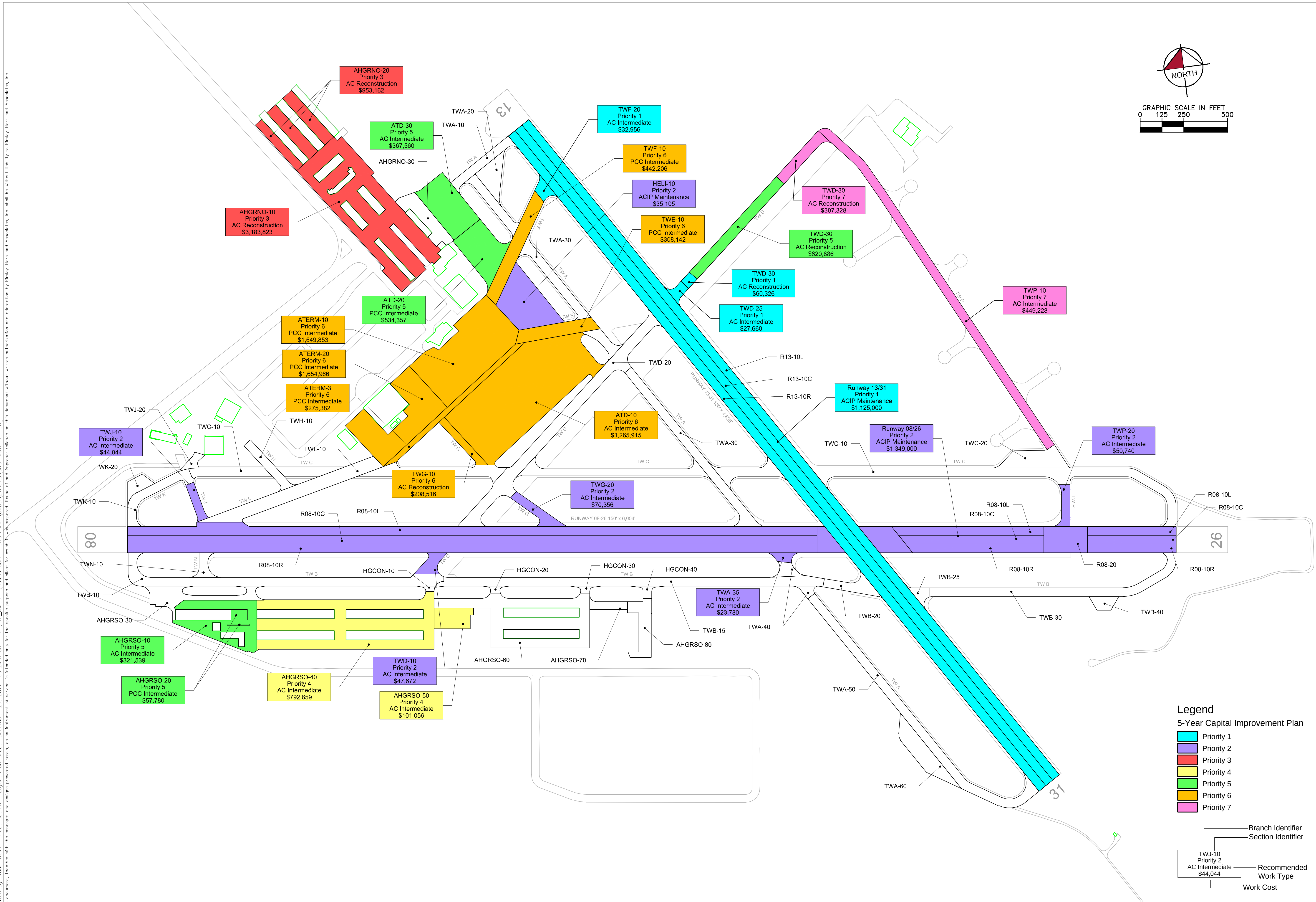


EXHIBIT 007

Kimley»Horn

5-YEAR MAINTENANCE AND REHABILITATION

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

7.2.2 Development of Project Specific Costs Estimates

The PAVER™ software produces cost estimates based on a unit cost per square foot for pavement related (hard costs) costs only. In an effort to develop realistic project specific cost estimates that SNS can trust for future planning purposes Kimley-Horn developed realistic cost estimates outside of the PAVER™ program to include additional construction items and soft costs including items such as airfield electrical improvements / upgrades, costs for unknown utilities, future planned underground drainage improvements, construction costs (including quality control and construction administration), general administration costs, and professional services for design and construction. The raw costs for the pavement materials were the basis for developing the cost estimates and those costs were increased based on applied percentages related to these items. A discussion of each of these items is presented below.

- Drainage/Electrical/Misc. Improvements – 8% of raw pavement costs
- QA/QC Testing – 5% of raw pavement costs
- Administrative – 12% of raw pavement costs
- Contingency – 10% of raw pavement costs

Design level investigation, evaluation, and analysis may expand upon the planning level costs identified in this study. It should be anticipated that final design level detail may influence the actual infrastructure costs for non-pavement related project elements such as drainage, electrical, NAVAIDs, signage, and pavement marking.

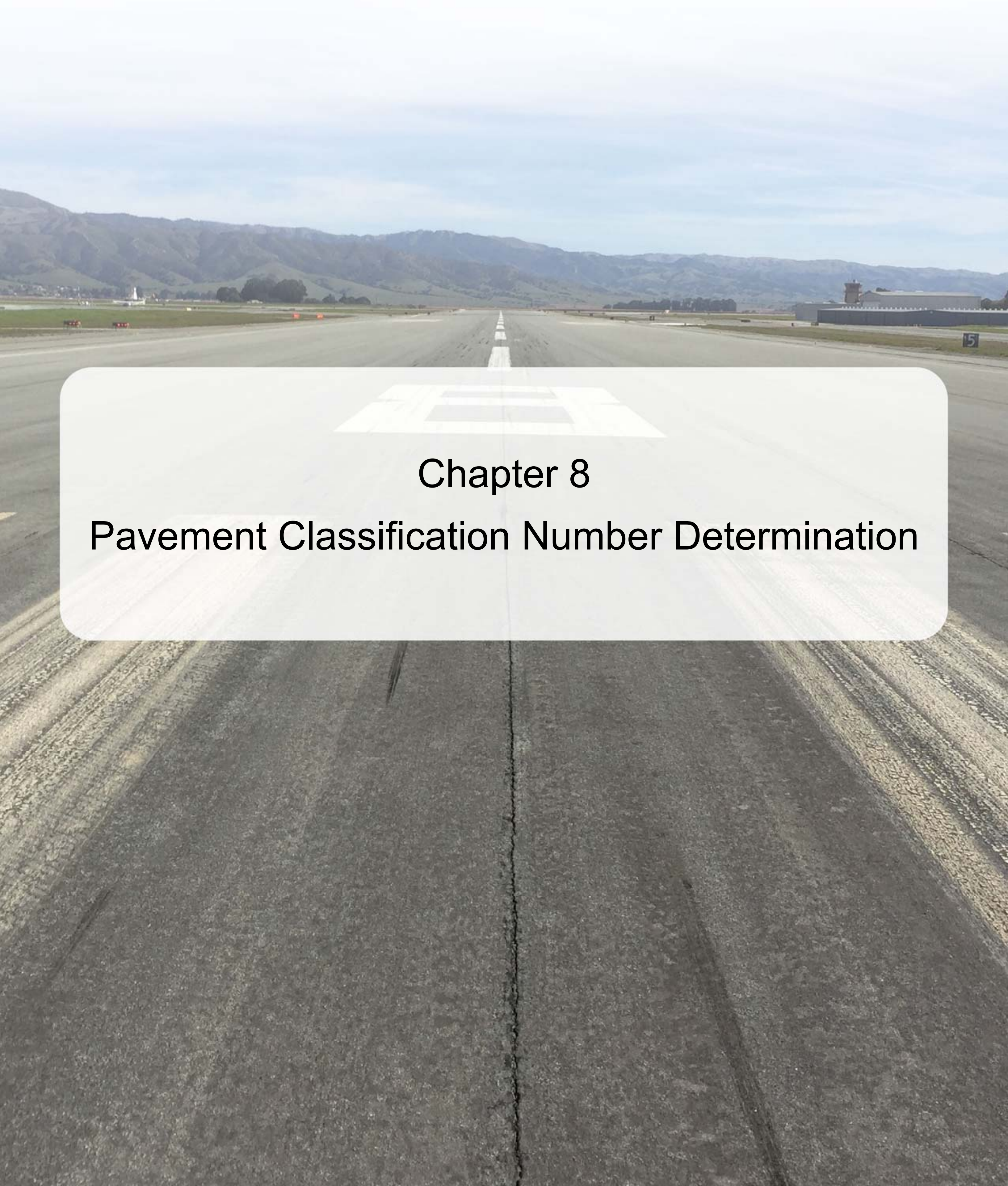
7.2.3 Detailed 1st Year Maintenance Needs

This analysis was performed to estimate the amount of preventive maintenance activities that are recommended based on the preventive maintenance policies to maintain the pavements that have a PCI value above the critical PCI value at a high level. PAVER™ develops specific (type and quantity of repair) maintenance recommendations for year 1 of the analysis using the extrapolated distresses which are based on actual field data collected during the PCI surveys. The analytical process for year 1 of the analysis develops a more accurate plan for identifying maintenance needs as compared to future years. Given that specific distress types and severity present are unknown for years 2 through 5 of the analysis, PAVER™ applies a unit cost ($/sf) based on PCI for each individual pavement section having a PCI below critical.

In order to determine the budget needs for preventive maintenance activities in year 1 of the analysis a “Consequence of Localized Distress Maintenance” scenario was simulated. Applying the recommended preventive maintenance activities will increase the area-weighted PCI value of the network only slightly; however, it is expected that applying such maintenance on an annual basis will extend the life of the pavements that have PCI values greater than the critical PCI values identified. It should be noted that applying preventive maintenance procedures to pavements below the critical PCI value is not a cost-effective way to manage a pavement infrastructure. The detailed year 1 recommended preventive and stopgap maintenance recommendations are presented in **Table 7.2.b Recommended Year-1 Localized Maintenance and Repair**.

Table 7.2.b
Recommended Year-1 Localized Maintenance and Repair

Branch ID	Section ID	Description	Severity	Distress Quantity	Distress Unit	Work Description	Work Quantity	Work Unit	Unit Cost	Work Cost
AHGRNO	20	SWELLING	H	147	SqFt	CA - Patching - AC Full Depth	199	SqFt	$5.00	$996.51
AHGRSO	20	JT SEAL DMG	H	33	Slabs	CA - Joint Seal - PCC	656	Ft	$3.00	$1,967.53
AHGRSO	60	RAVELING	M	163	SqFt	CA - Patching - AC Partial Depth	163	SqFt	$2.50	$406.42
AHGRSO	80	RAVELING	M	23	SqFt	CA - Patching - AC Partial Depth	23	SqFt	$2.50	$58.08
ATD	10	L & T CR	M	4,714	Ft	CA - Crack Sealing - AC	4,714	Ft	$1.75	$8,249.12
ATD	20	SCALING	H	53	Slabs	CA - Slab Replacement - PCC	10,283	SqFt	$25.00	$257,065.75
ATERM	10	LINEAR CR	M	9	Slabs	CA - Crack Sealing - PCC	153	Ft	$3.50	$534.48
ATERM	10	JT SEAL DMG	L	733	Slabs	CA - Joint Seal - PCC	24,040	Ft	$3.00	$72,119.86
ATERM	10	JOINT SPALL	M	5	Slabs	CA - Patching - PCC Partial Depth	30	SqFt	$9.25	$280.70
ATERM	10	CORNER SPALL	M	5	Slabs	CA - Patching - PCC Partial Depth	13	SqFt	$9.25	$116.96
ATERM	30	JT SEAL DMG	L	109	Slabs	CA - Joint Seal - PCC	2,510	Ft	$3.00	$7,529.58
ATERM	30	JOINT SPALL	M	2	Slabs	CA - Patching - PCC Partial Depth	11	SqFt	$9.25	$101.56
ATERM	30	CORNER SPALL	M	2	Slabs	CA - Patching - PCC Partial Depth	5	SqFt	$9.25	$42.32
HELI	10	L & T CR	M	538	Ft	CA - Crack Sealing - AC	538	Ft	$1.75	$942.08
R08	10C	L & T CR	M	1,279	Ft	CA - Crack Sealing - AC	1,279	Ft	$1.75	$2,238.45
R08	10R	L & T CR	M	303	Ft	CA - Crack Sealing - AC	303	Ft	$1.75	$529.99
TWD	30	RUTTING	H	188	SqFt	CA - Patching - AC Full Depth	188	SqFt	$5.00	$941.47
TWF	20	JT REF. CR	M	220	Ft	CA - Crack Sealing - AC	220	Ft	$1.75	$385.00
TWG	20	L & T CR	M	232	Ft	CA - Crack Sealing - AC	232	Ft	$1.75	$406.47
TWH	10	JT SEAL DMG	L	96	Slabs	CA - Joint Seal - PCC	2,173	Ft	$3.00	$6,518.99
TWJ	10	ALLIGATOR CR	M	236	SqFt	CA - Patching - AC Full Depth	302	SqFt	$5.00	$1,509.16



Chapter 8

Pavement Classification Number Determination

Chapter 8 – Pavement Classification Number Determination

PCNs were determined via the Using Aircraft Method for Runways 08/26 and 13/31.

A PCN, as defined by FAA Advisory Circular (AC) *150/5335-5C Standardized Method of Reporting Airport Pavement Strength – PCN*, is a number that expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load. It is important to note that the PCN value is for reporting relative pavement strength, so airport operators can evaluate acceptable operations of aircraft. The PCN should not be used for pavement design or to evaluate a given pavement structure.

AC 150/5335-5C requires all public-use paved runways at airports serving air carrier aircraft be assigned a PCN. The AC is mandatory for all projects funded with Federal grant monies through AIP and with revenue from the Passenger Facility Charge (PFC) Program.

8.1 Existing Pavement Cross Sections

Although not critical given the utilization of the Using Aircraft Method as the preferred analysis approach for SNS, it is important to understand the existing pavement thickness and composition of the runway facilities.

Runway 08/26

As-built records and geotechnical data suggests a variable cross section on Runway 08/26 pavement consisting of AC pavement, a granular base course, and unknown subgrade. Based on historical as-built data, the original pavement section consisted of 4- to 6-inches of asphalt over 4- to 6-inches of aggregate base.

Runway 13/31

As-built records and geotechnical data suggests a variable cross section on Runway 13/31 pavement consisting of AC pavement, a granular base course, and unknown subgrade. Based on historical as-built data, the original pavement section consisted of 4- to 6-inches of asphalt over 4- to 6-inches of aggregate base.

8.2 Aircraft Traffic Analysis

The Airport was unable to provide detailed fleet mix data for SNS. Kimley-Horn utilized a combination of two sources to derive the aircraft fleet mix that was utilized for the PCN analysis. Data from the FAA Traffic Flow Management System Counts (TFMSC) was used as a basis for development of the aircraft fleet mix. The TFMSC data does provide us with a good understanding of the fleet mix, type of aircraft, and approximate percent split of aircraft type. Unfortunately, the TFMSC data only accounts for traffic operations that have filed a flight plan. Secondly, the TFMSC data also tracks overflights that are recognized by radar and may not necessarily operate at SNS. Engineering judgement was used to weed out the overflight data. A second source, the Terminal Area Forecast (TAF), was utilized to “factor up” the TFMSC data so that it is more realistic to the actual number of operations at SNS. Ultimately, the TAF identified approximately 62,550 operations or 31,275 annual departures at SNS.

The TFMSC data contains data points for each individual aircraft model. This amount of data is too cumbersome for use in the PCN analysis software, COMFAA, so like aircraft were combined and are referred to as “Simplified Aircraft Reference for COMFAA”. For example, the Bombardier

Learjet 35/36/40/45/55/75 and Cessna III/VI/VII, were simplified to "Dual Wheel 20" with a maximum takeoff weight (MTOW) of 20,000 lbs. Larger jet aircraft like the Gulfstream GIV and larger were not simplified. It should be noted that the fleet mix at SNS is unique given the annual California International Airshow Salinas that introduces a variety of military aircraft into the fleet mix including the F-18, C-130, C-17, and others.

Upon arrival at the overall departure data the traffic had to be distributed across the two runways at SNS. **Table 8.2.a** summarizes the simplified fleet mix and runway utilizations that were used in the PCN analysis for SNS.

Table 8.2.a
SNS Aircraft Fleet Mix

Simplified Aircraft Reference for COMFAA	Gear Designation	MTOW (lbs)	Annual Departures	Runway Utilization (%)		Annual Departures	
				Runway 08/26	Runway 13/31	Runway 08/26	Runway 13/31
Single Wheel 2	S	1,500	218	30	70	65	152
Single Wheel 2	S	2,250	2,951	30	70	885	2,066
Single Wheel 2	S	3,000	1,619	30	70	486	1,134
Single Wheel 2	S	3,500	1,914	30	70	574	1,340
Single Wheel 5	S	4,250	390	30	70	117	273
Single Wheel 5	S	5,250	1,619	30	70	486	1,134
Single Wheel 5	S	6,500	1,280	30	70	384	896
Single Wheel 5	S	7,000	128	30	70	38	90
Single Wheel 10	S	8,500	550	50	50	275	275
Single Wheel 10	S	10,500	3,533	50	50	1,767	1,767
Single Wheel 10	S	11,250	237	50	50	118	118
Single Wheel 10	S	12,500	38	50	50	19	19
Single Wheel 15	S	16,000	5,037	50	50	2,519	2,519
Single Wheel 15	S	17,500	83	50	50	42	42
Single Wheel 20	S	20,000	1,216	50	50	608	608
S-50	S	51,500	6	45	55	3	4
C-130	2S	93,000	147	45	55	66	81
Dual Wheel 15	D	10,250	4,564	50	50	2,282	2,282
Dual Wheel 15	D	12,500	3,072	50	50	1,536	1,536
Dual Wheel 20	D	20,000	1,415	50	50	707	707
Dual Wheel 20	D	25,000	134	50	50	67	67
Dual Wheel 30	D	30,000	346	50	50	173	173
Dual Wheel 35	D	37,500	384	50	50	192	192
Dual Wheel 40	D	42,500	96	50	50	48	48
D-75	D	67,500	26	50	50	13	13

Table 8.2.a (cont.)
SNS Aircraft Fleet Mix

Simplified Aircraft Reference for COMFAA	Gear Designation	MTOW (lbs)	Annual Departures	Runway Utilization (%)		Annual Departures	
				Runway 8/26	Runway 13/31	Runway 8/26	Runway 13/31
Gulfstream-G-IV	D	74,500	147	50	50	74	74
Gulfstream-G-V	D	90,500	77	50	50	38	38
Adv. Boeing 737-200	D	89,600	6	50	50	3	3
C-17A	2T	351,000	26	45	55	12	14
2D-200	2D	200,000	13	45	55	6	7

8.3 In-Situ Subgrade Support Conditions

Geotechnical data summarized in previous geotechnical reports and prior analyses were intended to be used as the basis for determining the in-situ subgrade support conditions for this analysis. However, the previous geotechnical data had significant variation. Including a range of CBRs on Runway 08/26 of 9 to 50 and a range on Runway 13/31 of 8 to 31 based on a 2005 study completed by Kleinfelder. Recent construction projects completed by Kimley-Horn at SNS have indicated much weaker in-situ subgrade support conditions that required subgrade stabilization to establish a working platform for construction activities. In talking with a local geotechnical engineer with a high level of historical knowledge of local soil conditions, it was noted that an in-situ CBR value of 3 to 4 for SNS is realistic.

Understanding the importance of in-situ CBR to the PCN computation, and given the variability in available geotechnical data it was determined that the Using Aircraft Method, which doesn't require these key inputs, was the preferred analysis method compared to the Technical Analysis Method.

8.4 PCN Background and Data Inputs

The PCNs for the existing runway pavement sections at SNS were computed using the Using Aircraft Method outlined in *AC 150/5335-5C Standardized Method of Reporting Airport Pavement Strength – PCN*. Kimley-Horn computed the PCN values using version 3.0 of the FAA's COMFAA program.

The ACN/PCN methodology was developed making it possible to express the effect of an individual aircraft on different pavements by a single unique number, which varies based on in-situ pavement type and subgrade strength without identifying a particular pavement thickness. This number is referred to as the Aircraft Classification Number (ACN). Similarly, the load-carrying capacity of a pavement section can be expressed by a single unique number without identifying a particular aircraft. This number is referred to as the PCN. The ACN and PCN values are defined as follows:

- ACN – Expresses the relative structural effect of an aircraft on different pavement types for a specific subgrade strength in terms of standard wheel load. Calculated using aircraft characteristics.

- PCN – Expresses the relative load carrying capacity of a pavement section in terms of a standard single wheel load.

The methodology is structured so that a pavement with a certain PCN value can support, without restrictions, all aircraft that have an ACN equal to or less than the reported PCN value. For a pavement system with variable strength, the reported PCN value should be the pavement section with the lowest PCN. **Table 8.4.a** summarizes the other data codes that comprise the reported PCN values.

As stated in AC 150/5335-5C, "The PCN value is for reporting relative pavement strength only and should not be used for pavement design or as a substitute for evaluation. Pavement design and evaluation are complex engineering problems that require detailed analyses. They cannot be reduced to a single number. The PCN rating system uses a continuous scale to compare pavement strength where higher values represent pavements with larger load carrying capacity."

Table 8.4.a
PCN Data Codes

PCN	Pavement Type	Subgrade Strength	Tire Pressure	Method of PCN Determination
Numerical Value	R - Rigid	A	W	T – Technical Evaluation
		B	X	
	F - Flexible	C	Y	U - Using Aircraft
		D	Z	
Code	**Category**		**Flexible Pavement CBR (%)**	**Rigid Pavement K (pci)**
A	High		≥ 13	≥ 442
B	Medium		8 < CBR < 13	221 < k < 442
C	Low		4 < CBR ≤ 8	92 ≤ k ≤ 221
D	Ultralow		≤ 4	≤ 92
Code		**Category**		**Tire Pressure (pci)**
W		High		No limit
X		Medium		146-217
Y		Low		74-145
Z		Ultralow		0-73

8.5 PCN Results and Summary

Based on previous geotechnical investigations and as-built records, the two runways at SNS consist of an asphalt surface over an aggregate base course. Given this, the pavement section was analyzed as a flexible pavement section. Based on the procedures outlined in AC 150/5335-5C for the Using Aircraft Method, an ACN analysis was completed in COMFAA for the aircraft fleet mix summarized in **Table 8.2.a**. The detailed outputs from the COMFAA software are provided in **Figure 8.5.a** for Runways 08/26 and 13/31 at SNS. When utilizing the Using Aircraft Method, the PCN is equal to the highest produced ACN of all aircraft in the fleet mix at Subgrade Category C for SNS.

Figure 8.5.a
SNS Runways 08/26 and 13/31 COMFAA Results

ICAO ACN Computation, Detailed Output

Unit Conversions | Show Alpha | Show Ext File | Single Aircraft ACN: Flexible, Rigid | Other Calculation Modes: PCN, ACN Batch, Thickness, Life, MGW | Back

Save PCN Output to a Text File

Flexible ACN at Indicated Gross Weight and Strength. Units = English.

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN at Indicated Code A(15)	B(10)	C(6)	D(3)
1	Single Wheel 2	1,500	100.00	30.0	0.3	0.5	0.7	1.0
2	Single Wheel 2	2,250	100.00	30.0	0.4	0.7	1.1	1.6
3	Single Wheel 2	3,000	100.00	30.0	0.6	0.9	1.4	2.1
4	Single Wheel 2	3,500	100.00	30.0	0.7	1.1	1.7	2.4
5	Single Wheel 5	4,250	100.00	45.0	1.4	2.0	2.7	3.3
6	Single Wheel 5	5,250	100.00	45.0	1.7	2.4	3.3	4.1
7	Single Wheel 5	6,500	100.00	45.0	2.1	3.0	4.1	5.1
8	Single Wheel 5	7,000	100.00	45.0	2.3	3.2	4.4	5.5
9	Single Wheel 10	8,500	100.00	50.0	3.2	4.4	5.7	6.7
10	Single Wheel 10	10,500	100.00	50.0	4.0	5.4	7.1	8.3
11	Single Wheel 10	11,250	100.00	50.0	4.3	5.8	7.6	8.9
12	Single Wheel 10	12,500	100.00	50.0	4.8	6.4	8.4	9.9
13	Single Wheel 15	16,000	95.00	50.0	2.9	3.9	5.1	6.0
14	Single Wheel 15	17,500	95.00	50.0	3.2	4.3	5.6	6.6
15	Single Wheel 20	20,000	95.00	75.0	5.3	6.4	7.5	7.9
16	S-50	51,500	95.00	150.0	20.8	21.4	21.2	21.8
17	C-130	93,000	95.00	105.0	15.1	17.2	18.2	20.5
18	Dual Wheel 15	10,250	95.00	55.0	1.2	1.7	2.3	2.8
19	Dual Wheel 15	12,500	95.00	55.0	1.6	2.2	3.0	3.6
20	Dual Wheel 20	20,000	95.00	65.0	3.2	4.3	5.2	6.1
21	Dual Wheel 20	25,000	95.00	65.0	5.0	5.8	6.9	7.8
22	Dual Wheel 30	30,000	95.00	85.0	5.6	6.9	8.0	9.2
23	Dual Wheel 35	37,500	95.00	90.0	7.7	9.5	10.5	11.9
24	Dual Wheel 40	42,500	95.00	90.0	9.1	11.1	12.3	13.6
25	D-75	67,500	95.00	110.0	14.8	16.6	19.2	21.4
26	Gulfstream-G-IV	74,500	95.00	185.0	22.0	23.4	24.4	25.3
27	Gulfstream-G-V	90,900	95.00	188.0	25.8	27.9	29.4	30.6
28	Adv. B737-200	89,600	91.92	182.0	19.8	20.3	22.2	25.9
29	C-17A	351,000	95.00	138.0	22.0	23.5	27.5	35.8
30	2D-200	200,000	95.00	160.0	26.8	30.7	35.3	43.1

Based on the data provided and assumptions outlined in this chapter the following PCN numbers can be assigned to Runways 08/26 and 13/31 at SNS.

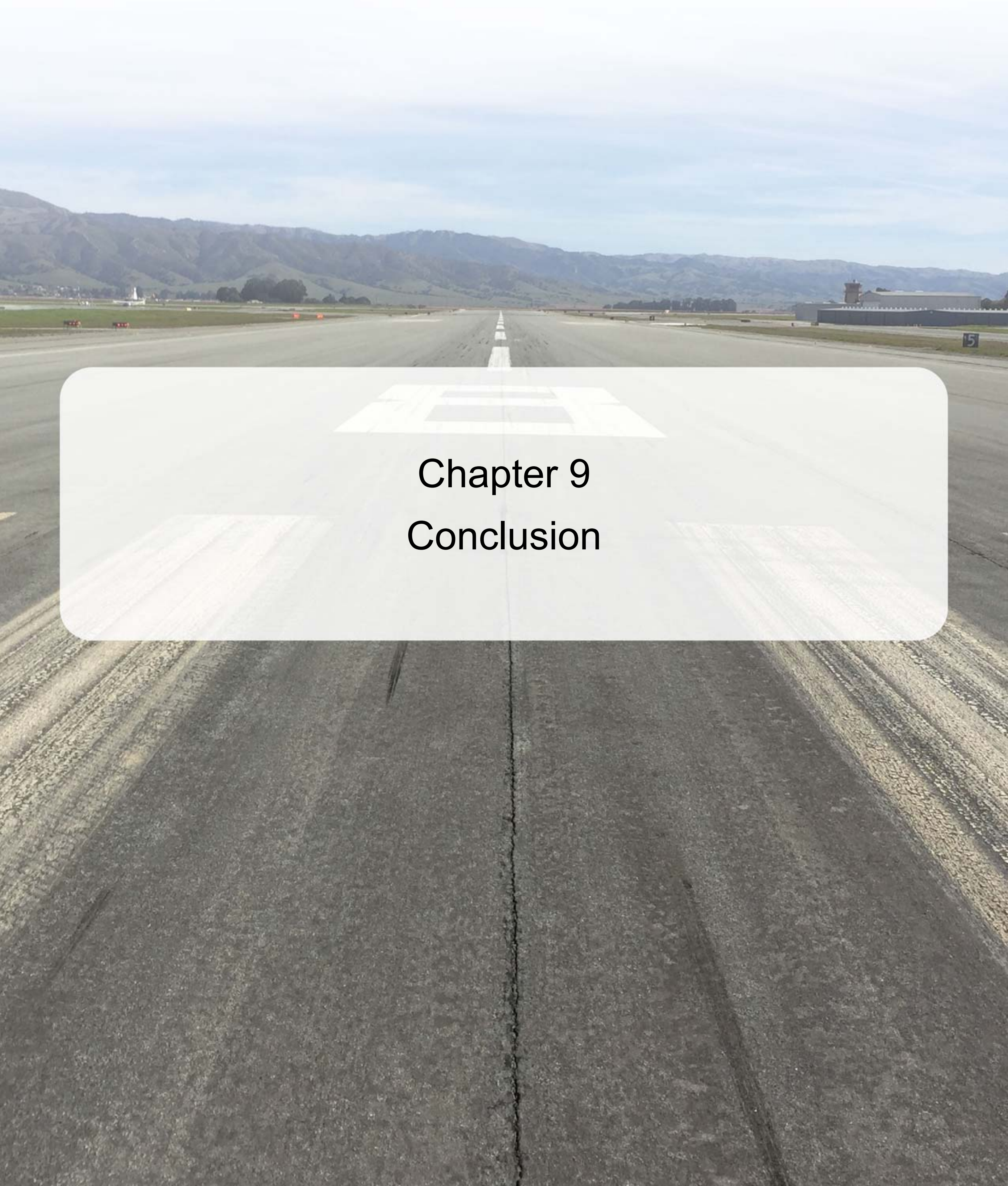
Runway 08/26

- 35/F/C/X/U

Runway 13/31

- 35/F/C/X/U

Again, it is important to note that the PCN value is for reporting relative pavement strength, so airport operators can evaluate acceptable operations of aircraft. The PCN should not be used for pavement design or to evaluate a given pavement structure. The analysis results presented are based on the data available at the time of analysis and the assumptions presented in this chapter, should there be any significant changes to these input parameters the analysis results presented in this memorandum will be impacted and should be re-evaluated. This includes significant changes in the aircraft fleet mix, aircraft operating weights, subgrade support conditions, or changes in pavement layer composition, to name a few.



Chapter 9
Conclusion

Chapter 9 – Conclusion

9.1 Existing Pavement Management System

SNS has maintained an excellent and comprehensive APMS for their airfield pavement facilities. The record keeping of work history is detailed and furthermore, the regular PCI Survey inspections performed by the airport should be recognized as a major contribution to the integrity and confidence of the performance models.

9.2 Comparison of Prior APMS Updates

All data collected by Kimley-Horn resulted in reasonably comparative results and expected deteriorations based on the prior PCI survey inspections performed by SNS from the prior APMS update. SNS will have an updated AutoCAD model that is reflective of their APMS database system.

9.3 Rio Vista Municipal Airport APMS Update Objectives

The specific objectives accomplished by this project and as communicated by this technical report are as follows:

- Updated the construction history from prior reports and record drawings of the existing pavements.
- Updated the existing or develop a new airport network definition map which is used to divide the pavements into manageable units to be visually inspected.
- Performed field investigations of airside pavements to identify current functional conditions.
- Updated the existing or develop a new APMS with PCI data gathered during the field investigations.
- Developed family curves for functional condition prediction.
- Established M&R policies and costs.
- Prioritize rehabilitation projects (Phasing).
- Established 5-year CIP for AIP including the development of an Overall Airport CIP which includes recommendations from other guiding documents.
- Determined PCN's for the airports two runways.
- Summarized the pavement study into a final report and executive summary.

9.4 Recommended Actions

It is highly recommended for SNS to perform rehabilitation efforts on the following airfield pavement branches:

- North Hangar Apron (AHGRNO-10, AHGRNO-20)
- Taxiway Golf (TWG-10)
- Taxiway Delta (TWD-10, 30)
- Tie Down Apron (ATD-20, 30)
- Terminal Apron (ATERM-20)
- South Hangar Apron (AHGRSO-10, 40, 50)
- Taxiway A (TWA-35)
- Taxiway E
- Taxiway F
- Taxiway L
- Taxiway P

The aforementioned pavement facilities had either already reached the critical PCI at the time of our inspection, or they are anticipated to reach the critical PCI within the 5-year planning period. As outlined in **Chapter 7**, major rehabilitation is the recommended action on the above list of pavements.

Appendix A
Pavement System Inventory

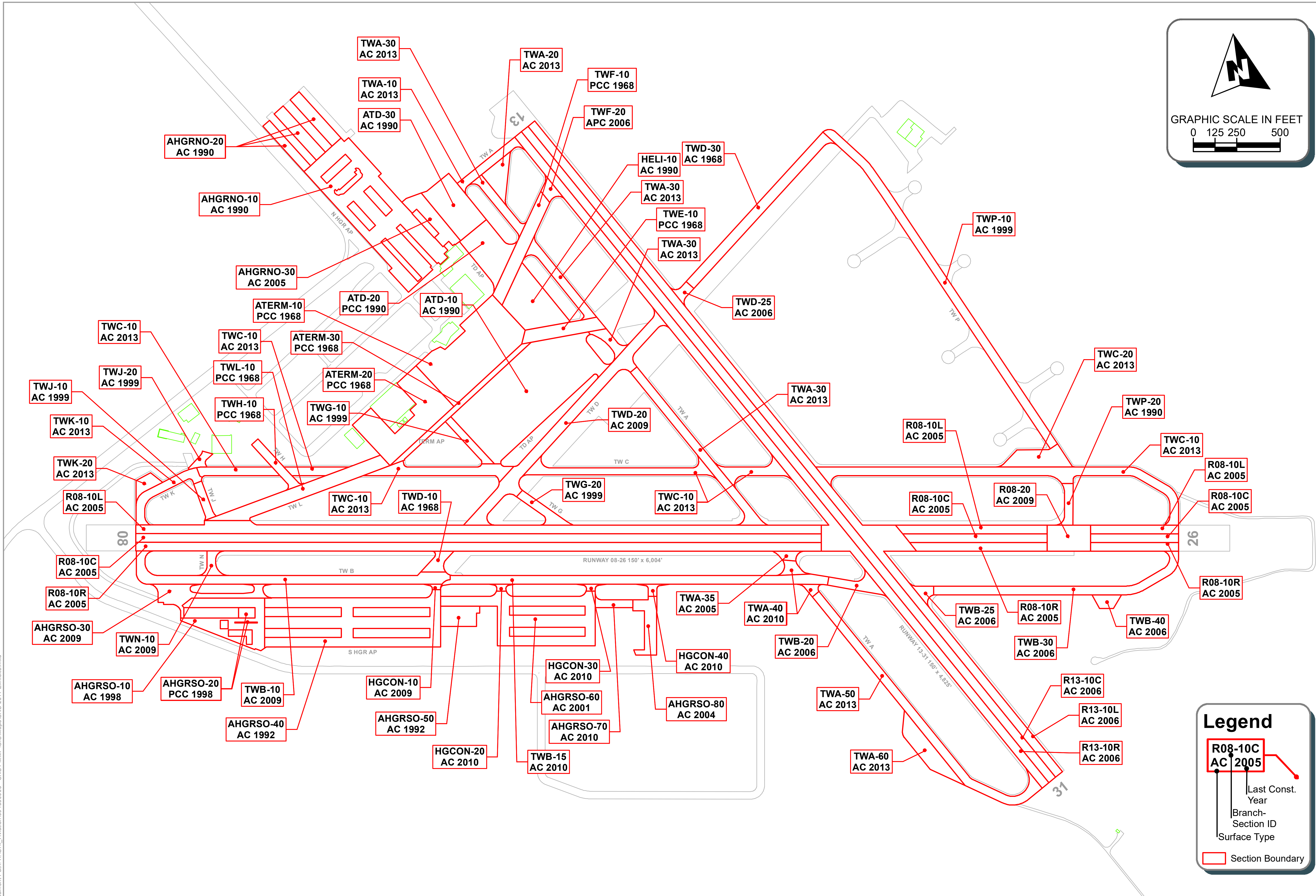


EXHIBIT 001

Kimley»Horn

PAVEMENT SYSTEM INVENTORY

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

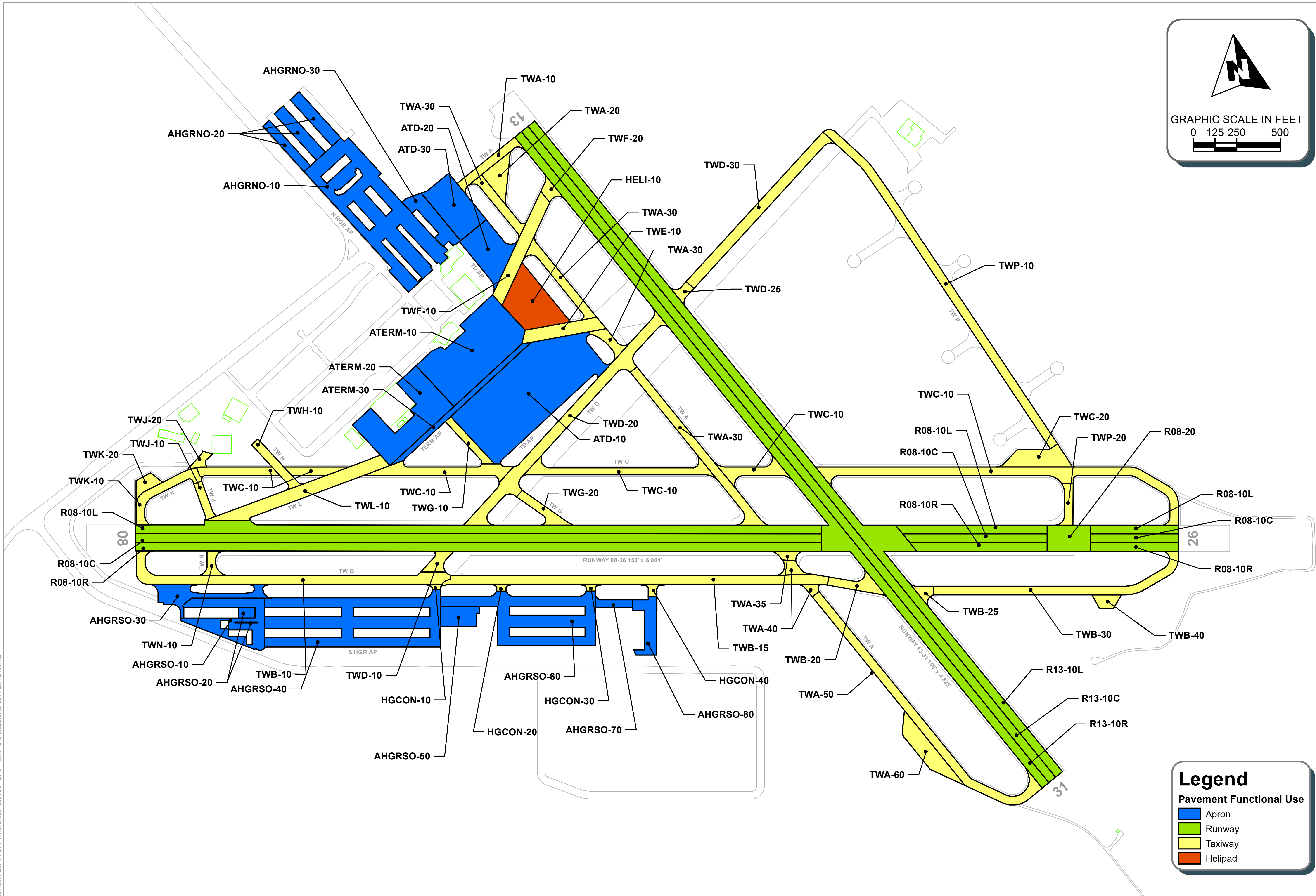


EXHIBIT 002

PAVEMENT FUNCTIONAL USE

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

Kimley»Horn

SALINAS

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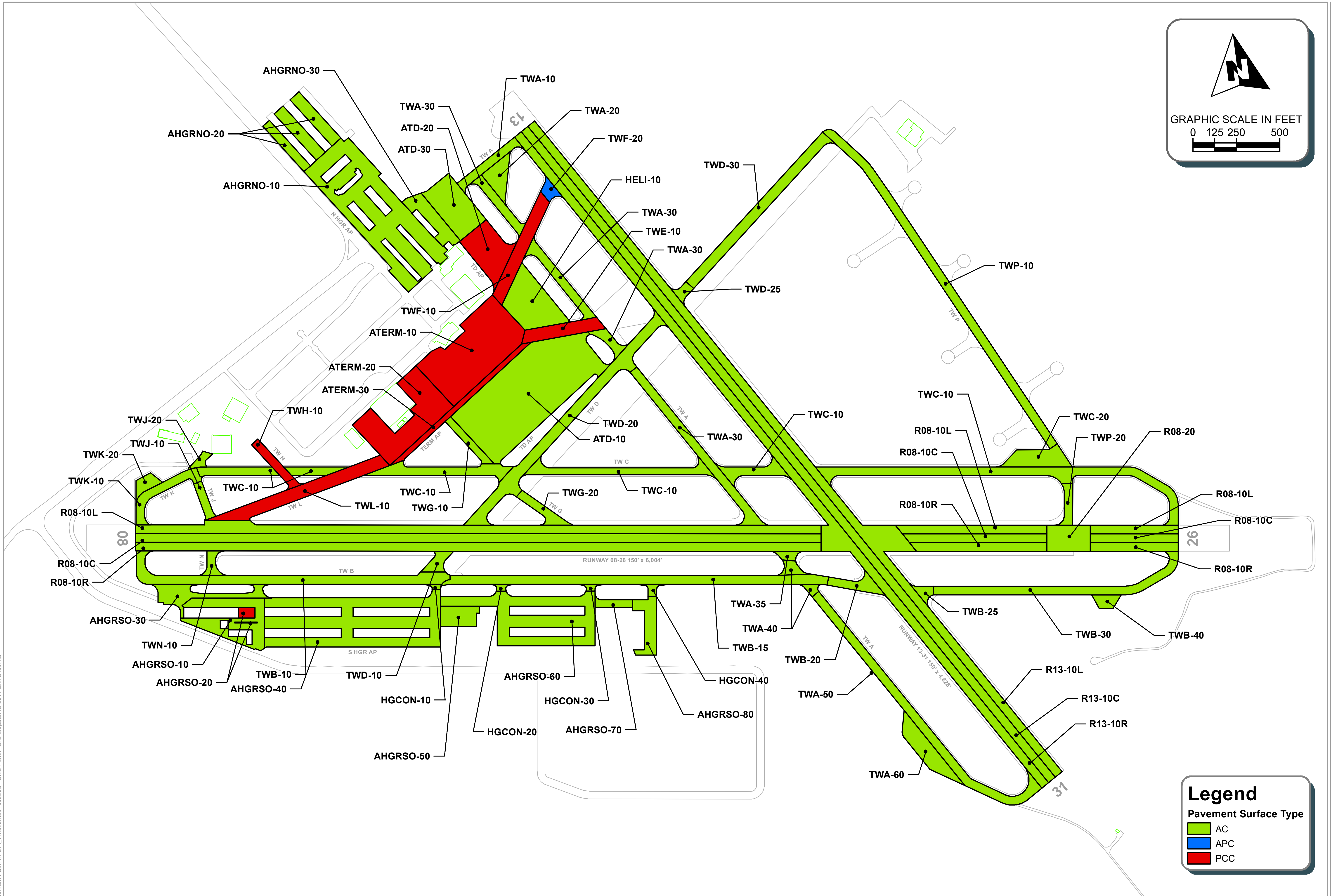

EXHIBIT 003

Kimley»Horn

PAVEMENT SURFACE TYPE

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

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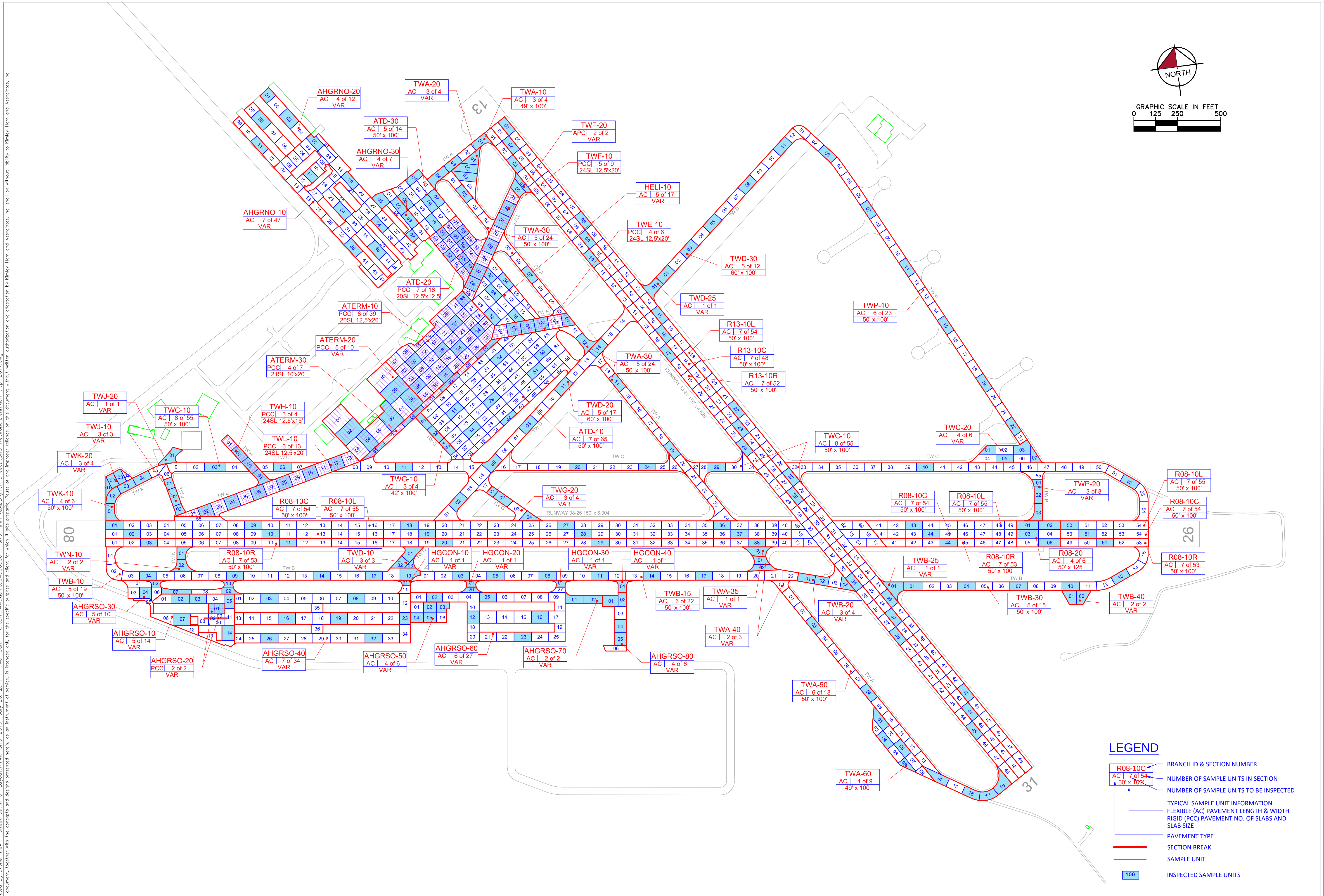


EXHIBIT 004

NETWORK DEFINITION MAP

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

Kimley»Horn

SALINAS

Table A-1
Pavement System Inventory Summary

Network ID	Name	Branch ID	Branch Use	Section ID	Length	Width	True Area	Section Rank	Surface Type	Estimated Last Construction Date
SNS	North Hangar Apron	AHGRNO	Apron	10	915	300	227,416	P	AC	1/1/1990
SNS	North Hangar Apron	AHGRNO	Apron	20	352	287	68,083	P	AC	1/1/1990
SNS	North Hangar Apron	AHGRNO	Apron	30	368	112	32,301	P	AC	8/1/2005
SNS	South Hangar Apron	AHGRSO	Apron	10	483	238	71,137	P	AC	7/1/1998
SNS	South Hangar Apron	AHGRSO	Apron	20	60	94	6,420	P	PCC	7/1/1998
SNS	South Hangar Apron	AHGRSO	Apron	30	80	607	39,005	P	AC	12/25/2009
SNS	South Hangar Apron	AHGRSO	Apron	40	1,013	284	198,165	P	AC	7/1/1992
SNS	South Hangar Apron	AHGRSO	Apron	50	208	118	25,264	P	AC	7/1/1992
SNS	South Hangar Apron	AHGRSO	Apron	60	100	1,000	138,028	P	AC	1/1/2001
SNS	South Hangar Apron	AHGRSO	Apron	70	216	46	10,147	P	AC	12/25/2010
SNS	South Hangar Apron	AHGRSO	Apron	80	71	409	29,692	P	AC	7/17/2004
SNS	Tie Down Apron	ATD	Apron	10	860	382	316,479	P	AC	1/1/1990
SNS	Tie Down Apron	ATD	Apron	20	288	200	59,373	P	PCC	1/1/1990
SNS	Tie Down Apron	ATD	Apron	30	344	192	66,587	P	AC	1/1/1990
SNS	Terminal Apron	ATERM	Apron	10	600	320	183,317	P	PCC	1/1/1968
SNS	Terminal Apron	ATERM	Apron	20	500	320	120,440	P	PCC	1/1/1968
SNS	Terminal Apron	ATERM	Apron	30	1,017	30	30,598	P	PCC	1/1/1968
SNS	Helipad	HELI	Helipad	10	301	239	75,915	P	AC	1/1/1990
SNS	Hangar Connector	HGCON	Taxiway	10	47	31	1,854	P	AC	12/25/2009
SNS	Hangar Connector	HGCON	Taxiway	20	52	40	2,622	P	AC	12/25/2010
SNS	Hangar Connector	HGCON	Taxiway	30	51	40	2,735	P	AC	12/25/2010
SNS	Hangar Connector	HGCON	Taxiway	40	70	50	4,321	P	AC	12/25/2010
SNS	Runway 08/26	R08	Runway	20	250	150	37,500	P	AC	12/25/2009

Table A-1 (cont.)
Pavement System Inventory Summary

Network ID	Name	Branch ID	Branch Use	Section ID	Length	Width	True Area	Section Rank	Surface Type	Estimated Last Construction Date
SNS	Runway 08/26	R08	Runway	10C	5,267	50	263,346	P	AC	8/1/2005
SNS	Runway 08/26	R08	Runway	10L	5,307	50	272,377	P	AC	8/1/2005
SNS	Runway 08/26	R08	Runway	10R	5,227	50	261,320	P	AC	8/1/2005
SNS	Runway 13/31	R13	Runway	10C	4,825	50	241,250	P	AC	4/1/2006
SNS	Runway 13/31	R13	Runway	10L	4,825	50	269,750	P	AC	4/1/2006
SNS	Runway 13/31	R13	Runway	10R	4,825	50	256,850	P	AC	4/1/2006
SNS	Taxiway A	TWA	Taxiway	10	425	50	21,686	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	20	229	107	23,170	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	30	2,259	50	122,877	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	35	53	75	5,945	P	AC	8/1/2005
SNS	Taxiway A	TWA	Taxiway	40	149	70	12,453	P	AC	12/25/2010
SNS	Taxiway A	TWA	Taxiway	50	1,807	50	95,193	P	AC	12/25/2013
SNS	Taxiway A	TWA	Taxiway	60	450	98	39,726	P	AC	12/25/2013
SNS	Taxiway B	TWB	Taxiway	10	1,914	50	100,734	P	AC	12/25/2009
SNS	Taxiway B	TWB	Taxiway	15	2,175	50	111,142	P	AC	12/25/2010
SNS	Taxiway B	TWB	Taxiway	20	305	50	19,031	P	AC	9/1/2006
SNS	Taxiway B	TWB	Taxiway	25	88	70	7,317	P	AC	4/1/2006
SNS	Taxiway B	TWB	Taxiway	30	1,494	50	75,583	P	AC	9/1/2006
SNS	Taxiway B	TWB	Taxiway	40	125	71	9,794	P	AC	9/1/2006
SNS	Taxiway C	TWC	Taxiway	10	5,085	50	270,996	P	AC	12/25/2013
SNS	Taxiway C	TWC	Taxiway	20	100	100	34,722	P	AC	12/25/2013
SNS	Taxiway D	TWD	Taxiway	10	133	60	11,918	P	AC	1/1/1968
SNS	Taxiway D	TWD	Taxiway	20	1,585	60	110,232	P	AC	12/25/2009

Table A-1 (cont.)
Pavement System Inventory Summary

Network ID	Name	Branch ID	Branch Use	Section ID	Length	Width	True Area	Section Rank	Surface Type	Estimated Last Construction Date
SNS	Taxiway D	TWD	Taxiway	25	99	60	6,915	P	AC	4/1/2006
SNS	Taxiway D	TWD	Taxiway	30	1,166	60	70,610	P	AC	1/1/1968
SNS	Taxiway E	TWE	Taxiway	10	457	75	34,238	P	PCC	1/1/1968
SNS	Taxiway F	TWF	Taxiway	10	655	75	49,134	P	PCC	1/1/1968
SNS	Taxiway F	TWF	Taxiway	20	80	104	8,239	P	APC	4/1/2006
SNS	Taxiway G	TWG	Taxiway	10	345	42	14,894	P	AC	7/1/1999
SNS	Taxiway G	TWG	Taxiway	20	299	50	17,589	P	AC	7/1/1999
SNS	Taxiway H	TWH	Taxiway	10	351	50	17,990	P	PCC	1/1/1968
SNS	Taxiway J	TWJ	Taxiway	10	220	50	11,011	P	AC	8/1/1999
SNS	Taxiway J	TWJ	Taxiway	20	107	43	6,117	P	AC	8/1/1999
SNS	Taxiway K	TWK	Taxiway	10	505	50	28,386	P	AC	12/25/2013
SNS	Taxiway K	TWK	Taxiway	20	149	79	11,147	P	AC	12/25/2013
SNS	Taxiway L	TWL	Taxiway	10	995	75	75,065	P	PCC	1/1/1968
SNS	Taxiway N	TWN	Taxiway	10	141	50	9,443	P	AC	12/25/2009
SNS	Taxiway P	TWP	Taxiway	10	2,252	50	112,307	P	AC	8/1/1999
SNS	Taxiway P	TWP	Taxiway	20	240	50	12,685	P	AC	6/1/1990

Appendix B
PAVER™ Reports

Date: 8 /23/2017

Branch Condition Report

Pavement Database: SNS_PMMS_2017 NetworkID: SNS

Branch ID	Number of Sections	Sum Section Length (Ft)	Avg Section Width (Ft)	True Area (SqFt)	Use	Average PCI	PCI Standard Deviation	Weighted Average PCI
AHGRNO (North Hangar Apron)	3	1,635.00	233.00	327,800.00	APRON	54.00	24.83	40.46
AHGRSO (South Hangar Apron)	8	2,231.00	349.50	517,858.00	APRON	71.38	13.77	68.41
ATD (Tie Down Apron)	3	1,492.00	258.00	442,439.00	APRON	60.00	8.29	65.05
ATERM (Terminal Apron)	3	2,117.00	223.33	334,355.00	APRON	59.67	9.67	58.89
HELI (Helipad)	1	301.00	239.00	75,915.00	HELIPAD	70.00	0.00	70.00
HGCON (Hangar Connector)	4	220.00	40.25	11,532.00	TAXIWAY	94.00	0.00	94.00
R08 (Runway 08/26)	4	16,051.00	75.00	834,543.00	RUNWAY	82.00	7.25	78.71
R13 (Runway 13/31)	3	14,475.00	50.00	767,850.00	RUNWAY	90.00	0.82	89.98
TWA (Taxiway A)	7	5,372.00	71.43	321,050.00	TAXIWAY	88.86	11.79	92.69
TWB (Taxiway B)	6	6,101.00	56.83	323,601.00	TAXIWAY	91.83	2.97	92.54
TWC (Taxiway C)	2	5,185.00	75.00	305,718.00	TAXIWAY	91.50	2.50	93.43
TWD (Taxiway D)	4	2,983.00	60.00	199,675.00	TAXIWAY	65.50	19.16	71.43
TWE (Taxiway E)	1	457.00	75.00	34,238.00	TAXIWAY	56.00	0.00	56.00
TWF (Taxiway F)	2	735.00	89.50	57,373.00	TAXIWAY	69.00	4.00	66.15
TWG (Taxiway G)	2	644.00	46.00	32,483.00	TAXIWAY	49.50	17.50	50.95
TWH (Taxiway H)	1	351.00	50.00	17,990.00	TAXIWAY	73.00	0.00	73.00

Branch Condition Report

Pavement Database: SNS_PMMS_2017 NetworkID: SNS

Branch ID	Number of Sections	Sum Section Length (Ft)	Avg Section Width (Ft)	True Area (SqFt)	Use	Average PCI	PCI Standard Deviation	Weighted Average PCI
TWJ (Taxiway J)	2	327.00	46.50	17,128.00	TAXIWAY	78.00	11.00	74.86
TWK (Taxiway K)	2	654.00	64.50	39,533.00	TAXIWAY	94.00	0.00	94.00
TWL (Taxiway L)	1	995.00	75.00	75,065.00	TAXIWAY	61.00	0.00	61.00
TWN (Taxiway N)	1	141.00	50.00	9,443.00	TAXIWAY	92.00	0.00	92.00
TWP (Taxiway P)	2	2,492.00	50.00	124,992.00	TAXIWAY	58.50	2.50	60.49

Use Category	Number of Sections	Total Area (SqFt)	Arithmetic Average PCI	Average PCI STD.	Weighted Average PCI
APRON	17	1,622,452.00	64.24	16.61	59.88
HELIPAD	1	75,915.00	70.00	0.00	70.00
RUNWAY	7	1,602,393.00	85.43	6.78	84.11
TAXIWAY	37	1,569,821.00	80.38	17.43	83.01
All	62	4,870,581.00	76.35	17.94	75.47

Date: 8 /23/2017

Section Condition Report

Pavement Database: SNS_PMMS_2017 *NetworkID: SNS*

Branch ID	Section ID	Last Const. Date	Surface	Use	Rank	Lanes	True Area (SqFt)	Last Inspection Date	Age At Inspection	PCI
AHGRNO (North Hangar Apron)	10	01/01/1990	AC	APRON	P	0	227,416.00	01/31/2017	27	34.00
AHGRNO (North Hangar Apron)	20	01/01/1990	AC	APRON	P	0	68,083.00	01/31/2017	27	39.00
AHGRNO (North Hangar Apron)	30	08/01/2005	AC	APRON	P	0	32,301.00	01/31/2017	12	89.00
AHGRSO (South Hangar Apron)	10	07/01/1998	AC	APRON	P	0	71,137.00	01/31/2017	19	50.00
AHGRSO (South Hangar Apron)	20	07/01/1998	PCC	APRON	P	0	6,420.00	01/31/2017	19	69.00
AHGRSO (South Hangar Apron)	30	12/25/2009	AC	APRON	P	0	39,005.00	01/30/2017	8	94.00
AHGRSO (South Hangar Apron)	40	07/01/1992	AC	APRON	P	0	198,165.00	01/31/2017	25	63.00
AHGRSO (South Hangar Apron)	50	07/01/1992	AC	APRON	P	0	25,264.00	01/31/2017	25	57.00
AHGRSO (South Hangar Apron)	60	01/01/2001	AC	APRON	P	0	138,028.00	02/01/2017	16	78.00
AHGRSO (South Hangar Apron)	70	12/25/2010	AC	APRON	P	0	10,147.00	02/01/2017	7	86.00
AHGRSO (South Hangar Apron)	80	07/17/2004	AC	APRON	P	0	29,692.00	02/01/2017	13	74.00
ATD (Tie Down Apron)	10	01/01/1990	AC	APRON	P	0	316,479.00	01/31/2017	27	69.00
ATD (Tie Down Apron)	20	01/01/1990	PCC	APRON	P	0	59,373.00	01/31/2017	27	62.00
ATD (Tie Down Apron)	30	01/01/1990	AC	APRON	P	0	66,587.00	01/31/2017	27	49.00
ATERM (Terminal Apron)	10	01/01/1968	PCC	APRON	P	0	183,317.00	01/31/2017	49	66.00
ATERM (Terminal Apron)	20	01/01/1968	PCC	APRON	P	0	120,440.00	01/31/2017	49	46.00
ATERM (Terminal Apron)	30	01/01/1968	PCC	APRON	P	0	30,598.00	01/31/2017	49	67.00
HELI (Helipad)	10	01/01/1990	AC	HELIPAD	P	0	75,915.00	01/31/2017	27	70.00
HGCON (Hangar Connector)	10	12/25/2009	AC	TAXIWAY	P	0	1,854.00	01/30/2017	8	94.00
HGCON (Hangar Connector)	20	12/25/2010	AC	TAXIWAY	P	0	2,622.00	01/30/2017	7	94.00
HGCON (Hangar Connector)	30	12/25/2010	AC	TAXIWAY	P	0	2,735.00	01/30/2017	7	94.00
HGCON (Hangar Connector)	40	12/25/2010	AC	TAXIWAY	P	0	4,321.00	01/30/2017	7	94.00
R08 (Runway 08/26)	10C	08/01/2005	AC	RUNWAY	P	0	263,346.00	01/30/2017	12	75.00
R08 (Runway 08/26)	10L	08/01/2005	AC	RUNWAY	P	0	272,377.00	01/30/2017	12	78.00
R08 (Runway 08/26)	10R	08/01/2005	AC	RUNWAY	P	0	261,320.00	01/30/2017	12	81.00
R08 (Runway 08/26)	20	12/25/2009	AC	RUNWAY	P	0	37,500.00	01/30/2017	8	94.00

Section Condition Report

Pavement Database: SNS_PMMS_2017 *NetworkID: SNS*

Branch ID	Section ID	Last Const. Date	Surface	Use	Rank	Lanes	True Area (SqFt)	Last Inspection Date	Age At Inspection	PCI
R13 (Runway 13/31)	10C	04/01/2006	AC	RUNWAY	P	0	241,250.00	01/30/2017	11	90.00
R13 (Runway 13/31)	10L	04/01/2006	AC	RUNWAY	P	0	269,750.00	01/30/2017	11	89.00
R13 (Runway 13/31)	10R	04/01/2006	AC	RUNWAY	P	0	256,850.00	01/30/2017	11	91.00
TWA (Taxiway A)	10	12/25/2013	AC	TAXIWAY	P	0	21,686.00	01/30/2017	4	94.00
TWA (Taxiway A)	20	12/25/2013	AC	TAXIWAY	P	0	23,170.00	01/30/2017	4	94.00
TWA (Taxiway A)	30	12/25/2013	AC	TAXIWAY	P	0	122,877.00	01/30/2017	4	93.00
TWA (Taxiway A)	35	08/01/2005	AC	TAXIWAY	P	0	5,945.00	01/30/2017	12	60.00
TWA (Taxiway A)	40	12/25/2010	AC	TAXIWAY	P	0	12,453.00	01/30/2017	7	94.00
TWA (Taxiway A)	50	12/25/2013	AC	TAXIWAY	P	0	95,193.00	01/30/2017	4	93.00
TWA (Taxiway A)	60	12/25/2013	AC	TAXIWAY	P	0	39,726.00	01/30/2017	4	94.00
TWB (Taxiway B)	10	12/25/2009	AC	TAXIWAY	P	0	100,734.00	01/30/2017	8	94.00
TWB (Taxiway B)	15	12/25/2010	AC	TAXIWAY	P	0	111,142.00	01/30/2017	7	93.00
TWB (Taxiway B)	20	09/01/2006	AC	TAXIWAY	P	0	19,031.00	01/30/2017	11	94.00
TWB (Taxiway B)	25	04/01/2006	AC	TAXIWAY	P	0	7,317.00	01/30/2017	11	86.00
TWB (Taxiway B)	30	09/01/2006	AC	TAXIWAY	P	0	75,583.00	01/30/2017	11	90.00
TWB (Taxiway B)	40	09/01/2006	AC	TAXIWAY	P	0	9,794.00	01/30/2017	11	94.00
TWC (Taxiway C)	10	12/25/2013	AC	TAXIWAY	P	0	270,996.00	01/30/2017	4	94.00
TWC (Taxiway C)	20	12/25/2013	AC	TAXIWAY	P	0	34,722.00	01/30/2017	4	89.00
TWD (Taxiway D)	10	01/01/1968	AC	TAXIWAY	P	0	11,918.00	01/30/2017	49	59.00
TWD (Taxiway D)	20	12/25/2009	AC	TAXIWAY	P	0	110,232.00	01/30/2017	8	93.00
TWD (Taxiway D)	25	04/01/2006	AC	TAXIWAY	P	0	6,915.00	01/30/2017	11	70.00
TWD (Taxiway D)	30	01/01/1968	AC	TAXIWAY	P	0	70,610.00	01/30/2017	49	40.00
TWE (Taxiway E)	10	01/01/1968	PCC	TAXIWAY	P	0	34,238.00	01/31/2017	49	56.00
TWF (Taxiway F)	10	01/01/1968	PCC	TAXIWAY	P	0	49,134.00	01/30/2017	49	65.00
TWF (Taxiway F)	20	04/01/2006	APC	TAXIWAY	P	0	8,239.00	01/30/2017	11	73.00
TWG (Taxiway G)	10	07/01/1999	AC	TAXIWAY	P	0	14,894.00	01/31/2017	18	32.00

Section Condition Report

Pavement Database: SNS_PMMS_2017   NetworkID: SNS

Branch ID	Section ID	Last Const. Date	Surface	Use	Rank	Lanes	True Area (SqFt)	Last Inspection Date	Age At Inspection	PCI
TWG (Taxiway G)	20	07/01/1999	AC	TAXIWAY	P	0	17,589.00	01/30/2017	18	67.00
TWH (Taxiway H)	10	01/01/1968	PCC	TAXIWAY	P	0	17,990.00	01/30/2017	49	73.00
TWJ (Taxiway J)	10	08/01/1999	AC	TAXIWAY	P	0	11,011.00	01/30/2017	18	67.00
TWJ (Taxiway J)	20	08/01/1999	AC	TAXIWAY	P	0	6,117.00	01/30/2017	18	89.00
TWK (Taxiway K)	10	12/25/2013	AC	TAXIWAY	P	0	28,386.00	01/30/2017	4	94.00
TWK (Taxiway K)	20	12/25/2013	AC	TAXIWAY	P	0	11,147.00	01/30/2017	4	94.00
TWL (Taxiway L)	10	01/01/1968	PCC	TAXIWAY	P	0	75,065.00	01/30/2017	49	61.00
TWN (Taxiway N)	10	12/25/2009	AC	TAXIWAY	P	0	9,443.00	01/30/2017	8	92.00
TWP (Taxiway P)	10	08/01/1999	AC	TAXIWAY	P	0	112,307.00	01/31/2017	18	61.00
TWP (Taxiway P)	20	06/01/1990	AC	TAXIWAY	P	0	12,685.00	01/30/2017	27	56.00

Age Category	Average Age At Inspection	Total Area (SqFt)	Number of Sections	Arithmetic Average PCI	PCI Standard Deviation	Weighted Average PCI
03-05	**4.00**	**647,903.00**	**9**	**93.22**	**1.64**	**93.40**
06-10	**7.50**	**442,188.00**	**12**	**93.00**	**2.30**	**93.27**
11-15	**11.47**	**1,759,710.00**	**15**	**82.27**	**10.17**	**84.05**
16-20	**18.00**	**377,503.00**	**8**	**64.13**	**17.29**	**65.04**
21-25	**25.00**	**223,429.00**	**2**	**60.00**	**4.24**	**62.32**
26-30	**27.00**	**826,538.00**	**7**	**54.14**	**14.14**	**54.68**
over 40	**49.00**	**593,310.00**	**9**	**59.22**	**10.53**	**57.68**
All	**18.10**	**4,870,581.00**	**62**	**76.35**	**18.09**	**75.47**

Work History Report

Pavement Database:SNS_PMMS_2017

Network: SNS **Branch:** AHGRNO (North Hangar Apron) **Section:** 10 **Surface:** AC
L.C.D.: 01/01/1990 **Use:** APRON **Rank** P **Length:** 915.00 Ft **Width:** 300.00 Ft **True Area:** 227,416.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	SS-SC	Surface Seal - Seal Coat	$0	0.00	False	
01/01/1990	HI-AG	New Construction	$0	0.00	True	

Network: SNS **Branch:** AHGRNO (North Hangar Apron) **Section:** 20 **Surface:** AC
L.C.D.: 01/01/1990 **Use:** APRON **Rank** P **Length:** 352.00 Ft **Width:** 287.00 Ft **True Area:** 68,083.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	SS-SC	Surface Seal - Seal Coat	$0	0.00	False	
01/01/1990	HI-AG	New Construction	$0	0.00	True	

Network: SNS **Branch:** AHGRNO (North Hangar Apron) **Section:** 30 **Surface:** AC
L.C.D.: 08/01/2005 **Use:** APRON **Rank** P **Length:** 368.00 Ft **Width:** 112.00 Ft **True Area:** 32,301.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	CR-AC	Complete Reconstruction - AC	$0	0.00	True	

Network: SNS **Branch:** AHGRSO (South Hangar Apron) **Section:** 10 **Surface:** AC
L.C.D.: 07/01/1998 **Use:** APRON **Rank** P **Length:** 483.00 Ft **Width:** 238.00 Ft **True Area:** 71,137.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1998	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** AHGRSO (South Hangar Apron) **Section:** 20 **Surface:** PCC
L.C.D.: 07/01/1998 **Use:** APRON **Rank** P **Length:** 60.00 Ft **Width:** 94.00 Ft **True Area:** 6,420.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1998	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** AHGRSO (South Hangar Apron) **Section:** 30 **Surface:** AC
L.C.D.: 12/25/2009 **Use:** APRON **Rank** P **Length:** 80.00 Ft **Width:** 607.00 Ft **True Area:** 39,005.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2009	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2009	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2009	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2009	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2009	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** AHGRSO (South Hangar Apron) **Section:** 40 **Surface:** AC
L.C.D.: 07/01/1992 **Use:** APRON **Rank** P **Length:** 1,013.00 Ft **Width:** 284.00 Ft **True Area:** 198,165.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1992	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** AHGRSO (South Hangar Apron) **Section:** 50 **Surface:** AC
L.C.D.: 07/01/1992 **Use:** APRON **Rank** P **Length:** 208.00 Ft **Width:** 118.00 Ft **True Area:** 25,264.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1992	NU-IN	New Construction - Initial	$0	0.00	True	

Work History Report

Pavement Database:SNS_PMMS_2017

Network: SNS **Branch**: AHGRSO (South Hangar Apron) **Section:** 60 **Surface:** AC
L.C.D.: 01/01/2001 **Use:** APRON **Rank** P **Length:** 100.00 Ft **Width:** 1,000.00 Ft **True Area:** 138,028.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/2001	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: AHGRSO (South Hangar Apron) **Section:** 70 **Surface:** AC
L.C.D.: 12/25/2010 **Use:** APRON **Rank** P **Length:** 216.00 Ft **Width:** 46.00 Ft **True Area:** 10,147.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2010	CR-AC	Complete Reconstruction - AC	$0	0.00	True	P-401
12/24/2010	BA-AG	Base Course - Aggregate	$0	0.00	False	P-209
12/23/2010	SB-LS	Subbase-Lime Stabilized	$0	6.00	False	P-155

Network: SNS **Branch**: AHGRSO (South Hangar Apron) **Section:** 80 **Surface:** AC
L.C.D.: 07/17/2004 **Use:** APRON **Rank** P **Length:** 71.00 Ft **Width:** 409.00 Ft **True Area:** 29,692.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/17/2004	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: ATD (Tie Down Apron) **Section:** 10 **Surface:** AC
L.C.D.: 01/01/1990 **Use:** APRON **Rank** P **Length:** 860.00 Ft **Width:** 382.00 Ft **True Area:** 316,479.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1990	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: ATD (Tie Down Apron) **Section:** 20 **Surface:** PCC
L.C.D.: 01/01/1990 **Use:** APRON **Rank** P **Length:** 288.00 Ft **Width:** 200.00 Ft **True Area:** 59,373.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1990	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: ATD (Tie Down Apron) **Section:** 30 **Surface:** AC
L.C.D.: 01/01/1990 **Use:** APRON **Rank** P **Length:** 344.00 Ft **Width:** 192.00 Ft **True Area:** 66,587.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2006	SS-SC	Surface Seal - Seal Coat	$0	0.00	False	
01/01/1990	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: ATERM (Terminal Apron) **Section:** 10 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** APRON **Rank** P **Length:** 600.00 Ft **Width:** 320.00 Ft **True Area:** 183,317.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: ATERM (Terminal Apron) **Section:** 20 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** APRON **Rank** P **Length:** 500.00 Ft **Width:** 320.00 Ft **True Area:** 120,440.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: ATERM (Terminal Apron) **Section:** 30 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** APRON **Rank** P **Length:** 1,017.00 Ft **Width:** 30.00 Ft **True Area:** 30,598.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** HELI (Helipad) **Section:** 10 **Surface:** AC
L.C.D.: 01/01/1990 **Use:** HELIPAD **Rank** P **Length:** 301.00 Ft **Width:** 239.00 Ft **True Area:** 75,915.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2003	SS-SC	Surface Seal - Seal Coat	$0	0.00	False	
01/01/1990	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** HGCON (Hangar Connector) **Section:** 10 **Surface:** AC
L.C.D.: 12/25/2009 **Use:** TAXIWAY **Rank** P **Length:** 47.00 Ft **Width:** 31.00 Ft **True Area:** 1,854.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2009	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2009	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2009	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2009	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2009	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** HGCON (Hangar Connector) **Section:** 20 **Surface:** AC
L.C.D.: 12/25/2010 **Use:** TAXIWAY **Rank** P **Length:** 52.00 Ft **Width:** 40.00 Ft **True Area:** 2,622.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2010	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2010	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2010	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2010	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2010	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2010	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** HGCON (Hangar Connector) **Section:** 30 **Surface:** AC
L.C.D.: 12/25/2010 **Use:** TAXIWAY **Rank** P **Length:** 51.00 Ft **Width:** 40.00 Ft **True Area:** 2,735.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2010	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2010	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2010	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2010	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2010	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2010	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** HGCON (Hangar Connector) **Section:** 40 **Surface:** AC
L.C.D.: 12/25/2010 **Use:** TAXIWAY **Rank** P **Length:** 70.00 Ft **Width:** 50.00 Ft **True Area:** 4,321.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2010	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2010	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2010	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2010	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2010	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2010	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** R08 (Runway 08/26) **Section:** 10C **Surface:** AC
L.C.D.: 08/01/2005 **Use:** RUNWAY **Rank** P **Length:** 5,267.00 Ft **Width:** 50.00 Ft **True Area:** 263,346.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: R08 (Runway 08/26) **Section:** 10L **Surface:** AC
L.C.D.: 08/01/2005 **Use:** RUNWAY **Rank** P **Length:** 5,307.00 Ft **Width:** 50.00 Ft **True Area:**272,377.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: R08 (Runway 08/26) **Section:** 10R **Surface:** AC
L.C.D.: 08/01/2005 **Use:** RUNWAY **Rank** P **Length:** 5,227.00 Ft **Width:** 50.00 Ft **True Area:**261,320.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: R08 (Runway 08/26) **Section:** 20 **Surface:** AC
L.C.D.: 12/25/2009 **Use:** RUNWAY **Rank** P **Length:** 250.00 Ft **Width:** 150.00 Ft **True Area:** 37,500.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	ML-OL	Mill and Overlay	$0	2.50	True	P-401
12/24/2009	CO-TA	Coat - Tack	$0	0.00	False	P-603

Network: SNS **Branch**: R13 (Runway 13/31) **Section:** 10C **Surface:** AC
L.C.D.: 04/01/2006 **Use:** RUNWAY **Rank** P **Length:** 4,825.00 Ft **Width:** 50.00 Ft **True Area:**241,250.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: R13 (Runway 13/31) **Section:** 10L **Surface:** AC
L.C.D.: 04/01/2006 **Use:** RUNWAY **Rank** P **Length:** 4,825.00 Ft **Width:** 50.00 Ft **True Area:**269,750.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: R13 (Runway 13/31) **Section:** 10R **Surface:** AC
L.C.D.: 04/01/2006 **Use:** RUNWAY **Rank** P **Length:** 4,825.00 Ft **Width:** 50.00 Ft **True Area:**256,850.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWA (Taxiway A) **Section:** 10 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 425.00 Ft **Width:** 50.00 Ft **True Area:** 21,686.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWA (Taxiway A) **Section:** 20 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 229.00 Ft **Width:** 107.00 Ft **True Area:** 23,170.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWA (Taxiway A) **Section:** 30 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 2,259.00 Ft **Width:** 50.00 Ft **True Area:**122,877.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401

08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWA (Taxiway A) **Section:** 35 **Surface:** AC
L.C.D.: 08/01/2005 **Use:** TAXIWAY **Rank** P **Length:** 53.00 Ft **Width:** 75.00 Ft **True Area:** 5,945.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWA (Taxiway A) **Section:** 40 **Surface:** AC
L.C.D.: 12/25/2010 **Use:** TAXIWAY **Rank** P **Length:** 149.00 Ft **Width:** 70.00 Ft **True Area:** 12,453.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2010	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2010	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2010	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2010	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2010	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2010	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** TWA (Taxiway A) **Section:** 50 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 1,807.00 Ft **Width:** 50.00 Ft **True Area:** 95,193.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWA (Taxiway A) **Section:** 60 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 450.00 Ft **Width:** 98.00 Ft **True Area:** 39,726.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
08/01/2005	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWB (Taxiway B) **Section:** 10 **Surface:** AC
L.C.D.: 12/25/2009 **Use:** TAXIWAY **Rank** P **Length:** 1,914.00 Ft **Width:** 50.00 Ft **True Area:** 100,734.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2009	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2009	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2009	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2009	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2009	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Network: SNS **Branch:** TWB (Taxiway B) **Section:** 15 **Surface:** AC
L.C.D.: 12/25/2010 **Use:** TAXIWAY **Rank** P **Length:** 2,175.00 Ft **Width:** 50.00 Ft **True Area:** 111,142.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2010	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2010	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2010	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2010	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2010	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2010	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155

Work History Report

Pavement Database:SNS_PMMS_2017

Network: SNS **Branch:** TWB (Taxiway B) **Section:** 20 **Surface:** AC
L.C.D.: 09/01/2006 **Use:** TAXIWAY **Rank** P **Length:** 305.00 Ft **Width:** 50.00 Ft **True Area:** 19,031.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
09/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWB (Taxiway B) **Section:** 25 **Surface:** AC
L.C.D.: 04/01/2006 **Use:** TAXIWAY **Rank** P **Length:** 88.00 Ft **Width:** 70.00 Ft **True Area:** 7,317.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWB (Taxiway B) **Section:** 30 **Surface:** AC
L.C.D.: 09/01/2006 **Use:** TAXIWAY **Rank** P **Length:** 1,494.00 Ft **Width:** 50.00 Ft **True Area:** 75,583.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
09/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWB (Taxiway B) **Section:** 40 **Surface:** AC
L.C.D.: 09/01/2006 **Use:** TAXIWAY **Rank** P **Length:** 125.00 Ft **Width:** 71.00 Ft **True Area:** 9,794.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
09/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWC (Taxiway C) **Section:** 10 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 5,085.00 Ft **Width:** 50.00 Ft **True Area:** 270,996.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
09/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWC (Taxiway C) **Section:** 20 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 100.00 Ft **Width:** 100.00 Ft **True Area:** 34,722.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
09/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWD (Taxiway D) **Section:** 10 **Surface:** AC
L.C.D.: 01/01/1968 **Use:** TAXIWAY **Rank** P **Length:** 133.00 Ft **Width:** 60.00 Ft **True Area:** 11,918.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
09/01/2004	SS-SC	Surface Seal - Seal Coat	$0	0.00	False	
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWD (Taxiway D) **Section:** 20 **Surface:** AC
L.C.D.: 12/25/2009 **Use:** TAXIWAY **Rank** P **Length:** 1,585.00 Ft **Width:** 60.00 Ft **True Area:** 110,232.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	CR-AC	Complete Reconstruction - AC	$0	1.50	True	P-401
12/24/2009	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2009	LC-AC	Surface Course - AC (Layer C	$0	3.50	False	P-401
12/22/2009	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2009	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2009	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155
09/01/2004	NU-IN	New Construction - Initial	$0	0.00	True	

Work History Report

Pavement Database:SNS_PMMS_2017

Network: SNS **Branch**: TWD (Taxiway D) **Section:** 25 **Surface:** AC
L.C.D.: 04/01/2006 **Use:** TAXIWAY **Rank** P **Length:** 99.00 Ft **Width:** 60.00 Ft **True Area:** 6,915.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/01/2006	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWD (Taxiway D) **Section:** 30 **Surface:** AC
L.C.D.: 01/01/1968 **Use:** TAXIWAY **Rank** P **Length:** 1,166.00 Ft **Width:** 60.00 Ft **True Area:** 70,610.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	CS-SS	Crack Seal - Slurry Seal	$0	0.00	False	
09/01/2004	SS-SC	Surface Seal - Seal Coat	$0	0.00	False	
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWE (Taxiway E) **Section:** 10 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** TAXIWAY **Rank** P **Length:** 457.00 Ft **Width:** 75.00 Ft **True Area:** 34,238.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWF (Taxiway F) **Section:** 10 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** TAXIWAY **Rank** P **Length:** 655.00 Ft **Width:** 75.00 Ft **True Area:** 49,134.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NC-PC	New Construction - PCC	$0	0.00	True	

Network: SNS **Branch**: TWF (Taxiway F) **Section:** 20 **Surface:** APC
L.C.D.: 04/01/2006 **Use:** TAXIWAY **Rank** P **Length:** 80.00 Ft **Width:** 104.00 Ft **True Area:** 8,239.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
04/01/2006	OL-AC	Overlay - AC	$0	0.00	True	
01/01/1968	NC-PC	New Construction - PCC	$0	0.00	True	

Network: SNS **Branch**: TWG (Taxiway G) **Section:** 10 **Surface:** AC
L.C.D.: 07/01/1999 **Use:** TAXIWAY **Rank** P **Length:** 345.00 Ft **Width:** 42.00 Ft **True Area:** 14,894.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	
01/01/1990	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWG (Taxiway G) **Section:** 20 **Surface:** AC
L.C.D.: 07/01/1999 **Use:** TAXIWAY **Rank** P **Length:** 299.00 Ft **Width:** 50.00 Ft **True Area:** 17,589.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
07/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWH (Taxiway H) **Section:** 10 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** TAXIWAY **Rank** P **Length:** 351.00 Ft **Width:** 50.00 Ft **True Area:** 17,990.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch**: TWJ (Taxiway J) **Section:** 10 **Surface:** AC
L.C.D.: 08/01/1999 **Use:** TAXIWAY **Rank** P **Length:** 220.00 Ft **Width:** 50.00 Ft **True Area:** 11,011.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments

08/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWJ (Taxiway J) **Section:** 20 **Surface:** AC
L.C.D.: 08/01/1999 **Use:** TAXIWAY **Rank** P **Length:** 107.00 Ft **Width:** 43.00 Ft **True Area:** 6,117.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWK (Taxiway K) **Section:** 10 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 505.00 Ft **Width:** 50.00 Ft **True Area:** 28,386.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
07/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWK (Taxiway K) **Section:** 20 **Surface:** AC
L.C.D.: 12/25/2013 **Use:** TAXIWAY **Rank** P **Length:** 149.00 Ft **Width:** 79.00 Ft **True Area:** 11,147.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2013	ML-OL	Mill and Overlay	$0	3.00	True	P-401
08/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWL (Taxiway L) **Section:** 10 **Surface:** PCC
L.C.D.: 01/01/1968 **Use:** TAXIWAY **Rank** P **Length:** 995.00 Ft **Width:** 75.00 Ft **True Area:** 75,065.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
01/01/1968	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWN (Taxiway N) **Section:** 10 **Surface:** AC
L.C.D.: 12/25/2009 **Use:** TAXIWAY **Rank** P **Length:** 141.00 Ft **Width:** 50.00 Ft **True Area:** 9,443.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
12/25/2009	CR-AC	Complete Reconstruction - AC	$0	2.50	True	P-401
12/24/2009	CO-TA	Coat - Tack	$0	0.00	False	P-603
12/23/2009	LC-AC	Surface Course - AC (Layer C	$0	2.50	False	P-401
12/22/2009	CO-PR	Coat - Prime	$0	0.00	False	P-602
12/21/2009	BA-AG	Base Course - Aggregate	$0	13.00	False	P-209
12/20/2009	SB-LS	Subbase-Lime Stabilized	$0	18.00	False	P-155
08/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWP (Taxiway P) **Section:** 10 **Surface:** AC
L.C.D.: 08/01/1999 **Use:** TAXIWAY **Rank** P **Length:** 2,252.00 Ft **Width:** 50.00 Ft **True Area:** 112,307.00 SqF

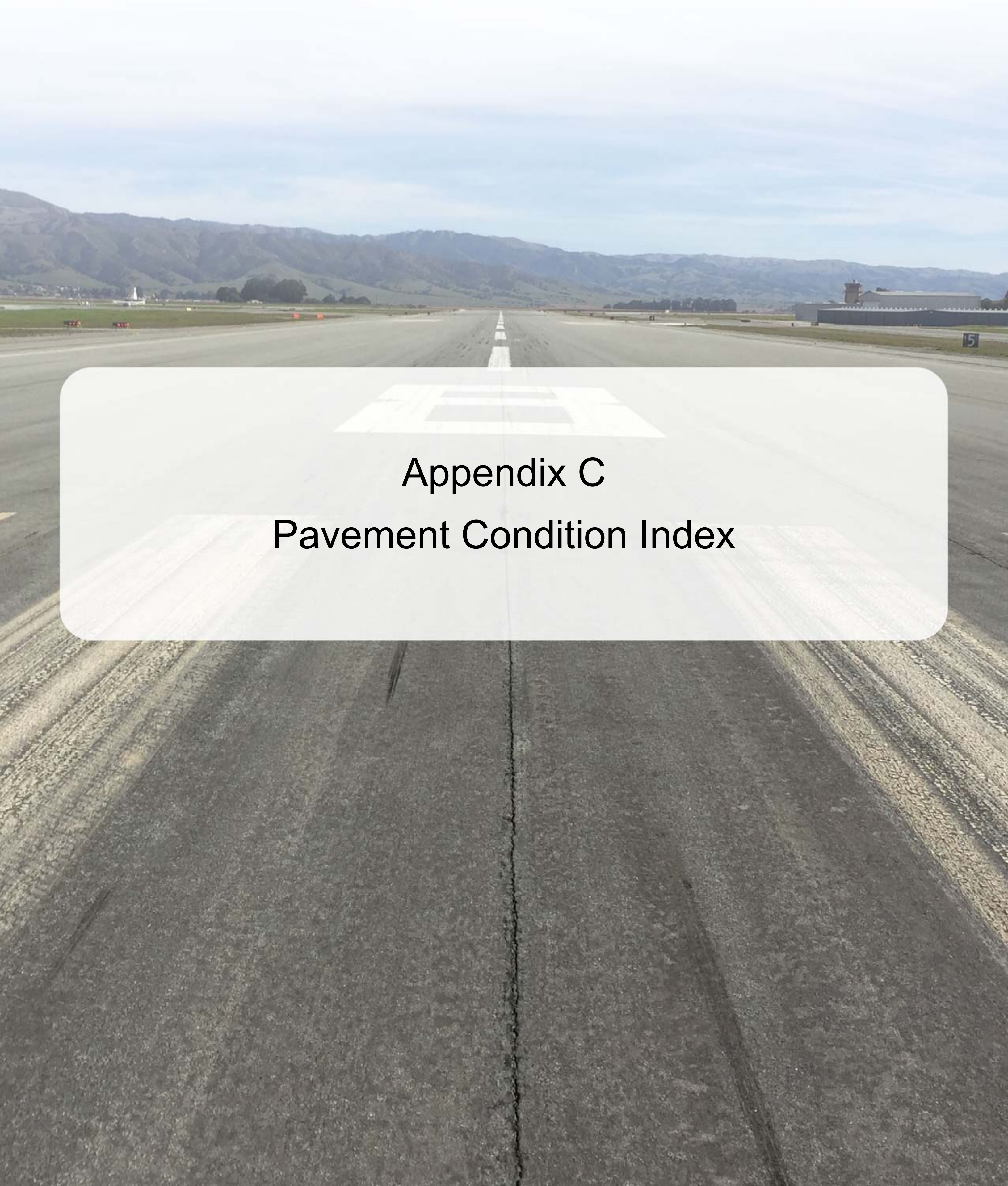
Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/01/1999	NU-IN	New Construction - Initial	$0	0.00	True	

Network: SNS **Branch:** TWP (Taxiway P) **Section:** 20 **Surface:** AC
L.C.D.: 06/01/1990 **Use:** TAXIWAY **Rank** P **Length:** 240.00 Ft **Width:** 50.00 Ft **True Area:** 12,685.00 SqF

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
06/01/1990	NU-IN	New Construction - Initial	$0	0.00	True	

Summary:

Work Description	Section Count	Area Total (SqFt)	Thickness Avg (in)	Thickness STD (in)
Base Course - Aggregate	11	404,688.00	11.82	3.92
Coat - Prime	10	394,541.00	.00	.00
Coat - Tack	11	432,041.00	.00	.00
Complete Reconstruction - AC	12	436,989.00	2.00	.98
Crack Seal - Slurry Seal	1	70,610.00	.00	
Mill and Overlay	10	685,403.00	2.95	.16
New Construction	2	295,499.00	.00	.00
New Construction - Initial	48	4,177,789.00	.00	.00
New Construction - PCC	2	57,373.00	.00	.00
Overlay - AC	1	8,239.00	.00	
Subbase-Lime Stabilized	11	404,688.00	16.91	3.62
Surface Course - AC (Layer	10	394,541.00	2.60	.32
Surface Seal - Seal Coat	6	520,529.00	.00	.00



Appendix C
Pavement Condition Index

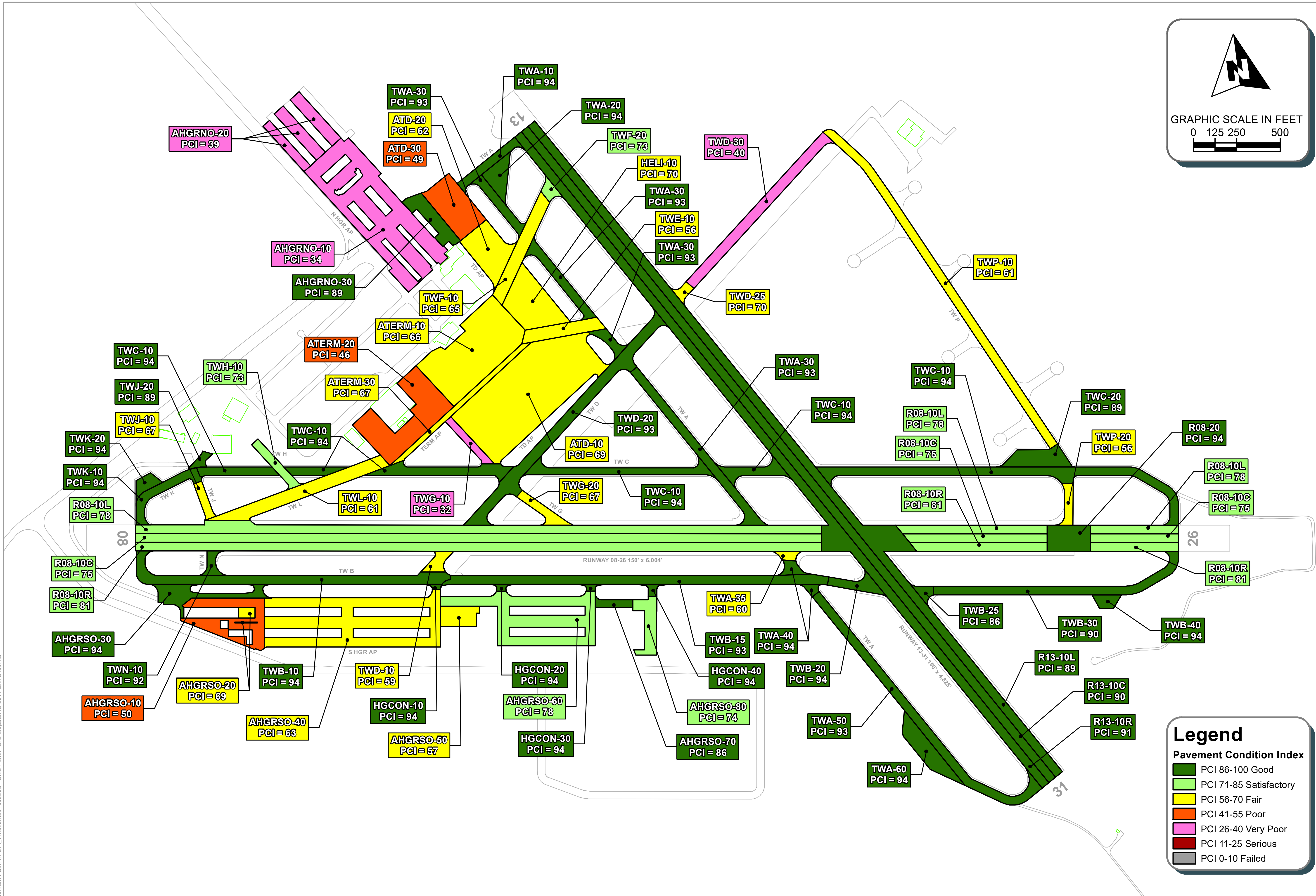


EXHIBIT 005

2017 PAVEMENT CONDITION INDEX

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

Kimley»Horn

SALINAS

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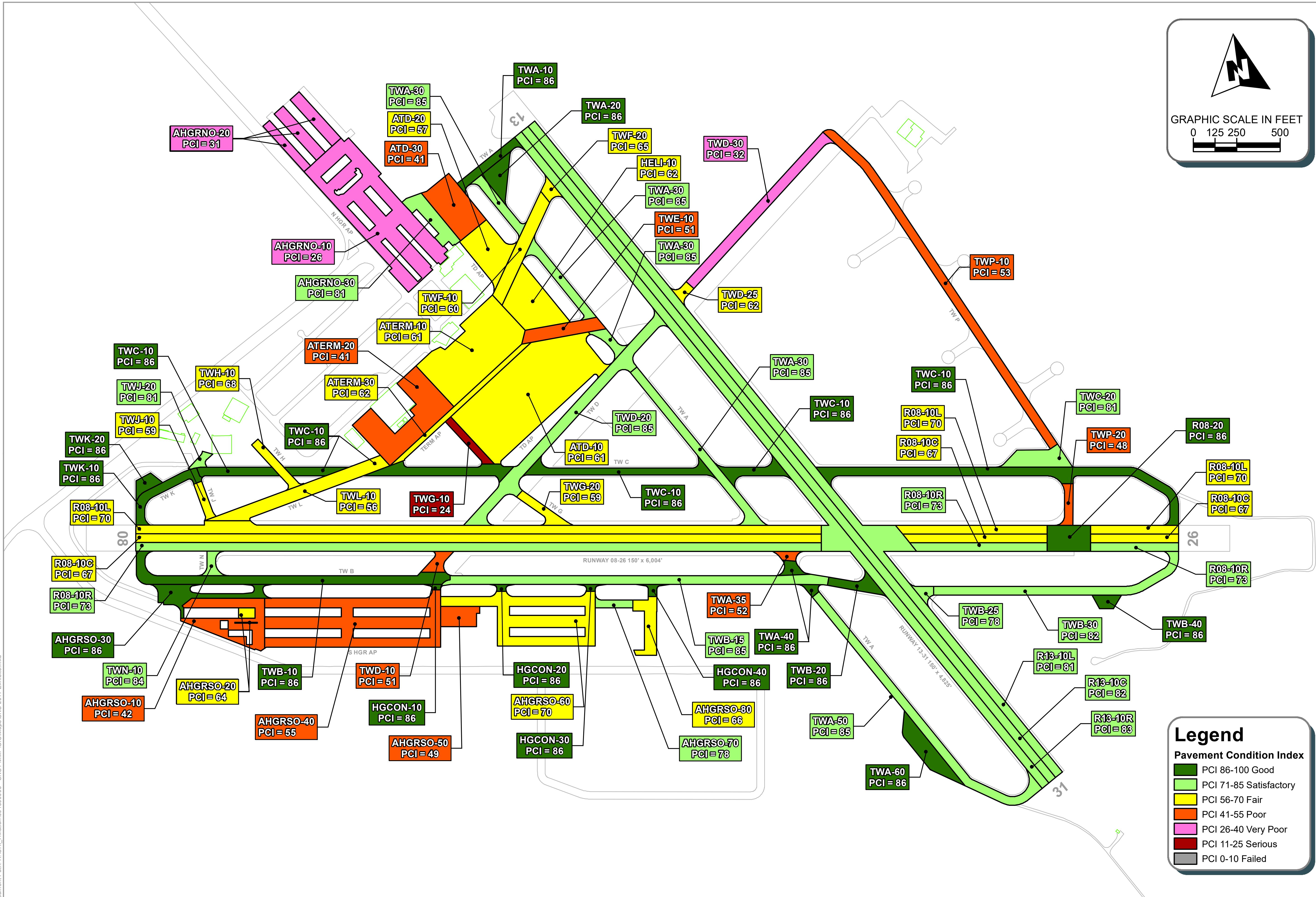

Kimley»Horn

EXHIBIT 006

2022 PREDICTED PAVEMENT CONDITION INDEX

2017 AIRPORT PAVEMENT MANAGEMENT SYSTEM REPORT

Salinas Municipal Airport (SNS)

SALINAS

Table C-1
2017 PCI Summary

Network ID	Branch ID	Name	Branch Use	Section ID	Estimated Area (SF)	Surface Type	2017 PCI	PCI Category
SNS	AHGRNO	North Hangar Apron	Apron	10	227,416	AC	34	Very Poor
SNS	AHGRNO	North Hangar Apron	Apron	20	68,083	AC	39	Very Poor
SNS	AHGRNO	North Hangar Apron	Apron	30	32,301	AC	89	Good
SNS	AHGRSO	South Hangar Apron	Apron	10	71,137	AC	50	Poor
SNS	AHGRSO	South Hangar Apron	Apron	20	6,420	PCC	69	Fair
SNS	AHGRSO	South Hangar Apron	Apron	30	39,005	AC	94	Good
SNS	AHGRSO	South Hangar Apron	Apron	40	198,165	AC	63	Fair
SNS	AHGRSO	South Hangar Apron	Apron	50	25,264	AC	57	Fair
SNS	AHGRSO	South Hangar Apron	Apron	60	138,028	AC	78	Satisfactory
SNS	AHGRSO	South Hangar Apron	Apron	70	10,147	AC	86	Good
SNS	AHGRSO	South Hangar Apron	Apron	80	29,692	AC	74	Satisfactory
SNS	ATD	Tie Down Apron	Apron	10	316,479	AC	69	Fair
SNS	ATD	Tie Down Apron	Apron	20	59,373	PCC	62	Fair
SNS	ATD	Tie Down Apron	Apron	30	66,587	AC	49	Poor
SNS	ATERM	Terminal Apron	Apron	10	183,317	PCC	66	Fair
SNS	ATERM	Terminal Apron	Apron	20	120,440	PCC	46	Poor
SNS	ATERM	Terminal Apron	Apron	30	30,598	PCC	67	Fair
SNS	HELI	Helipad	Helipad	10	75,915	AC	70	Fair
SNS	HGCON	Hangar Connector	Taxiway	10	1,854	AC	94	Good
SNS	HGCON	Hangar Connector	Taxiway	20	2,622	AC	94	Good
SNS	HGCON	Hangar Connector	Taxiway	30	2,735	AC	94	Good
SNS	HGCON	Hangar Connector	Taxiway	40	4,321	AC	94	Good
SNS	R08	Runway 08/26	Runway	20	37,500	AC	94	Good
SNS	R08	Runway 08/26	Runway	10C	263,346	AC	75	Satisfactory
SNS	R08	Runway 08/26	Runway	10L	272,377	AC	78	Satisfactory
SNS	R08	Runway 08/26	Runway	10R	261,320	AC	81	Satisfactory
SNS	R13	Runway 13/31	Runway	10C	241,250	AC	90	Good
SNS	R13	Runway 13/31	Runway	10L	269,750	AC	89	Good
SNS	R13	Runway 13/31	Runway	10R	256,850	AC	91	Good
SNS	TWA	Taxiway A	Taxiway	10	21,686	AC	94	Good
SNS	TWA	Taxiway A	Taxiway	20	23,170	AC	94	Good
SNS	TWA	Taxiway A	Taxiway	30	122,877	AC	93	Good
SNS	TWA	Taxiway A	Taxiway	35	5,945	AC	60	Fair
SNS	TWA	Taxiway A	Taxiway	40	12,453	AC	94	Good
SNS	TWA	Taxiway A	Taxiway	50	95,193	AC	93	Good
SNS	TWA	Taxiway A	Taxiway	60	39,726	AC	94	Good

Table C-1 (cont.)
2017 PCI Summary

Network ID	Branch ID	Name	Branch Use	Section ID	Estimated Area (SF)	Surface Type	2017 PCI	PCI Category
SNS	TWB	Taxiway B	Taxiway	10	100,734	AC	94	Good
SNS	TWB	Taxiway B	Taxiway	15	111,142	AC	93	Good
SNS	TWB	Taxiway B	Taxiway	20	19,031	AC	94	Good
SNS	TWB	Taxiway B	Taxiway	25	7,317	AC	86	Good
SNS	TWB	Taxiway B	Taxiway	30	75,583	AC	90	Good
SNS	TWB	Taxiway B	Taxiway	40	9,794	AC	94	Good
SNS	TWC	Taxiway C	Taxiway	10	270,996	AC	94	Good
SNS	TWC	Taxiway C	Taxiway	20	34,722	AC	89	Good
SNS	TWD	Taxiway D	Taxiway	10	11,918	AC	59	Fair
SNS	TWD	Taxiway D	Taxiway	20	110,232	AC	93	Good
SNS	TWD	Taxiway D	Taxiway	25	6,915	AC	70	Fair
SNS	TWD	Taxiway D	Taxiway	30	70,610	AC	40	Very Poor
SNS	TWE	Taxiway E	Taxiway	10	34,238	PCC	56	Fair
SNS	TWF	Taxiway F	Taxiway	10	49,134	PCC	65	Fair
SNS	TWF	Taxiway F	Taxiway	20	8,239	APC	73	Satisfactory
SNS	TWG	Taxiway G	Taxiway	10	14,894	AC	32	Very Poor
SNS	TWG	Taxiway G	Taxiway	20	17,589	AC	67	Fair
SNS	TWH	Taxiway H	Taxiway	10	17,990	PCC	73	Satisfactory
SNS	TWJ	Taxiway J	Taxiway	10	11,011	AC	67	Fair
SNS	TWJ	Taxiway J	Taxiway	20	6,117	AC	89	Good
SNS	TWK	Taxiway K	Taxiway	10	28,386	AC	94	Good
SNS	TWK	Taxiway K	Taxiway	20	11,147	AC	94	Good
SNS	TWL	Taxiway L	Taxiway	10	75,065	PCC	61	Fair
SNS	TWN	Taxiway N	Taxiway	10	9,443	AC	92	Good
SNS	TWP	Taxiway P	Taxiway	10	112,307	AC	61	Fair
SNS	TWP	Taxiway P	Taxiway	20	12,685	AC	56	Fair

Table C-2
5-Year (2018-2022) Predicted PCI Summary

Network ID	Branch ID	Section ID	Use	2018	2019	2020	2021	2022
SNS	AHGRNO	10	Apron	33	31	29	28	26
SNS	AHGRNO	20	Apron	38	36	34	33	31
SNS	AHGRNO	30	Apron	88	86	84	83	81
SNS	AHGRSO	10	Apron	49	47	45	44	42
SNS	AHGRSO	20	Apron	68	67	66	65	64
SNS	AHGRSO	30	Apron	93	91	89	88	86
SNS	AHGRSO	40	Apron	62	60	58	57	55
SNS	AHGRSO	50	Apron	56	54	52	51	49
SNS	AHGRSO	60	Apron	77	75	73	72	70
SNS	AHGRSO	70	Apron	85	83	81	80	78
SNS	AHGRSO	80	Apron	73	71	69	68	66
SNS	ATD	10	Apron	68	66	64	63	61
SNS	ATD	20	Apron	61	60	59	58	57
SNS	ATD	30	Apron	48	46	44	43	41
SNS	ATERM	10	Apron	65	64	63	62	61
SNS	ATERM	20	Apron	45	44	43	42	41
SNS	ATERM	30	Apron	66	65	64	63	62
SNS	HELI	10	Helipad	69	67	65	64	62
SNS	HGCON	10	Taxiway	93	91	89	88	86
SNS	HGCON	20	Taxiway	93	91	89	88	86
SNS	HGCON	30	Taxiway	93	91	89	88	86
SNS	HGCON	40	Taxiway	93	91	89	88	86
SNS	R08	20	Runway	93	91	89	88	86
SNS	R08	10C	Runway	74	72	70	69	67
SNS	R08	10L	Runway	77	75	73	72	70
SNS	R08	10R	Runway	80	78	76	75	73
SNS	R13	10C	Runway	89	87	85	84	82
SNS	R13	10L	Runway	88	86	84	83	81
SNS	R13	10R	Runway	90	88	86	85	83
SNS	TWA	10	Taxiway	93	91	89	88	86
SNS	TWA	20	Taxiway	93	91	89	88	86
SNS	TWA	30	Taxiway	92	90	88	87	85
SNS	TWA	35	Taxiway	59	57	55	54	52
SNS	TWA	40	Taxiway	93	91	89	88	86
SNS	TWA	50	Taxiway	92	90	88	87	85
SNS	TWA	60	Taxiway	93	91	89	88	86

Table C-2 (cont.)
5-Year (2018-2022) Predicted PCI Summary

Network ID	Branch ID	Section ID	Use	2018	2019	2020	2021	2022
SNS	TWB	10	Taxiway	93	91	89	88	86
SNS	TWB	15	Taxiway	92	90	88	87	85
SNS	TWB	20	Taxiway	93	91	89	88	86
SNS	TWB	25	Taxiway	85	83	81	80	78
SNS	TWB	30	Taxiway	89	87	85	84	82
SNS	TWB	40	Taxiway	93	91	89	88	86
SNS	TWC	10	Taxiway	93	91	89	88	86
SNS	TWC	20	Taxiway	88	86	84	83	81
SNS	TWD	10	Taxiway	58	56	54	53	51
SNS	TWD	20	Taxiway	92	90	88	87	85
SNS	TWD	25	Taxiway	69	67	65	64	62
SNS	TWD	30	Taxiway	39	37	35	34	32
SNS	TWE	10	Taxiway	55	54	53	52	51
SNS	TWF	10	Taxiway	64	63	62	61	60
SNS	TWF	20	Taxiway	72	70	68	67	65
SNS	TWG	10	Taxiway	31	29	27	26	24
SNS	TWG	20	Taxiway	66	64	62	61	59
SNS	TWH	10	Taxiway	72	71	70	69	68
SNS	TWJ	10	Taxiway	66	64	62	61	59
SNS	TWJ	20	Taxiway	88	86	84	83	81
SNS	TWK	10	Taxiway	93	91	89	88	86
SNS	TWK	20	Taxiway	93	91	89	88	86
SNS	TWL	10	Taxiway	60	59	58	57	56
SNS	TWN	10	Taxiway	91	89	87	86	84
SNS	TWP	10	Taxiway	60	58	56	55	53
SNS	TWP	20	Taxiway	55	53	51	50	48

Appendix D
Inspection Report 2017

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRNO Name: North Hangar Apron Use: APRON Area: 327,800.00SqFt

Section: 10 of 3 From: - To: - Last Const.: 01/01/1990
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 227,416.00SqFt Length: 915.00Ft Width: 300.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 47 Surveyed: 7
Conditions: PCI : 34
Inspection Comments:

Sample Number: 02 Type: R Area: 4,640.00SqFt PCI = 12
Sample Comments:

41 ALLIGATOR CRACKING	M	1,621.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	98.00 SqFt	Comments:
45 DEPRESSION	L	500.00 SqFt	Comments:
52 RAVELING	M	928.00 SqFt	Comments:
52 RAVELING	L	3,712.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	120.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	65.00 Ft	Comments:

Sample Number: 11 Type: R Area: 3,854.00SqFt PCI = 10
Sample Comments:

43 BLOCK CRACKING	M	1,350.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	2,500.00 SqFt	Comments:
52 RAVELING	L	2,698.00 SqFt	Comments:
52 RAVELING	M	1,156.00 SqFt	Comments:

Sample Number: 19 Type: R Area: 4,793.00SqFt PCI = 33
Sample Comments:

41 ALLIGATOR CRACKING	L	63.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	108.00 SqFt	Comments:
45 DEPRESSION	M	21.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	100.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	41.00 Ft	Comments:
52 RAVELING	L	959.00 SqFt	Comments:
57 WEATHERING	L	3,834.00 SqFt	Comments:

Sample Number: 24 Type: R Area: 5,424.00SqFt PCI = 40
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	62.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	221.00 Ft	Comments:
41 ALLIGATOR CRACKING	L	250.00 SqFt	Comments:
43 BLOCK CRACKING	L	1,665.00 SqFt	Comments:
52 RAVELING	L	1,085.00 SqFt	Comments:
57 WEATHERING	L	4,339.00 SqFt	Comments:

Sample Number: 34 Type: R Area: 4,260.00SqFt PCI = 34
Sample Comments:

43 BLOCK CRACKING	L	2,204.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	61.00 Ft	Comments:
41 ALLIGATOR CRACKING	M	4.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	192.00 SqFt	Comments:
45 DEPRESSION	L	30.00 SqFt	Comments:

52 RAVELING	L	1,278.00 SqFt	Comments:
57 WEATHERING	L	2,982.00 SqFt	Comments:
53 RUTTING	L	100.00 SqFt	Comments:

Sample Number: 36 Type: R Area: 5,600.00SqFt PCI = 24
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	242.00 Ft	Comments:
50 PATCHING	M	144.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	540.00 SqFt	Comments:
52 RAVELING	L	1,091.00 SqFt	Comments:
57 WEATHERING	L	4,365.00 SqFt	Comments:

Sample Number: 40 Type: R Area: 6,071.00SqFt PCI = 69
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	331.00 Ft	Comments:
53 RUTTING	L	50.00 SqFt	Comments:
52 RAVELING	L	1,821.00 SqFt	Comments:
57 WEATHERING	L	4,250.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRNO Name: North Hangar Apron Use: APRON Area: 327,800.00SqFt

Section: 20 of 3 From: - To: - Last Const.: 01/01/1990
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 68,083.00SqFt Length: 352.00Ft Width: 287.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 12 Surveyed: 4
Conditions: PCI : 39
Inspection Comments:

Sample Number: 01 Type: R Area: 4,212.00SqFt PCI = 58
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	438.00 Ft	Comments:
41 ALLIGATOR CRACKING	L	20.00 SqFt	Comments:
52 RAVELING	M	100.00 SqFt	Comments:
52 RAVELING	L	4,112.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 6,989.00SqFt PCI = 43
Sample Comments:

41 ALLIGATOR CRACKING	M	95.00 SqFt	Comments:
45 DEPRESSION	L	126.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	570.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	43.00 Ft	Comments:
52 RAVELING	L	2,097.00 SqFt	Comments:
57 WEATHERING	L	4,892.00 SqFt	Comments:

Sample Number: 06 Type: R Area: 7,035.00SqFt PCI = 25
Sample Comments:

41 ALLIGATOR CRACKING	L	200.00 SqFt	Comments:
43 BLOCK CRACKING	L	3,417.00 SqFt	Comments:
43 BLOCK CRACKING	M	3,417.00 SqFt	Comments:
52 RAVELING	M	2,110.00 SqFt	Comments:
52 RAVELING	L	4,924.00 SqFt	Comments:

Sample Number: 11 Type: R Area: 4,989.00SqFt PCI = 36
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	267.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	288.00 Ft	Comments:
56 SWELLING	M	20.00 SqFt	Comments:
56 SWELLING	H	50.00 SqFt	Comments:
56 SWELLING	L	2.00 SqFt	Comments:
43 BLOCK CRACKING	L	729.00 SqFt	Comments:
52 RAVELING	L	1,497.00 SqFt	Comments:
57 WEATHERING	L	3,492.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRNO Name: North Hangar Apron Use: APRON Area: 327,800.00SqFt

Section: 30 of 3 From: - To: - Last Const.: 08/01/2005
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 32,301.00SqFt Length: 368.00Ft Width: 112.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 7 Surveyed: 4
Conditions: PCI : 89
Inspection Comments:

Sample Number: 02 Type: R Area: 5,260.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,260.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 5,353.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,353.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 5,403.00SqFt PCI = 91
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	10.00 Ft	Comments:
57 WEATHERING	L	5,403.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 2,998.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	14.00 Ft	Comments:
45 DEPRESSION	L	110.00 SqFt	Comments:
52 RAVELING	L	899.00 SqFt	Comments:
57 WEATHERING	L	2,099.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 10 of 8 From: - To: - Last Const.: 07/01/1998
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 71,137.00SqFt Length: 483.00Ft Width: 238.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 14 Surveyed: 5
Conditions: PCI : 50
Inspection Comments:

Sample Number: 02 Type: R Area: 5,442.00SqFt PCI = 49
Sample Comments:

41 ALLIGATOR CRACKING	L	315.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	50.00 Ft	Comments:
57 WEATHERING	L	5,333.00 SqFt	Comments:
52 RAVELING	L	109.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 5,442.00SqFt PCI = 45
Sample Comments:

41 ALLIGATOR CRACKING	L	450.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	67.00 Ft	Comments:
57 WEATHERING	L	5,333.00 SqFt	Comments:
52 RAVELING	L	109.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 4,625.00SqFt PCI = 25
Sample Comments:

50 PATCHING	L	1,288.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	1,290.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	75.00 Ft	Comments:
52 RAVELING	L	167.00 SqFt	Comments:
57 WEATHERING	L	3,170.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 6,515.00SqFt PCI = 83
Sample Comments:

52 RAVELING	L	977.00 SqFt	Comments:
57 WEATHERING	L	5,538.00 SqFt	Comments:

Sample Number: 14 Type: R Area: 6,023.00SqFt PCI = 41
Sample Comments:

50 PATCHING	L	1,360.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	72.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	125.00 Ft	Comments:
41 ALLIGATOR CRACKING	L	200.00 SqFt	Comments:
57 WEATHERING	L	4,663.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 20 of 8 From: - To: - Last Const.: 07/01/1998
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 6,420.00SqFt Length: 60.00Ft Width: 94.00Ft
Slabs: 33 Slab Width: 15.00Ft Slab Length: 13.00Ft Joint Length: 655.85Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 2 Surveyed: 2
Conditions: PCI : 69
Inspection Comments:

Sample Number: 01 Type: R Area: 24.00Slabs PCI = 68
Sample Comments:

74 JOINT SPALLING	L	3.00 Slabs	Comments:
75 CORNER SPALLING	L	5.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	3.00 Slabs	Comments:
63 LINEAR CRACKING	L	3.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
62 CORNER BREAK	L	1.00 Slabs	Comments:
65 JOINT SEAL DAMAGE	H	24.00 Slabs	Comments:

Sample Number: 02 Type: R Area: 7.00Slabs PCI = 72
Sample Comments:

63 LINEAR CRACKING	L	6.00 Slabs	Comments:
65 JOINT SEAL DAMAGE	H	7.00 Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 30 of 8 From: - To: - Last Const.: 12/25/2009
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 39,005.00SqFt Length: 80.00Ft Width: 607.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 10 Surveyed: 5
Conditions: PCI : 94
Inspection Comments:

Sample Number: 02 Type: R Area: 2,778.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 2,778.00 SqFt Comments:

Sample Number: 04 Type: R Area: 4,537.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,537.00 SqFt Comments:

Sample Number: 07 Type: R Area: 4,699.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,699.00 SqFt Comments:

Sample Number: 09 Type: R Area: 3,256.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,256.00 SqFt Comments:

Sample Number: 10 Type: R Area: 2,619.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 2,619.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 40 of 8 From: - To: - Last Const.: 07/01/1992
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 198,165.00SqFt Length: 1,013.00Ft Width: 284.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 34 Surveyed: 7
Conditions: PCI : 63
Inspection Comments:

Sample Number: 03 Type: R Area: 5,642.00SqFt PCI = 31
Sample Comments:

41 ALLIGATOR CRACKING	L	242.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	83.00 Ft	Comments:
52 RAVELING	L	89.00 SqFt	Comments:
57 WEATHERING	L	4,339.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	198.00 SqFt	Comments:
50 PATCHING	L	1,214.00 SqFt	Comments:

Sample Number: 08 Type: R Area: 5,642.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,642.00 SqFt	Comments:

Sample Number: 16 Type: R Area: 6,900.00SqFt PCI = 52
Sample Comments:

50 PATCHING	L	517.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	40.00 Ft	Comments:
57 WEATHERING	L	6,383.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	274.00 SqFt	Comments:

Sample Number: 19 Type: R Area: 6,900.00SqFt PCI = 80
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	100.00 Ft	Comments:
52 RAVELING	L	690.00 SqFt	Comments:
57 WEATHERING	L	6,210.00 SqFt	Comments:

Sample Number: 23 Type: R Area: 4,224.00SqFt PCI = 71
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	68.00 Ft	Comments:
41 ALLIGATOR CRACKING	L	19.00 SqFt	Comments:
57 WEATHERING	L	3,590.00 SqFt	Comments:
52 RAVELING	L	634.00 SqFt	Comments:

Sample Number: 26 Type: R Area: 5,434.00SqFt PCI = 41
Sample Comments:

50 PATCHING	L	290.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	127.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	10.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	66.00 Ft	Comments:
53 RUTTING	L	114.00 SqFt	Comments:
57 WEATHERING	L	4,115.00 SqFt	Comments:
52 RAVELING	L	1,029.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Sample Number: 32	Type: R	Area: 5,434.00SqFt	PCI = 70	

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	158.00 Ft	Comments:
52 RAVELING	L	2,717.00 SqFt	Comments:
57 WEATHERING	L	2,717.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 50 of 8 From: - To: - Last Const.: 07/01/1992
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 25,264.00SqFt Length: 208.00Ft Width: 118.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 6 Surveyed: 4
Conditions: PCI : 57
Inspection Comments:

Sample Number: 02 Type: R Area: 4,425.00SqFt PCI = 30
Sample Comments:

50 PATCHING	L	120.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	816.00 SqFt	Comments:
45 DEPRESSION	L	200.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	137.00 Ft	Comments:
52 RAVELING	L	4,305.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 4,142.00SqFt PCI = 69
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	143.00 Ft	Comments:
45 DEPRESSION	L	40.00 SqFt	Comments:
52 RAVELING	L	1,243.00 SqFt	Comments:
57 WEATHERING	L	2,899.00 SqFt	Comments:

Sample Number: 04 Type: R Area: 4,425.00SqFt PCI = 60
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	114.00 Ft	Comments:
52 RAVELING	L	4,425.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	106.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 4,425.00SqFt PCI = 68
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	108.00 Ft	Comments:
52 RAVELING	L	3,098.00 SqFt	Comments:
57 WEATHERING	L	1,327.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 60 of 8 From: - To: - Last Const.: 01/01/2001
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 138,028.00SqFt Length: 100.00Ft Width: 1,000.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 02/01/2017 Total Samples: 27 Surveyed: 6
Conditions: PCI : 78
Inspection Comments:

Sample Number: 02 Type: R Area: 5,186.00SqFt PCI = 88
Sample Comments:

52 RAVELING	L	259.00 SqFt	Comments:
57 WEATHERING	L	4,927.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 5,576.00SqFt PCI = 73
Sample Comments:

50 PATCHING	L	425.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	39.00 Ft	Comments:
57 WEATHERING	L	4,893.00 SqFt	Comments:
52 RAVELING	L	258.00 SqFt	Comments:

Sample Number: 12 Type: R Area: 4,900.00SqFt PCI = 74
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	46.00 Ft	Comments:
52 RAVELING	M	36.00 SqFt	Comments:
52 RAVELING	L	295.00 SqFt	Comments:
50 PATCHING	L	317.00 SqFt	Comments:

Sample Number: 16 Type: R Area: 7,000.00SqFt PCI = 79
Sample Comments:

50 PATCHING	L	425.00 SqFt	Comments:
52 RAVELING	L	329.00 SqFt	Comments:
57 WEATHERING	L	6,246.00 SqFt	Comments:

Sample Number: 23 Type: R Area: 5,500.00SqFt PCI = 77
Sample Comments:

50 PATCHING	L	425.00 SqFt	Comments:
52 RAVELING	L	165.00 SqFt	Comments:
57 WEATHERING	L	4,910.00 SqFt	Comments:

Sample Number: 26 Type: R Area: 2,404.00SqFt PCI = 77
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	105.00 Ft	Comments:
52 RAVELING	L	120.00 SqFt	Comments:
57 WEATHERING	L	2,284.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 70 of 8 From: - To: - Last Const.: 12/25/2010
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 10,147.00SqFt Length: 216.00Ft Width: 46.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 02/01/2017 Total Samples: 2 Surveyed: 2
Conditions: PCI : 86
Inspection Comments:

Sample Number: 01 Type: R Area: 5,205.00SqFt PCI = 79
Sample Comments:

57 WEATHERING	L	4,541.00 SqFt	Comments:
50 PATCHING	L	664.00 SqFt	Comments:

Sample Number: 02 Type: R Area: 4,942.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	4,942.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: AHGRSO Name: South Hangar Apron Use: APRON Area: 517,858.00SqFt

Section: 80 of 8 From: - To: - Last Const.: 07/17/2004
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 29,692.00SqFt Length: 71.00Ft Width: 409.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 02/01/2017 Total Samples: 6 Surveyed: 4
Conditions: PCI : 74
Inspection Comments:

Sample Number: 01 Type: R Area: 5,652.00SqFt PCI = 76
Sample Comments:

52 RAVELING	M	16.00 SqFt	Comments:
52 RAVELING	L	1,130.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	213.00 Ft	Comments:

Sample Number: 02 Type: R Area: 4,138.00SqFt PCI = 77
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	171.00 Ft	Comments:
52 RAVELING	L	207.00 SqFt	Comments:
57 WEATHERING	L	3,931.00 SqFt	Comments:

Sample Number: 04 Type: R Area: 5,330.00SqFt PCI = 74
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	308.00 Ft	Comments:
57 WEATHERING	L	5,063.00 SqFt	Comments:
52 RAVELING	L	267.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 5,330.00SqFt PCI = 71
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	373.00 Ft	Comments:
52 RAVELING	L	267.00 SqFt	Comments:
57 WEATHERING	L	5,063.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: ATD Name: Tie Down Apron Use: APRON Area: 442,439.00SqFt

Section: 10 of 3 From: - To: - Last Const.: 01/01/1990
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 316,479.00SqFt Length: 860.00Ft Width: 382.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 65 Surveyed: 7
Conditions: PCI : 69
Inspection Comments:

Sample Number: 11 Type: R Area: 5,000.00SqFt PCI = 65
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	223.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	90.00 Ft	Comments:
52 RAVELING	L	965.00 SqFt	Comments:
57 WEATHERING	L	3,860.00 SqFt	Comments:
50 PATCHING	L	175.00 SqFt	Comments:

Sample Number: 14 Type: R Area: 5,000.00SqFt PCI = 72
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	204.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	40.00 Ft	Comments:
52 RAVELING	L	750.00 SqFt	Comments:
57 WEATHERING	L	4,250.00 SqFt	Comments:

Sample Number: 29 Type: R Area: 5,000.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	193.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	90.00 Ft	Comments:
52 RAVELING	L	750.00 SqFt	Comments:
57 WEATHERING	L	4,250.00 SqFt	Comments:

Sample Number: 32 Type: R Area: 3,234.00SqFt PCI = 66
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	225.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	80.00 Ft	Comments:
52 RAVELING	L	485.00 SqFt	Comments:
57 WEATHERING	L	2,749.00 SqFt	Comments:

Sample Number: 42 Type: R Area: 5,000.00SqFt PCI = 71
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	138.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	75.00 Ft	Comments:
52 RAVELING	L	1,000.00 SqFt	Comments:
57 WEATHERING	L	4,000.00 SqFt	Comments:

Sample Number: 54 Type: R Area: 5,000.00SqFt PCI = 71
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	118.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	30.00 Ft	Comments:
52 RAVELING	L	1,000.00 SqFt	Comments:
57 WEATHERING	L	4,000.00 SqFt	Comments:

Re-inspection Report

Sample Number: 59 Type: R Area: 5,000.00SqFt PCI = 65

Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	220.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	90.00	Ft	Comments:
50 PATCHING	L	206.00	SqFt	Comments:
52 RAVELING	L	959.00	SqFt	Comments:
57 WEATHERING	L	3,835.00	SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: ATD Name: Tie Down Apron Use: APRON Area: 442,439.00SqFt

Section: 20 of 3 From: - To: - Last Const.: 01/01/1990
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 59,373.00SqFt Length: 288.00Ft Width: 200.00Ft
Slabs: 380 Slab Width: 12.50Ft Slab Length: 12.50Ft Joint Length: 8,728.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 18 Surveyed: 7
Conditions: PCI : 62
Inspection Comments:

Sample Number: 03 Type: R Area: 20.00Slabs PCI = 71
Sample Comments:

65 JOINT SEAL DAMAGE	M	20.00 Slabs	Comments:
70 SCALING/CRAZING	L	15.00 Slabs	Comments:
63 LINEAR CRACKING	L	4.00 Slabs	Comments:
66 SMALL PATCH	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	5.00 Slabs	Comments:

Sample Number: 05 Type: R Area: 20.00Slabs PCI = 54
Sample Comments:

65 JOINT SEAL DAMAGE	M	20.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	12.00 Slabs	Comments:
63 LINEAR CRACKING	L	7.00 Slabs	Comments:
63 LINEAR CRACKING	M	2.00 Slabs	Comments:
70 SCALING/CRAZING	L	7.00 Slabs	Comments:
72 SHATTERED SLAB	L	1.00 Slabs	Comments:

Sample Number: 06 Type: R Area: 20.00Slabs PCI = 80
Sample Comments:

65 JOINT SEAL DAMAGE	M	20.00 Slabs	Comments:
70 SCALING/CRAZING	L	4.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	16.00 Slabs	Comments:

Sample Number: 10 Type: R Area: 20.00Slabs PCI = 67
Sample Comments:

65 JOINT SEAL DAMAGE	M	20.00 Slabs	Comments:
75 CORNER SPALLING	L	3.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	17.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
70 SCALING/CRAZING	L	3.00 Slabs	Comments:
63 LINEAR CRACKING	L	3.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:

Sample Number: 12 Type: R Area: 20.00Slabs PCI = 26
Sample Comments:

65 JOINT SEAL DAMAGE	M	20.00 Slabs	Comments:
63 LINEAR CRACKING	L	11.00 Slabs	Comments:
63 LINEAR CRACKING	M	1.00 Slabs	Comments:
70 SCALING/CRAZING	L	7.00 Slabs	Comments:
70 SCALING/CRAZING	M	10.00 Slabs	Comments:
66 SMALL PATCH	L	4.00 Slabs	Comments:
70 SCALING/CRAZING	H	2.00 Slabs	Comments:

Re-inspection Report

Sample Number: 15 Type: R Area: 20.00Slabs PCI = 74

Sample Comments:

65 JOINT SEAL DAMAGE	M	20.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	18.00	Slabs	Comments:
63 LINEAR CRACKING	L	3.00	Slabs	Comments:
75 CORNER SPALLING	L	1.00	Slabs	Comments:

Sample Number: 17 Type: R Area: 16.00Slabs PCI = 63

Sample Comments:

65 JOINT SEAL DAMAGE	M	16.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	16.00	Slabs	Comments:
75 CORNER SPALLING	L	1.00	Slabs	Comments:
62 CORNER BREAK	L	1.00	Slabs	Comments:
63 LINEAR CRACKING	L	1.00	Slabs	Comments:
71 FAULTING	L	2.00	Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: ATD Name: Tie Down Apron Use: APRON Area: 442,439.00SqFt

Section: 30 of 3 From: - To: - Last Const.: 01/01/1990
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 66,587.00SqFt Length: 344.00Ft Width: 192.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 14 Surveyed: 5
Conditions: PCI : 49
Inspection Comments:

Sample Number: 01 Type: R Area: 4,356.00SqFt PCI = 6
Sample Comments:

43 BLOCK CRACKING	L	2,300.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	67.00 Ft	Comments:
43 BLOCK CRACKING	M	767.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	179.00 SqFt	Comments:
45 DEPRESSION	M	170.00 SqFt	Comments:
45 DEPRESSION	L	56.00 SqFt	Comments:
57 WEATHERING	L	3,485.00 SqFt	Comments:
52 RAVELING	L	871.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	343.00 SqFt	Comments:

Sample Number: 06 Type: R Area: 4,402.00SqFt PCI = 59
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	210.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	48.00 Ft	Comments:
41 ALLIGATOR CRACKING	L	5.00 SqFt	Comments:
52 RAVELING	L	1,321.00 SqFt	Comments:
57 WEATHERING	L	3,081.00 SqFt	Comments:
45 DEPRESSION	L	153.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 5,000.00SqFt PCI = 57
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	309.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	200.00 Ft	Comments:
45 DEPRESSION	L	106.00 SqFt	Comments:
52 RAVELING	L	1,500.00 SqFt	Comments:
57 WEATHERING	L	3,500.00 SqFt	Comments:

Sample Number: 08 Type: R Area: 5,000.00SqFt PCI = 60
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	312.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	200.00 Ft	Comments:
45 DEPRESSION	L	16.00 SqFt	Comments:
52 RAVELING	L	1,500.00 SqFt	Comments:
57 WEATHERING	L	3,500.00 SqFt	Comments:

Sample Number: 13 Type: R Area: 5,000.00SqFt PCI = 56
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	305.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	200.00 Ft	Comments:
45 DEPRESSION	L	12.00 SqFt	Comments:
52 RAVELING	L	1,500.00 SqFt	Comments:

57 WEATHERING	L	3,500.00	SqFt	Comments:
54 SHOVING	L	82.00	SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: ATERM Name: Terminal Apron Use: APRON Area: 334,355.00SqFt

Section: 10 of 3 From: - To: - Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 183,317.00SqFt Length: 600.00Ft Width: 320.00Ft
Slabs: 733 Slab Width: 20.00Ft Slab Length: 12.50Ft Joint Length: 24,040.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 39 Surveyed: 8
Conditions: PCI : 66
Inspection Comments:

Sample Number: 04 Type: R Area: 20.00Slabs PCI = 71
Sample Comments:

65 JOINT SEAL DAMAGE	L	20.00 Slabs	Comments:
74 JOINT SPALLING	L	2.00 Slabs	Comments:
63 LINEAR CRACKING	L	4.00 Slabs	Comments:
62 CORNER BREAK	L	2.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	1.00 Slabs	Comments:

Sample Number: 07 Type: R Area: 23.00Slabs PCI = 53
Sample Comments:

65 JOINT SEAL DAMAGE	L	23.00 Slabs	Comments:
66 SMALL PATCH	L	5.00 Slabs	Comments:
63 LINEAR CRACKING	L	13.00 Slabs	Comments:
75 CORNER SPALLING	M	1.00 Slabs	Comments:
74 JOINT SPALLING	L	5.00 Slabs	Comments:
63 LINEAR CRACKING	M	2.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:

Sample Number: 15 Type: R Area: 20.00Slabs PCI = 74
Sample Comments:

65 JOINT SEAL DAMAGE	L	20.00 Slabs	Comments:
63 LINEAR CRACKING	L	6.00 Slabs	Comments:
66 SMALL PATCH	L	2.00 Slabs	Comments:
74 JOINT SPALLING	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	2.00 Slabs	Comments:

Sample Number: 18 Type: R Area: 20.00Slabs PCI = 69
Sample Comments:

65 JOINT SEAL DAMAGE	L	20.00 Slabs	Comments:
63 LINEAR CRACKING	L	10.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
72 SHATTERED SLAB	L	1.00 Slabs	Comments:

Sample Number: 24 Type: R Area: 20.00Slabs PCI = 70
Sample Comments:

65 JOINT SEAL DAMAGE	L	20.00 Slabs	Comments:
63 LINEAR CRACKING	L	9.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	3.00 Slabs	Comments:

Re-inspection Report

Sample Number: 27 Type: R Area: 20.00Slabs PCI = 59

Sample Comments:

65 JOINT SEAL DAMAGE	L	20.00	Slabs	Comments:
63 LINEAR CRACKING	L	18.00	Slabs	Comments:
66 SMALL PATCH	L	8.00	Slabs	Comments:
62 CORNER BREAK	L	1.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	4.00	Slabs	Comments:
72 SHATTERED SLAB	L	1.00	Slabs	Comments:

Sample Number: 34 Type: R Area: 15.00Slabs PCI = 76

Sample Comments:

65 JOINT SEAL DAMAGE	L	15.00	Slabs	Comments:
63 LINEAR CRACKING	L	3.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	3.00	Slabs	Comments:
75 CORNER SPALLING	L	1.00	Slabs	Comments:
66 SMALL PATCH	L	2.00	Slabs	Comments:

Sample Number: 36 Type: R Area: 18.00Slabs PCI = 55

Sample Comments:

65 JOINT SEAL DAMAGE	L	18.00	Slabs	Comments:
63 LINEAR CRACKING	L	11.00	Slabs	Comments:
67 LARGE PATCH/UTILITY	L	2.00	Slabs	Comments:
74 JOINT SPALLING	M	1.00	Slabs	Comments:
74 JOINT SPALLING	L	1.00	Slabs	Comments:
75 CORNER SPALLING	L	2.00	Slabs	Comments:
62 CORNER BREAK	L	1.00	Slabs	Comments:
66 SMALL PATCH	L	1.00	Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: ATERM Name: Terminal Apron Use: APRON Area: 334,355.00SqFt

Section: 20 of 3 From: - To: - Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 120,440.00SqFt Length: 500.00Ft Width: 320.00Ft
Slabs: 301 Slab Width: 20.00Ft Slab Length: 20.00Ft Joint Length: 15,180.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 10 Surveyed: 5
Conditions: PCI : 46
Inspection Comments:

Sample Number: 02 Type: R Area: 28.00Slabs PCI = 43
Sample Comments:

65 JOINT SEAL DAMAGE	L	28.00 Slabs	Comments:
72 SHATTERED SLAB	L	3.00 Slabs	Comments:
63 LINEAR CRACKING	L	20.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	23.00 Slabs	Comments:
62 CORNER BREAK	L	2.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	3.00 Slabs	Comments:
71 FAULTING	L	4.00 Slabs	Comments:
74 JOINT SPALLING	M	1.00 Slabs	Comments:
75 CORNER SPALLING	M	1.00 Slabs	Comments:
66 SMALL PATCH	L	4.00 Slabs	Comments:

Sample Number: 04 Type: R Area: 24.00Slabs PCI = 40
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	15.00 Slabs	Comments:
72 SHATTERED SLAB	L	3.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	21.00 Slabs	Comments:
71 FAULTING	L	4.00 Slabs	Comments:
62 CORNER BREAK	L	6.00 Slabs	Comments:
70 SCALING/CRAZING	L	1.00 Slabs	Comments:

Sample Number: 06 Type: R Area: 28.00Slabs PCI = 41
Sample Comments:

65 JOINT SEAL DAMAGE	L	28.00 Slabs	Comments:
72 SHATTERED SLAB	L	8.00 Slabs	Comments:
62 CORNER BREAK	L	2.00 Slabs	Comments:
63 LINEAR CRACKING	L	8.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	1.00 Slabs	Comments:
69 PUMPING	N	2.00 Slabs	Comments:
66 SMALL PATCH	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	21.00 Slabs	Comments:
74 JOINT SPALLING	L	2.00 Slabs	Comments:

Sample Number: 08 Type: R Area: 24.00Slabs PCI = 42
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
62 CORNER BREAK	L	3.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	18.00 Slabs	Comments:
63 LINEAR CRACKING	L	8.00 Slabs	Comments:
71 FAULTING	L	6.00 Slabs	Comments:

72 SHATTERED SLAB	L	5.00	Slabs	Comments:

Sample Number: 09 Type: R Area: 28.00Slabs PCI = 60

Sample Comments:

63 LINEAR CRACKING	L	8.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	24.00	Slabs	Comments:
72 SHATTERED SLAB	L	2.00	Slabs	Comments:
62 CORNER BREAK	L	5.00	Slabs	Comments:
66 SMALL PATCH	L	2.00	Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: ATERM Name: Terminal Apron Use: APRON Area: 334,355.00SqFt

Section: 30 of 3 From: - To: - Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 30,598.00SqFt Length: 1,017.00Ft Width: 30.00Ft
Slabs: 153 Slab Width: 20.00Ft Slab Length: 10.00Ft Joint Length: 3,529.50Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 7 Surveyed: 4
Conditions: PCI : 67
Inspection Comments:

Sample Number: 01 Type: R Area: 26.00Slabs PCI = 64
Sample Comments:

62 CORNER BREAK	L	1.00 Slabs	Comments:
75 CORNER SPALLING	M	1.00 Slabs	Comments:
74 JOINT SPALLING	L	3.00 Slabs	Comments:
63 LINEAR CRACKING	L	7.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	2.00 Slabs	Comments:
70 SCALING/CRAZING	L	15.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:

Sample Number: 03 Type: R Area: 21.00Slabs PCI = 70
Sample Comments:

65 JOINT SEAL DAMAGE	L	22.00 Slabs	Comments:
70 SCALING/CRAZING	L	9.00 Slabs	Comments:
63 LINEAR CRACKING	L	15.00 Slabs	Comments:
74 JOINT SPALLING	M	1.00 Slabs	Comments:

Sample Number: 05 Type: R Area: 21.00Slabs PCI = 70
Sample Comments:

65 JOINT SEAL DAMAGE	L	21.00 Slabs	Comments:
70 SCALING/CRAZING	L	21.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
63 LINEAR CRACKING	L	8.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:

Sample Number: 07 Type: R Area: 22.00Slabs PCI = 67
Sample Comments:

65 JOINT SEAL DAMAGE	L	21.00 Slabs	Comments:
63 LINEAR CRACKING	L	12.00 Slabs	Comments:
70 SCALING/CRAZING	L	22.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	1.00 Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: HELI Name: Helipad Use: HELIPAD Area: 75,915.00SqFt

Section: 10 of 1 From: - To: - Last Const.: 01/01/1990
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 75,915.00SqFt Length: 301.00Ft Width: 239.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 17 Surveyed: 5
Conditions: PCI : 70
Inspection Comments:

Sample Number: 02 Type: R Area: 3,585.00SqFt PCI = 65
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	114.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	32.00 Ft	Comments:
57 WEATHERING	L	2,688.00 SqFt	Comments:
52 RAVELING	L	896.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	4.00 SqFt	Comments:

Sample Number: 04 Type: R Area: 4,104.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	165.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	30.00 Ft	Comments:
57 WEATHERING	L	3,078.00 SqFt	Comments:
52 RAVELING	L	1,026.00 SqFt	Comments:

Sample Number: 06 Type: R Area: 4,850.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	134.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	40.00 Ft	Comments:
57 WEATHERING	L	3,638.00 SqFt	Comments:
52 RAVELING	L	1,212.00 SqFt	Comments:

Sample Number: 13 Type: R Area: 4,897.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	203.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	50.00 Ft	Comments:
57 WEATHERING	L	3,672.00 SqFt	Comments:
52 RAVELING	L	1,224.00 SqFt	Comments:

Sample Number: 16 Type: R Area: 3,999.00SqFt PCI = 75
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	106.00 Ft	Comments:
57 WEATHERING	L	2,999.00 SqFt	Comments:
52 RAVELING	L	1,000.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: HGCON Name: Hangar Connector Use: TAXIWAY Area: 11,532.00SqFt

Section: 10 of 4 From: AHGRSO-40 To: TWB-10 Last Const.: 12/25/2009
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 1,854.00SqFt Length: 47.00Ft Width: 31.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1 Surveyed: 1
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 1,854.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	1,854.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: HGCON Name: Hangar Connector Use: TAXIWAY Area: 11,532.00SqFt

Section: 20 of 4 From: AHGRSO-60 To: TWB-15 Last Const.: 12/25/2010
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 2,622.00SqFt Length: 52.00Ft Width: 40.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1 Surveyed: 1
Conditions: PCI : 94
Inspection Comments:

Sample Number: 10 Type: R Area: 2,622.00SqFt PCI = 94
Sample Comments:

57 WEATHERING L 2,622.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: HGCON Name: Hangar Connector Use: TAXIWAY Area: 11,532.00SqFt

Section: 30 of 4 From: AHGRSO-60 To: TWB-15 Last Const.: 12/25/2010
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 2,735.00SqFt Length: 51.00Ft Width: 40.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1 Surveyed: 1
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 2,734.00SqFt PCI = 94
Sample Comments:

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57 WEATHERING                          L    2,734.00 SqFt     Comments:
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Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: HGCON Name: Hangar Connector Use: TAXIWAY Area: 11,532.00SqFt

Section: 40 of 4 From: AHGRSO-70 To: TWB-15 Last Const.: 12/25/2010
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 4,321.00SqFt Length: 70.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1 Surveyed: 1
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 4,321.00SqFt PCI = 94
Sample Comments:

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57 WEATHERING                          L    4,321.00 SqFt     Comments:
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Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: R08 Name: Runway 08/26 Use: RUNWAY Area: 834,543.00SqFt

Section: 10C of 4 From: R08 End To: R08 End Last Const.: 08/01/2005
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 263,346.00SqFt Length: 5,267.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 54 Surveyed: 7
Conditions: PCI : 75
Inspection Comments:

Sample Number: 02 Type: R Area: 5,000.00SqFt PCI = 85
Sample Comments:

52 RAVELING	L	500.00 SqFt	Comments:
57 WEATHERING	L	4,500.00 SqFt	Comments:

Sample Number: 10 Type: R Area: 5,000.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	50.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	250.00 Ft	Comments:
52 RAVELING	L	500.00 SqFt	Comments:
57 WEATHERING	L	4,500.00 SqFt	Comments:

Sample Number: 19 Type: R Area: 5,000.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	255.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	70.00 Ft	Comments:
52 RAVELING	L	1,250.00 SqFt	Comments:
57 WEATHERING	L	3,750.00 SqFt	Comments:

Sample Number: 28 Type: R Area: 5,000.00SqFt PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	218.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	50.00 Ft	Comments:
57 WEATHERING	L	3,750.00 SqFt	Comments:
52 RAVELING	L	1,250.00 SqFt	Comments:

Sample Number: 37 Type: R Area: 5,000.00SqFt PCI = 75
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	264.00 Ft	Comments:
57 WEATHERING	L	3,750.00 SqFt	Comments:
52 RAVELING	L	1,250.00 SqFt	Comments:

Sample Number: 44 Type: R Area: 5,000.00SqFt PCI = 75
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	175.00 Ft	Comments:
57 WEATHERING	L	3,750.00 SqFt	Comments:
52 RAVELING	L	1,250.00 SqFt	Comments:

Sample Number: 51 Type: R Area: 5,000.00SqFt PCI = 83
Sample Comments:

57 WEATHERING	L	4,250.00 SqFt	Comments:
52 RAVELING	L	750.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: R08 Name: Runway 08/26 Use: RUNWAY Area: 834,543.00SqFt

Section: 10L of 4 From: R08 End To: R08 End Last Const.: 08/01/2005
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 272,377.00SqFt Length: 5,307.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 55 Surveyed: 7
Conditions: PCI : 78
Inspection Comments:

Sample Number: 01 Type: R Area: 5,000.00SqFt PCI = 79
Sample Comments:

52 RAVELING	L	1,500.00 SqFt	Comments:
57 WEATHERING	L	3,500.00 SqFt	Comments:

Sample Number: 09 Type: R Area: 5,000.00SqFt PCI = 74
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	290.00 Ft	Comments:
52 RAVELING	L	250.00 SqFt	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:

Sample Number: 18 Type: R Area: 5,000.00SqFt PCI = 79
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	175.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 27 Type: R Area: 5,000.00SqFt PCI = 77
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	212.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 36 Type: R Area: 5,000.00SqFt PCI = 74
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	285.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 43 Type: R Area: 5,000.00SqFt PCI = 77
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	220.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 50 Type: R Area: 5,375.00SqFt PCI = 88
Sample Comments:

57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS   Name: Salinas Municipal Airport

Branch: R08   Name: Runway 08/26   Use: RUNWAY   Area: 834,543.00SqFt

Section: 10R of 4   From: R08 End   To: R08 End   Last Const.: 08/01/2005
Surface: AC   Family: CAL_SNS_ALL_AC/APC   Zone: Category: Rank: P
Area: 261,320.00SqFt   Length: 5,227.00Ft   Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00   Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 53   Surveyed: 7
Conditions: PCI : 81
Inspection Comments:

Sample Number: 03   Type: R   Area: 5,000.00SqFt   PCI = 88
Sample Comments:

57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 11   Type: R   Area: 5,000.00SqFt   PCI = 80
Sample Comments:

52 RAVELING	L	250.00 SqFt	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	141.00 Ft	Comments:

Sample Number: 20   Type: R   Area: 5,000.00SqFt   PCI = 77
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	204.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 29   Type: R   Area: 5,000.00SqFt   PCI = 76
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	121.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	12.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 38   Type: R   Area: 5,000.00SqFt   PCI = 75
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	37.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	157.00 Ft	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 44   Type: R   Area: 5,000.00SqFt   PCI = 82
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	111.00 Ft	Comments:
52 RAVELING	L	250.00 SqFt	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:

Sample Number: 51   Type: R   Area: 5,000.00SqFt   PCI = 88
Sample Comments:

52 RAVELING	L	250.00 SqFt	Comments:
57 WEATHERING	L	4,750.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: R08 Name: Runway 08/26 Use: RUNWAY Area: 834,543.00SqFt

Section: 20 of 4 From: R08 To: TWP-20 Last Const.: 12/25/2009
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 37,500.00SqFt Length: 250.00Ft Width: 150.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 6 Surveyed: 4
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 6,250.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,250.00 SqFt Comments:

Sample Number: 02 Type: R Area: 6,250.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,250.00 SqFt Comments:

Sample Number: 03 Type: R Area: 6,250.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,250.00 SqFt Comments:

Sample Number: 06 Type: R Area: 6,250.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,250.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: R13 Name: Runway 13/31 Use: RUNWAY Area: 767,850.00SqFt

Section: 10C of 3 From: R13 End To: R13 End Last Const.: 04/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 241,250.00SqFt Length: 4,825.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 48 Surveyed: 7
Conditions: PCI : 90
Inspection Comments:

Sample Number: 02 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	19.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 09 Type: R Area: 5,000.00SqFt PCI = 84
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	171.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 16 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 23 Type: R Area: 5,000.00SqFt PCI = 89
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	50.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 28 Type: R Area: 5,000.00SqFt PCI = 92
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	2.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 37 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	20.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 44 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	25.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: R13 Name: Runway 13/31 Use: RUNWAY Area: 767,850.00SqFt

Section: 10L of 3 From: R13 End To: R13 End Last Const.: 04/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 269,750.00SqFt Length: 4,825.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 54 Surveyed: 7
Conditions: PCI : 89
Inspection Comments:

Sample Number: 01 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 25.00 Ft Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 08 Type: R Area: 5,000.00SqFt PCI = 84
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 161.00 Ft Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 15 Type: R Area: 5,000.00SqFt PCI = 88
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 99.00 Ft Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 22 Type: R Area: 5,000.00SqFt PCI = 89
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 58.00 Ft Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 27 Type: R Area: 5,000.00SqFt PCI = 89
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 51.00 Ft Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 36 Type: R Area: 5,000.00SqFt PCI = 92
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 2.00 Ft Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 43 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: R13 Name: Runway 13/31 Use: RUNWAY Area: 767,850.00SqFt

Section: 10R of 3 From: R13 End To: R13End Last Const.: 04/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 256,850.00SqFt Length: 4,825.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 52 Surveyed: 7
Conditions: PCI : 91
Inspection Comments:

Sample Number: 03 Type: R Area: 5,000.00SqFt PCI = 87
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	116.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 10 Type: R Area: 5,000.00SqFt PCI = 92
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	5.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 17 Type: R Area: 5,000.00SqFt PCI = 89
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	40.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 24 Type: R Area: 5,000.00SqFt PCI = 89
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	68.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 34 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 38 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 45 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	25.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWA Name: Taxiway A Use: TAXIWAY Area: 321,050.00SqFt

Section: 10 of 7 From: R13-10R To: ATD-30 Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 21,686.00SqFt Length: 425.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 5,417.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,417.00 SqFt Comments:

Sample Number: 03 Type: R Area: 4,900.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,900.00 SqFt Comments:

Sample Number: 04 Type: R Area: 6,468.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,468.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWA Name: Taxiway A Use: TAXIWAY Area: 321,050.00SqFt

Section: 20 of 7 From: TWA-10 To: TWA-30 Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 23,170.00SqFt Length: 229.00Ft Width: 107.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 5,228.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,228.00 SqFt Comments:

Sample Number: 02 Type: R Area: 6,344.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,344.00 SqFt Comments:

Sample Number: 03 Type: R Area: 6,339.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,339.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWA Name: Taxiway A Use: TAXIWAY Area: 321,050.00SqFt

Section: 30 of 7 From: TWA-10 To: R08-10L Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 122,877.00SqFt Length: 2,259.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 24 Surveyed: 5
Conditions: PCI : 93
Inspection Comments:

Sample Number: 02 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 12 Type: R Area: 6,295.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	6,295.00 SqFt	Comments:

Sample Number: 14 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 19 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:

57 WEATHERING	L	4,931.00 SqFt	Comments:
50 PATCHING	L	69.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS   Name: Salinas Municipal Airport

Branch: TWA   Name: Taxiway A   Use: TAXIWAY   Area: 321,050.00SqFt

Section: 35 of 7   From: R08-10R   To: TWA-40   Last Const.: 08/01/2005
Surface: AC   Family: CAL_SNS_ALL_AC/APC   Zone: Category: Rank: P
Area: 5,945.00SqFt   Length: 53.00Ft   Width: 75.00Ft
Shoulder: Street Type: Grade: 0.00   Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1   Surveyed: 1
Conditions: PCI : 60
Inspection Comments:

Sample Number: 01   Type: R   Area: 5,945.00SqFt   PCI = 60
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	275.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	326.00	Ft	Comments:
45 DEPRESSION	L	129.00	SqFt	Comments:
57 WEATHERING	L	5,945.00	SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWA Name: Taxiway A Use: TAXIWAY Area: 321,050.00SqFt

Section: 40 of 7 From: TWA-35 To: TAW-50 Last Const.: 12/25/2010
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 12,453.00SqFt Length: 149.00Ft Width: 70.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 3 Surveyed: 2
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 3,668.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,668.00 SqFt Comments:

Sample Number: 02 Type: R Area: 4,400.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,400.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWA Name: Taxiway A Use: TAXIWAY Area: 321,050.00SqFt

Section: 50 of 7 From: TWA-40 To: R13-10R Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 95,193.00SqFt Length: 1,807.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 18 Surveyed: 6
Conditions: PCI : 93
Inspection Comments:

Sample Number: 03 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 08 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 14 Type: R Area: 6,027.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,027.00 SqFt Comments:

Sample Number: 16 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 17 Type: R Area: 4,993.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,993.00 SqFt Comments:

Sample Number: 18 Type: R Area: 7,364.00SqFt PCI = 90
Sample Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING L 35.00 Ft Comments:
57 WEATHERING L 7,364.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWA Name: Taxiway A Use: TAXIWAY Area: 321,050.00SqFt

Section: 60 of 7 From: TWA-50 To: - Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 39,726.00SqFt Length: 450.00Ft Width: 98.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 9 Surveyed: 4
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 5,679.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,679.00 SqFt Comments:

Sample Number: 04 Type: R Area: 4,900.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,900.00 SqFt Comments:

Sample Number: 05 Type: R Area: 4,900.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,900.00 SqFt Comments:

Sample Number: 08 Type: R Area: 3,145.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,145.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWB Name: Taxiway B Use: TAXIWAY Area: 323,601.00SqFt

Section: 10 of 6 From: R08-10R To: TWB-15 Last Const.: 12/25/2009
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 100,734.00SqFt Length: 1,914.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 19 Surveyed: 5
Conditions: PCI : 94
Inspection Comments:

Sample Number: 04 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 09 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 14 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 17 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 19 Type: R Area: 6,979.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,979.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWB Name: Taxiway B Use: TAXIWAY Area: 323,601.00SqFt

Section: 15 of 6 From: TWB-10 To: TWB-20 Last Const.: 12/25/2010
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 111,142.00SqFt Length: 2,175.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 22 Surveyed: 6
Conditions: PCI : 93
Inspection Comments:

Sample Number: 03 Type: R Area: 5,000.00SqFt PCI = 90
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	20.00 Ft	Comments:
57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 5,000.00SqFt PCI = 91
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	10.00 Ft	Comments:

Sample Number: 08 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 11 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 14 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 17 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWB Name: Taxiway B Use: TAXIWAY Area: 323,601.00SqFt

Section: 20 of 6 From: TWB-15 To: R13-10R Last Const.: 09/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 19,031.00SqFt Length: 305.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 4,833.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,833.00 SqFt Comments:

Sample Number: 02 Type: R Area: 3,985.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,985.00 SqFt Comments:

Sample Number: 04 Type: R Area: 3,782.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,782.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWB Name: Taxiway B Use: TAXIWAY Area: 323,601.00SqFt

Section: 25 of 6 From: R13-10L To: TWB-30 Last Const.: 04/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 7,317.00SqFt Length: 88.00Ft Width: 70.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1 Surveyed: 1
Conditions: PCI : 86
Inspection Comments:

Sample Number: 01 Type: R Area: 7,317.00SqFt PCI = 86
Sample Comments:

45 DEPRESSION	L	100.00 SqFt	Comments:
57 WEATHERING	L	7,317.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWB Name: Taxiway B Use: TAXIWAY Area: 323,601.00SqFt

Section: 30 of 6 From: TWB-25 To: R08-10R Last Const.: 09/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 75,583.00SqFt Length: 1,494.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 15 Surveyed: 5
Conditions: PCI : 90
Inspection Comments:

Sample Number: 01 Type: R Area: 5,653.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,653.00 SqFt	Comments:

Sample Number: 04 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 5,000.00SqFt PCI = 88
Sample Comments:

57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Sample Number: 10 Type: R Area: 5,000.00SqFt PCI = 84
Sample Comments:

57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	22.00 Ft	Comments:

Sample Number: 13 Type: R Area: 5,000.00SqFt PCI = 88
Sample Comments:

57 WEATHERING	L	4,750.00 SqFt	Comments:
52 RAVELING	L	250.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWB Name: Taxiway B Use: TAXIWAY Area: 323,601.00SqFt

Section: 40 of 6 From: TWB-30 To: - Last Const.: 09/01/2006
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 9,794.00SqFt Length: 125.00Ft Width: 71.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 2 Surveyed: 2
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 4,883.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,883.00 SqFt Comments:

Sample Number: 02 Type: R Area: 4,911.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,911.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWC Name: Taxiway C Use: TAXIWAY Area: 305,718.00SqFt

Section: 10 of 2 From: TWK-10 To: R08-10L Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 270,996.00SqFt Length: 5,085.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 55 Surveyed: 8
Conditions: PCI : 94
Inspection Comments:

Sample Number: 03 Type: R Area: 6,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 6,000.00 SqFt Comments:

Sample Number: 06 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 11 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 20 Type: R Area: 4,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,000.00 SqFt Comments:

Sample Number: 24 Type: R Area: 4,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 4,000.00 SqFt Comments:

Sample Number: 29 Type: R Area: 5,093.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,093.00 SqFt Comments:

Sample Number: 40 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Sample Number: 52 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 5,000.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWC Name: Taxiway C Use: TAXIWAY Area: 305,718.00SqFt

Section: 20 of 2 From: TWP-10 To: TWC-20 Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 34,722.00SqFt Length: 100.00Ft Width: 100.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 6 Surveyed: 4
Conditions: PCI : 89
Inspection Comments:

Sample Number: 01 Type: R Area: 3,771.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	3,771.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 6,216.00SqFt PCI = 86
Sample Comments:

57 WEATHERING	L	6,156.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	54.00 Ft	Comments:
50 PATCHING	L	60.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 5,000.00SqFt PCI = 84
Sample Comments:

57 WEATHERING	L	4,700.00 SqFt	Comments:
50 PATCHING	L	300.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 3,416.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	3,416.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWD Name: Taxiway D Use: TAXIWAY Area: 199,675.00SqFt

Section: 10 of 4 From: TWB-10 To: R08-10R Last Const.: 01/01/1968
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 11,918.00SqFt Length: 133.00Ft Width: 60.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 3 Surveyed: 3
Conditions: PCI : 59
Inspection Comments:

Sample Number: 01 Type: R Area: 6,173.00SqFt PCI = 54
Sample Comments:

50 PATCHING	L	2,850.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	114.00 Ft	Comments:
45 DEPRESSION	L	20.00 SqFt	Comments:
42 BLEEDING	N	120.00 SqFt	Comments:
52 RAVELING	L	3,323.00 SqFt	Comments:

Sample Number: 02 Type: R Area: 4,103.00SqFt PCI = 65
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	262.00 Ft	Comments:
52 RAVELING	L	4,103.00 SqFt	Comments:
42 BLEEDING	N	30.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 1,642.00SqFt PCI = 66
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	186.00 Ft	Comments:
52 RAVELING	L	1,642.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWD Name: Taxiway D Use: TAXIWAY Area: 199,675.00SqFt

Section: 20 of 4 From: R08-10L To: R13-10R Last Const.: 12/25/2009
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 110,232.00SqFt Length: 1,585.00Ft Width: 60.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 17 Surveyed: 5
Conditions: PCI : 93
Inspection Comments:

Sample Number: 02 Type: R Area: 6,048.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	6,048.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 6,370.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	6,370.00 SqFt	Comments:

Sample Number: 08 Type: R Area: 6,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	6,000.00 SqFt	Comments:

Sample Number: 11 Type: R Area: 6,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	6,000.00 SqFt	Comments:

Sample Number: 14 Type: R Area: 6,000.00SqFt PCI = 86
Sample Comments:

45 DEPRESSION	L	84.00 SqFt	Comments:
57 WEATHERING	L	6,000.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS   Name: Salinas Municipal Airport

Branch: TWD   Name: Taxiway D   Use: TAXIWAY   Area: 199,675.00SqFt

Section: 25   of   4   From: R13-10L   To: TWD-30   Last Const.: 04/01/2006
Surface: AC   Family: CAL_SNS_ALL_AC/APC   Zone: Category: Rank: P
Area: 6,915.00SqFt   Length: 99.00Ft   Width: 60.00Ft
Shoulder: Street Type: Grade: 0.00   Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1   Surveyed: 1
Conditions: PCI : 70
Inspection Comments:

Sample Number: 01   Type: R   Area: 6,915.00SqFt   PCI = 70
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	38.00	Ft	Comments:
45 DEPRESSION	L	400.00	SqFt	Comments:
57 WEATHERING	L	6,915.00	SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWD Name: Taxiway D Use: TAXIWAY Area: 199,675.00SqFt

Section: 30 of 4 From: TWD-25 To: TWP-10 Last Const.: 01/01/1968
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 70,610.00SqFt Length: 1,166.00Ft Width: 60.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 12 Surveyed: 5
Conditions: PCI : 40
Inspection Comments:

Sample Number: 01 Type: R Area: 6,000.00SqFt PCI = 39
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	588.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	3.00 Ft	Comments:
53 RUTTING	L	420.00 SqFt	Comments:
50 PATCHING	M	120.00 SqFt	Comments:
45 DEPRESSION	L	25.00 SqFt	Comments:
52 RAVELING	L	4,704.00 SqFt	Comments:
52 RAVELING	M	1,176.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 6,000.00SqFt PCI = 22
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	40.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	525.00 Ft	Comments:
53 RUTTING	H	80.00 SqFt	Comments:
53 RUTTING	M	220.00 SqFt	Comments:
52 RAVELING	M	1,200.00 SqFt	Comments:
52 RAVELING	L	4,800.00 SqFt	Comments:
53 RUTTING	L	200.00 SqFt	Comments:

Sample Number: 05 Type: R Area: 6,000.00SqFt PCI = 45
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	337.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	110.00 Ft	Comments:
53 RUTTING	L	200.00 SqFt	Comments:
52 RAVELING	M	1,200.00 SqFt	Comments:
52 RAVELING	L	4,800.00 SqFt	Comments:

Sample Number: 08 Type: R Area: 6,000.00SqFt PCI = 49
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	559.00 Ft	Comments:
52 RAVELING	M	1,200.00 SqFt	Comments:
52 RAVELING	L	4,800.00 SqFt	Comments:
53 RUTTING	L	200.00 SqFt	Comments:

Sample Number: 11 Type: R Area: 6,000.00SqFt PCI = 43
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	497.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	288.00 Ft	Comments:
45 DEPRESSION	M	10.00 SqFt	Comments:
45 DEPRESSION	L	20.00 SqFt	Comments:
52 RAVELING	M	1,200.00 SqFt	Comments:
52 RAVELING	L	4,800.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWE Name: Taxiway E Use: TAXIWAY Area: 34,238.00SqFt

Section: 10 of 1 From: ATERM-10 To: TW-A Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 34,238.00SqFt Length: 457.00Ft Width: 75.00Ft
Slabs: 137 Slab Width: 20.00Ft Slab Length: 12.50Ft Joint Length: 3,923.75Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 6 Surveyed: 4
Conditions: PCI : 56
Inspection Comments:

Sample Number: 01 Type: R Area: 19.00Slabs PCI = 47
Sample Comments:

65 JOINT SEAL DAMAGE	L	19.00 Slabs	Comments:
63 LINEAR CRACKING	L	11.00 Slabs	Comments:
63 LINEAR CRACKING	M	2.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	2.00 Slabs	Comments:
75 CORNER SPALLING	L	3.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
62 CORNER BREAK	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	4.00 Slabs	Comments:

Sample Number: 03 Type: R Area: 24.00Slabs PCI = 59
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
75 CORNER SPALLING	L	4.00 Slabs	Comments:
63 LINEAR CRACKING	L	11.00 Slabs	Comments:
66 SMALL PATCH	L	5.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	4.00 Slabs	Comments:
63 LINEAR CRACKING	M	1.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	1.00 Slabs	Comments:

Sample Number: 04 Type: R Area: 24.00Slabs PCI = 59
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
62 CORNER BREAK	L	6.00 Slabs	Comments:
66 SMALL PATCH	L	3.00 Slabs	Comments:
63 LINEAR CRACKING	L	9.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	4.00 Slabs	Comments:
75 CORNER SPALLING	L	4.00 Slabs	Comments:

Sample Number: 05 Type: R Area: 24.00Slabs PCI = 57
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	13.00 Slabs	Comments:
66 SMALL PATCH	L	8.00 Slabs	Comments:
63 LINEAR CRACKING	M	1.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	2.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWF Name: Taxiway F Use: TAXIWAY Area: 57,373.00SqFt

Section: 10 of 2 From: ATERM-10 To: TWF-20 Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 49,134.00SqFt Length: 655.00Ft Width: 75.00Ft
Slabs: 197 Slab Width: 20.00Ft Slab Length: 12.50Ft Joint Length: 5,656.25Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 9 Surveyed: 5
Conditions: PCI : 65
Inspection Comments:

Sample Number: 02 Type: R Area: 24.00Slabs PCI = 54
Sample Comments:

74 JOINT SPALLING	L	2.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	5.00 Slabs	Comments:
63 LINEAR CRACKING	L	14.00 Slabs	Comments:
66 SMALL PATCH	L	2.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:
72 SHATTERED SLAB	L	2.00 Slabs	Comments:
71 FAULTING	L	1.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	1.00 Slabs	Comments:
62 CORNER BREAK	L	1.00 Slabs	Comments:

Sample Number: 03 Type: R Area: 24.00Slabs PCI = 67
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	10.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	9.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:

Sample Number: 05 Type: R Area: 24.00Slabs PCI = 65
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	13.00 Slabs	Comments:
75 CORNER SPALLING	L	3.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	5.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	1.00 Slabs	Comments:

Sample Number: 07 Type: R Area: 24.00Slabs PCI = 68
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	9.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	4.00 Slabs	Comments:
62 CORNER BREAK	L	1.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:

Re-inspection Report

Sample Number: 08 Type: R Area: 24.00Slabs PCI = 70

Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00	Slabs	Comments:
66 SMALL PATCH	L	4.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	7.00	Slabs	Comments:
75 CORNER SPALLING	L	1.00	Slabs	Comments:
63 LINEAR CRACKING	L	1.00	Slabs	Comments:
63 LINEAR CRACKING	M	1.00	Slabs	Comments:
67 LARGE PATCH/UTILITY	L	1.00	Slabs	Comments:
62 CORNER BREAK	L	1.00	Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWF Name: Taxiway F Use: TAXIWAY Area: 57,373.00SqFt

Section: 20 of 2 From: TWF-10 To: RW13-10R Last Const.: 04/01/2006
Surface: APC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 8,239.00SqFt Length: 80.00Ft Width: 104.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 2 Surveyed: 2
Conditions: PCI : 73
Inspection Comments:

Sample Number: 01 Type: R Area: 3,729.00SqFt PCI = 84
Sample Comments:

57 WEATHERING	L	3,729.00 SqFt	Comments:
47 JOINT REFLECTION CRACKING	L	66.00 Ft	Comments:
47 JOINT REFLECTION CRACKING	M	20.00 Ft	Comments:

Sample Number: 02 Type: R Area: 4,510.00SqFt PCI = 64
Sample Comments:

47 JOINT REFLECTION CRACKING	L	165.00 Ft	Comments:
47 JOINT REFLECTION CRACKING	M	200.00 Ft	Comments:
57 WEATHERING	L	4,510.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWG Name: Taxiway G Use: TAXIWAY Area: 32,483.00SqFt

Section: 10 of 2 From: ATERM-30 To: TWC-10 Last Const.: 07/01/1999
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 14,894.00SqFt Length: 345.00Ft Width: 42.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 32
Inspection Comments:

Sample Number: 01 Type: R Area: 4,200.00SqFt PCI = 26
Sample Comments:

41 ALLIGATOR CRACKING	L	144.00 SqFt	Comments:
43 BLOCK CRACKING	M	807.00 SqFt	Comments:
43 BLOCK CRACKING	L	3,229.00 SqFt	Comments:
45 DEPRESSION	L	500.00 SqFt	Comments:
52 RAVELING	L	4,180.00 SqFt	Comments:
50 PATCHING	L	20.00 SqFt	Comments:

Sample Number: 02 Type: R Area: 4,200.00SqFt PCI = 29
Sample Comments:

52 RAVELING	M	100.00 SqFt	Comments:
43 BLOCK CRACKING	M	840.00 SqFt	Comments:
43 BLOCK CRACKING	L	1,260.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	150.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	83.00 Ft	Comments:
45 DEPRESSION	L	300.00 SqFt	Comments:
41 ALLIGATOR CRACKING	L	10.00 SqFt	Comments:
52 RAVELING	L	4,100.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 4,200.00SqFt PCI = 39
Sample Comments:

52 RAVELING	M	100.00 SqFt	Comments:
43 BLOCK CRACKING	L	1,260.00 SqFt	Comments:
43 BLOCK CRACKING	M	840.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	135.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	110.00 Ft	Comments:
52 RAVELING	L	4,100.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWG Name: Taxiway G Use: TAXIWAY Area: 32,483.00SqFt

Section: 20 of 2 From: TWD-20 To: R08-10L Last Const.: 07/01/1999
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 17,589.00SqFt Length: 299.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 67
Inspection Comments:

Sample Number: 01 Type: R Area: 2,269.00SqFt PCI = 54
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	50.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	274.00	Ft	Comments:
45 DEPRESSION	L	20.00	SqFt	Comments:
57 WEATHERING	L	454.00	SqFt	Comments:
52 RAVELING	L	1,815.00	SqFt	Comments:

Sample Number: 02 Type: R Area: 5,042.00SqFt PCI = 69
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	100.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	148.00	Ft	Comments:
45 DEPRESSION	L	10.00	SqFt	Comments:
52 RAVELING	L	1,008.00	SqFt	Comments:
57 WEATHERING	L	4,034.00	SqFt	Comments:

Sample Number: 04 Type: R Area: 4,048.00SqFt PCI = 73
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	106.00	Ft	Comments:
57 WEATHERING	L	3,846.00	SqFt	Comments:
52 RAVELING	L	202.00	SqFt	Comments:
45 DEPRESSION	L	84.00	SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWH Name: Taxiway H Use: TAXIWAY Area: 17,990.00SqFt

Section: 10 of 1 From: - To: TWL-10 Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 17,990.00SqFt Length: 351.00Ft Width: 50.00Ft
Slabs: 96 Slab Width: 15.00Ft Slab Length: 12.50Ft Joint Length: 2,173.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 73
Inspection Comments:

Sample Number: 02 Type: R Area: 24.00Slabs PCI = 78
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
70 SCALING/CRAZING	L	24.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
63 LINEAR CRACKING	L	3.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	1.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:

Sample Number: 03. Type: R Area: 24.00Slabs PCI = 67
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
70 SCALING/CRAZING	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	5.00 Slabs	Comments:
74 JOINT SPALLING	L	3.00 Slabs	Comments:
66 SMALL PATCH	L	5.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	4.00 Slabs	Comments:

Sample Number: 04 Type: R Area: 29.00Slabs PCI = 73
Sample Comments:

65 JOINT SEAL DAMAGE	L	29.00 Slabs	Comments:
70 SCALING/CRAZING	L	27.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	4.00 Slabs	Comments:
66 SMALL PATCH	L	8.00 Slabs	Comments:
62 CORNER BREAK	L	1.00 Slabs	Comments:
63 LINEAR CRACKING	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWJ Name: Taxiway J Use: TAXIWAY Area: 17,128.00SqFt

Section: 10 of 2 From: TWK-10 To: TWL-10 Last Const.: 08/01/1999
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 11,011.00SqFt Length: 220.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 3 Surveyed: 3
Conditions: PCI : 67
Inspection Comments:

Sample Number: 01 Type: R Area: 3,087.00SqFt PCI = 76
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	148.00 Ft	Comments:
45 DEPRESSION	L	24.00 SqFt	Comments:
57 WEATHERING	L	3,087.00 SqFt	Comments:

Sample Number: 02 Type: R Area: 4,900.00SqFt PCI = 80
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	189.00 Ft	Comments:
45 DEPRESSION	L	24.00 SqFt	Comments:
57 WEATHERING	L	4,900.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 3,024.00SqFt PCI = 37
Sample Comments:

45 DEPRESSION	L	176.00 SqFt	Comments:
57 WEATHERING	L	3,024.00 SqFt	Comments:
41 ALLIGATOR CRACKING	M	236.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWJ Name: Taxiway J Use: TAXIWAY Area: 17,128.00SqFt

Section: 20 of 2 From: TWK-10 To: - Last Const.: 08/01/1999
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 6,117.00SqFt Length: 107.00Ft Width: 43.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 1 Surveyed: 1
Conditions: PCI : 89
Inspection Comments:

Sample Number: 01 Type: R Area: 6,117.00SqFt PCI = 89
Sample Comments:

57 WEATHERING	L	6,117.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	59.00 Ft	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWK Name: Taxiway K Use: TAXIWAY Area: 39,533.00SqFt

Section: 10 of 2 From: R08-10L To: TWC-10 Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 28,386.00SqFt Length: 505.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 6 Surveyed: 4
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 5,521.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,521.00 SqFt	Comments:

Sample Number: 02 Type: R Area: 5,349.00SqFt PCI = 94
Sample Comments:

42 BLEEDING	N	2.00 SqFt	Comments:
57 WEATHERING	L	5,349.00 SqFt	Comments:

Sample Number: 03 Type: R Area: 5,004.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,004.00 SqFt	Comments:

Sample Number: 04 Type: R Area: 5,000.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	5,000.00 SqFt	Comments:

Re-inspection Report

Network: SNS Name: Salinas Municipal Airport

Branch: TWK Name: Taxiway K Use: TAXIWAY Area: 39,533.00SqFt

Section: 20 of 2 From: TWK-10 To: - Last Const.: 12/25/2013
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 11,147.00SqFt Length: 149.00Ft Width: 79.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 4 Surveyed: 3
Conditions: PCI : 94
Inspection Comments:

Sample Number: 01 Type: R Area: 2,122.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 2,122.00 SqFt Comments:

Sample Number: 02 Type: R Area: 3,714.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,714.00 SqFt Comments:

Sample Number: 03 Type: R Area: 3,740.00SqFt PCI = 94
Sample Comments:
57 WEATHERING L 3,740.00 SqFt Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWL Name: Taxiway L Use: TAXIWAY Area: 75,065.00SqFt

Section: 10 of 1 From: R08-10L To: ATERM-20 Last Const.: 01/01/1968
Surface: PCC Family: CAL_SNS_ALL_PCC Zone: Category: Rank: P
Area: 75,065.00SqFt Length: 995.00Ft Width: 75.00Ft
Slabs: 300 Slab Width: 20.00Ft Slab Length: 12.50Ft Joint Length: 8,631.25Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 13 Surveyed: 6
Conditions: PCI : 61
Inspection Comments:

Sample Number: 02 Type: R Area: 22.00Slabs PCI = 60
Sample Comments:

67 LARGE PATCH/UTILITY	L	5.00 Slabs	Comments:
63 LINEAR CRACKING	L	16.00 Slabs	Comments:
63 LINEAR CRACKING	M	1.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
72 SHATTERED SLAB	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:

Sample Number: 04 Type: R Area: 24.00Slabs PCI = 71
Sample Comments:

66 SMALL PATCH	L	4.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	5.00 Slabs	Comments:
75 CORNER SPALLING	L	1.00 Slabs	Comments:
63 LINEAR CRACKING	L	6.00 Slabs	Comments:
62 CORNER BREAK	L	2.00 Slabs	Comments:

Sample Number: 06 Type: R Area: 24.00Slabs PCI = 66
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
63 LINEAR CRACKING	L	4.00 Slabs	Comments:
66 SMALL PATCH	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:
74 JOINT SPALLING	L	4.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	3.00 Slabs	Comments:
62 CORNER BREAK	L	1.00 Slabs	Comments:
75 CORNER SPALLING	M	2.00 Slabs	Comments:

Sample Number: 08 Type: R Area: 24.00Slabs PCI = 56
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	L	5.00 Slabs	Comments:
67 LARGE PATCH/UTILITY	M	1.00 Slabs	Comments:
75 CORNER SPALLING	M	1.00 Slabs	Comments:
73 SHRINKAGE CRACKING	N	6.00 Slabs	Comments:
66 SMALL PATCH	L	4.00 Slabs	Comments:
63 LINEAR CRACKING	L	9.00 Slabs	Comments:
74 JOINT SPALLING	L	1.00 Slabs	Comments:
75 CORNER SPALLING	L	2.00 Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Sample Number: 10 Type: R Area: 24.00Slabs PCI = 61
Sample Comments:

65 JOINT SEAL DAMAGE	L	24.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	7.00	Slabs	Comments:
66 SMALL PATCH	L	3.00	Slabs	Comments:
63 LINEAR CRACKING	L	11.00	Slabs	Comments:
75 CORNER SPALLING	L	4.00	Slabs	Comments:
74 JOINT SPALLING	L	1.00	Slabs	Comments:
72 SHATTERED SLAB	L	1.00	Slabs	Comments:

Sample Number: 12 Type: R Area: 24.00Slabs PCI = 55
Sample Comments:

72 SHATTERED SLAB	L	1.00	Slabs	Comments:
75 CORNER SPALLING	M	1.00	Slabs	Comments:
63 LINEAR CRACKING	L	16.00	Slabs	Comments:
73 SHRINKAGE CRACKING	N	4.00	Slabs	Comments:
74 JOINT SPALLING	L	4.00	Slabs	Comments:
74 JOINT SPALLING	M	1.00	Slabs	Comments:
66 SMALL PATCH	L	4.00	Slabs	Comments:
75 CORNER SPALLING	L	1.00	Slabs	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWN Name: Taxiway N Use: TAXIWAY Area: 9,443.00SqFt

Section: 10 of 1 From: R08-10R To: TWB-10 Last Const.: 12/25/2009
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 9,443.00SqFt Length: 141.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 2 Surveyed: 2
Conditions: PCI : 92
Inspection Comments:

Sample Number: 01 Type: R Area: 4,087.00SqFt PCI = 94
Sample Comments:

57 WEATHERING	L	4,087.00 SqFt	Comments:

Sample Number: 02 Type: R Area: 5,356.00SqFt PCI = 90
Sample Comments:

45 DEPRESSION	L	30.00 SqFt	Comments:
57 WEATHERING	L	5,356.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWP Name: Taxiway P Use: TAXIWAY Area: 124,992.00SqFt

Section: 10 of 2 From: TWD-30 To: TWC-20 Last Const.: 08/01/1999
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 112,307.00SqFt Length: 2,252.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/31/2017 Total Samples: 23 Surveyed: 6
Conditions: PCI : 61
Inspection Comments:

Sample Number: 03 Type: R Area: 5,000.00SqFt PCI = 65
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	30.00 Ft	Comments:
52 RAVELING	L	4,900.00 SqFt	Comments:
52 RAVELING	M	100.00 SqFt	Comments:

Sample Number: 07 Type: R Area: 5,000.00SqFt PCI = 64
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	37.00 Ft	Comments:
52 RAVELING	L	4,900.00 SqFt	Comments:
52 RAVELING	M	100.00 SqFt	Comments:

Sample Number: 11 Type: R Area: 5,000.00SqFt PCI = 58
Sample Comments:

52 RAVELING	M	100.00 SqFt	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	131.00 Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	30.00 Ft	Comments:
52 RAVELING	L	4,900.00 SqFt	Comments:
56 SWELLING	L	4.00 SqFt	Comments:

Sample Number: 15 Type: R Area: 5,000.00SqFt PCI = 60
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	73.00 Ft	Comments:
50 PATCHING	L	600.00 SqFt	Comments:
52 RAVELING	L	4,300.00 SqFt	Comments:
52 RAVELING	M	100.00 SqFt	Comments:

Sample Number: 19 Type: R Area: 5,000.00SqFt PCI = 64
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	65.00 Ft	Comments:
52 RAVELING	L	4,800.00 SqFt	Comments:
52 RAVELING	M	200.00 SqFt	Comments:

Sample Number: 22 Type: R Area: 5,000.00SqFt PCI = 58
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	L	23.00 Ft	Comments:
52 RAVELING	L	4,800.00 SqFt	Comments:
56 SWELLING	L	200.00 SqFt	Comments:
45 DEPRESSION	L	20.00 SqFt	Comments:
52 RAVELING	M	200.00 SqFt	Comments:

Re-inspection Report

SNS_PMMS_2017
Report Generated Date: August 23, 2017

Network: SNS Name: Salinas Municipal Airport

Branch: TWP Name: Taxiway P Use: TAXIWAY Area: 124,992.00SqFt

Section: 20 of 2 From: TWC-10 To: R08-20 Last Const.: 06/01/1990
Surface: AC Family: CAL_SNS_ALL_AC/APC Zone: Category: Rank: P
Area: 12,685.00SqFt Length: 240.00Ft Width: 50.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0

Section Comments:

Last Insp. Date: 01/30/2017 Total Samples: 3 Surveyed: 3
Conditions: PCI : 56
Inspection Comments:

Sample Number: 01 Type: R Area: 2,230.00SqFt PCI = 61
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	100.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	159.00	Ft	Comments:
52 RAVELING	L	223.00	SqFt	Comments:
57 WEATHERING	L	2,007.00	SqFt	Comments:

Sample Number: 02 Type: R Area: 4,906.00SqFt PCI = 55
Sample Comments:

48 LONGITUDINAL/TRANSVERSE CRACKING	M	161.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	L	193.00	Ft	Comments:
45 DEPRESSION	L	40.00	SqFt	Comments:
56 SWELLING	L	200.00	SqFt	Comments:
52 RAVELING	L	491.00	SqFt	Comments:
57 WEATHERING	L	4,415.00	SqFt	Comments:

Sample Number: 03 Type: R Area: 5,549.00SqFt PCI = 56
Sample Comments:

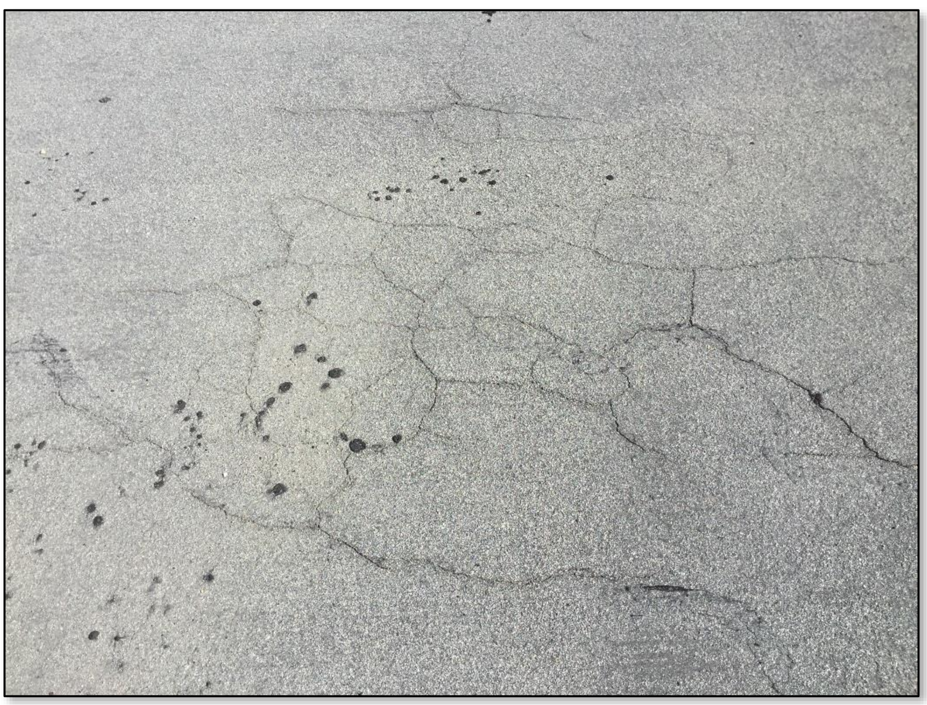
48 LONGITUDINAL/TRANSVERSE CRACKING	L	192.00	Ft	Comments:
48 LONGITUDINAL/TRANSVERSE CRACKING	M	7.00	Ft	Comments:
56 SWELLING	L	4.00	SqFt	Comments:
50 PATCHING	L	1,650.00	SqFt	Comments:
52 RAVELING	L	390.00	SqFt	Comments:
57 WEATHERING	L	3,509.00	SqFt	Comments:

Appendix E
Field Photographs

Runway 13-31, Section 10C – Weathering

Runway 08-26, Section 10C – Longitudinal and Transverse Cracking and Raveling

Taxiway G, Section 10 – Block Cracking



Taxiway J, Section 10 – Alligator Cracking

Taxiway D, Section 30 – Patch

Taxiway D, Section 30 – Raveling

Taxiway F, Section 10 – Transverse Cracking

Taxiway L, Section 10 – Corner Spalling

Taxiway F, Section 20 – Joint Reflection Cracking

North Hangar Apron, Section 10 – Alligator Cracking

North Hangar Apron, Section 20 – Alligator Cracking

Tie Down Apron, Section 30 – Block Cracking

Appendix F
References

Designation: D5340 – 12

Standard Test Method for
Airport Pavement Condition Index Surveys[1]

This standard is issued under the fixed designation D5340; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of airport pavement condition through visual surveys of asphalt-surfaced pavements, including porous friction courses, and plain or reinforced jointed portland cement concrete pavements, using the Pavement Condition Index (PCI) method of quantifying pavement condition.

1.2 The PCI for airport pavements was developed by the US Army Corps of Engineers through the funding provided by the U.S. Air Force (**1, 2, 3**).[2] It is further verified and adopted by FAA (**4**), and the U.S. Naval Facilities Engineering Command (**5**).

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Section 6.

2. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *additional sample*—a sample unit inspected in addition to the random sample units to include nonrepresentative sample units in the determination of the pavement condition. This includes very poor or excellent samples that are not typical of the section and sample units which contain an unusual distress such as a utility cut. If a sample unit containing an unusual distress is chosen at random, it should be counted as an additional sample unit and another random sample unit should be chosen. If every sample unit is surveyed, then there are no additional sample units.

2.1.2 *asphalt concrete (AC) surface*—aggregate mixture with an asphalt cement binder. This term also refers to surfaces constructed of coal tars and natural tars for purposes of this test method.

2.1.3 *pavement branch*—a branch is an identifiable part of the pavement network that is a single entity and has a distinct function. For example, each runway, taxiway, and apron areas are separate branches.

2.1.4 *pavement condition index (PCI)*—a numerical rating of the pavement condition that ranges from 0 to 100 with 0 being the worst possible condition and 100 being the best possible condition.

2.1.5 *pavement condition rating*—a verbal description of pavement condition as a function of the PCI value. Fig. 1 shows two examples of PCI rating scales.

2.1.6 *pavement distress*—external indicators of pavement deterioration caused by loading, environmental factors, or construction deficiencies, or a combination thereof. Typical distresses are cracks, rutting, and weathering of the pavement surface. Distress types and severity levels detailed in Appendix X1 for AC and Appendix X2 for PCC pavements must be used to obtain an accurate PCI value.

2.1.7 *pavement sample unit*—a subdivision of a pavement section that has a standard size range: 20 contiguous slabs (±8 slabs if the total number of slabs in the section is not evenly divided by 20, or to accommodate specific field condition) for PCC airfield pavement and 5000 contiguous square feet (± 2000 ft^2 (450 ± 180 m^2) if the pavement is not evenly divided by 5000, or to accommodate specific field condition) for AC airfield pavement and porous friction surfaces.

2.1.8 *pavement section*—a contiguous pavement area having uniform construction, maintenance, usage history, and condition. A section should also have the same traffic volume and load intensity.

2.1.9 *porous friction surfaces*—open-graded select aggregate mixture with an asphalt cement binder. This is a subset of asphalt concrete-surfaced pavements.

2.1.10 *portland cement concrete (PCC) pavement*—aggregate mixture with portland cement binder including nonreinforced and reinforced jointed pavement.

[1] This test method is under the jurisdiction of ASTM Committee E17 on Vehicle - Pavement Systems and is the direct responsibility of Subcommittee E17.42 on Pavement Management and Data Needs.

Current edition approved June 1, 2012. Published May 2013. Originally approved in 1998. Last previous edition approved in 2011 as D5340 – 11. DOI: 10.1520/D5340-12.

[2] The boldface numbers in parentheses refer to a list of references at the end of the text.

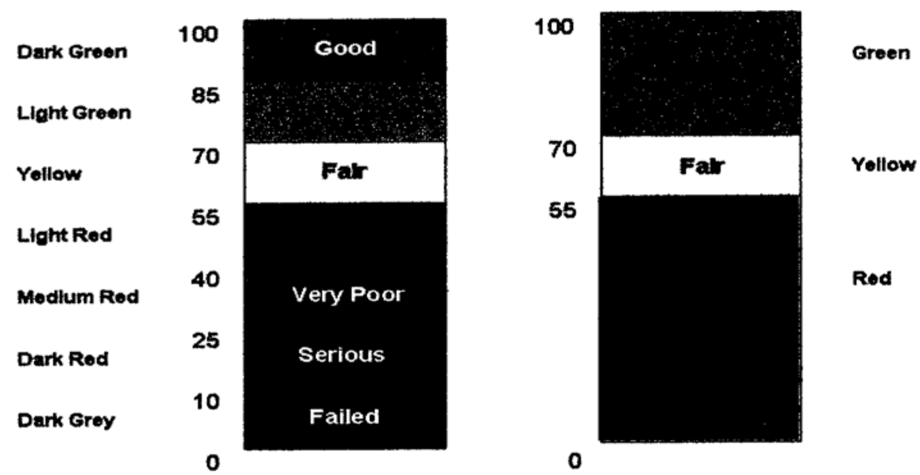


FIG. 1 Two Examples of Pavement Condition Index (PCI (trademarked)) Rating Scales

2.1.11 *random sample*—a sample unit of the pavement section selected for inspection by random sampling techniques, such as a random number table or systematic random procedure.

3. Summary of Test Method

3.1 The pavement is divided into branches that are divided into sections. Each section is divided into sample units. The type and severity of airport pavement distress is assessed by visual inspection of the pavement sample units. The quantity of the distress is measured as described in Appendix X1 and Appendix X2. The distress data are used to calculate the PCI for each sample unit. The PCI of the pavement section is determined based on the PCI of the inspected sample units within the section.

4. Significance and Use

4.1 The PCI is a numerical indicator that rates the surface condition of the pavement. The PCI provides a measure of the present condition of the pavement based on the distress observed on the surface of the pavement which also indicates the structural integrity and surface operational condition (localized roughness and safety). The PCI cannot measure the structural capacity, neither does it provide direct measurement of skid resistance or roughness. It provides an objective and rational basis for determining maintenance and repair needs and priorities. Continuous monitoring of the PCI is used to establish the rate of pavement deterioration, which permits early identification of major rehabilitation needs. The PCI provides feedback on pavement performance for validation or improvement of current pavement design and maintenance procedures.

5. Apparatus

5.1 *Data Sheets,* or other field recording instruments that record at a minimum the following information: date, location, branch, section, sample unit size, slab number and size, distress types, severity levels, quantities, and names of surveyors. Example data sheets for AC and PCC pavements are shown in Fig. 2 and Fig. 3.

5.2 *Hand Odometer Wheel,* that reads to the nearest 0.1 ft (30 mm).

5.3 *Straightedge or String Line* (AC only), 10 ft (3 m).

5.4 *Scale,* 12 in. (300 mm) that reads to ⅛ in. (3 mm) or better. Additional 12-in. (300-mm) ruler or straightedge is needed to measure faulting in PCC pavements.

5.5 *Layout Plan,* for airport to be inspected.

6. Hazards

6.1 Traffic is a hazard as inspectors must walk on the pavement to perform the condition survey. Inspection must be approved by and coordinated with the airport operational staff.

6.2 Noise from aircraft can be a hazard. Hearing protection must be available to the inspector at all times when airside inspections are being performed.

7. Sampling and Sample Units

7.1 Identify areas of the pavement with different uses such as runways, taxiways, and aprons on the airport layout plan.

7.2 Divide each single-use area into sections based on the pavement design, construction history, traffic, and condition.

7.3 Divide the pavement sections into sample units. If the pavement slabs in PCC have joint spacings greater than 25 ft (8 m), subdivide each slab into imaginary slabs. The imaginary slabs should all be less than or equal to 25 ft (8 m) in length, and the imaginary joints dividing the slabs are assumed to be in perfect condition. This is needed because the deduct values were developed for jointed concrete slabs less than or equal to 25 ft (8 m).

7.4 Individual sample units to be inspected should be marked or identified in a manner to allow inspectors and quality control personnel to easily locate them on the pavement surface. Paint marks along the edge and sketches with locations connected to physical pavement features are acceptable. The use of nails or other potential FOD sources is not recommended. It is necessary to be able to accurately relocate the sample units to allow verification of current distress data, to

AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT	**SKETCH:**
BRANCH________ SECTION________ SAMPLE UNIT________ SURVEYED BY________ DATE________ SAMPLE AREA________	

1. Alligator Cracking	5. Depression	9. Oil Spillage	13. Rutting
2. Bleeding	6. Jet Blast	10. Patching	14. Shoving from PCC
3. Block Cracking	7. Jt. Reflection (PCC)	11. Polished Aggregate	15. Slippage Cracking
4. Corrugation	8. Long. & Trans. Cracking	12. Raveling/Weathering	16. Swell

DISTRESS SEVERITY	QUANTITY									TOTAL	DENSITY %	DEDUCT VALUE

FIG. 2 Flexible Pavement Condition Survey Data Sheet for Sample Unit

examine changes in condition with time of a particular sample unit, and to enable future inspections of the same sample unit if desired.

7.5 Select the sample units to be inspected. The number of sample units to be inspected may vary from all of the sample units in the section, a number of sample units that provides a 95 % confidence level, or a lesser number.

7.5.1 All sample units in the section may be inspected to determine the average PCI of the section. This is usually precluded for routine management purposes by available manpower, funds, and time. Total sampling, however, is desirable for project analysis to help estimate maintenance and repair quantities.

7.5.2 The minimum number of sample units (n) that must be surveyed within a given section to obtain a statistically adequate estimate (95 % confidence) of the PCI of the section is calculated using the following formula and rounding n to the next highest whole number (**1**).

$$n = \frac{Ns^2}{\left(\left(\frac{e^2}{4}\right)(N-1)+s^2\right)} \quad (1)$$

where:

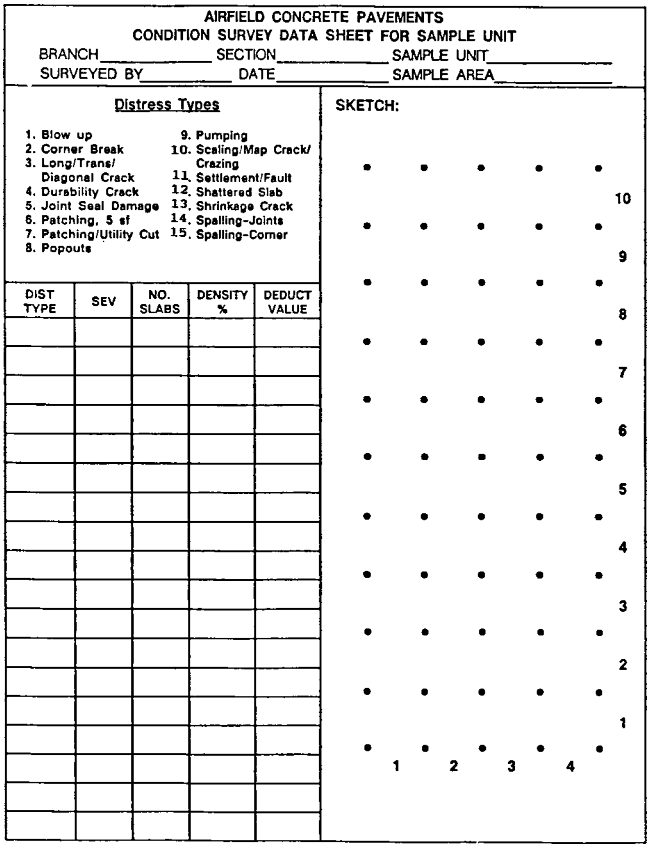
e = acceptable error in estimating the section PCI. Commonly, e = ±5 PCI points,

s = standard deviation of the PCI from one sample unit to another within the section. When performing the initial inspection, the standard deviation is assumed to be ten for AC pavements and 15 for PCC pavements. This assumption should be checked as described below after PCI values are determined. For subsequent inspections the standard deviation from the preceding inspection should be used to determine n, and

N = total number of sample units in the section.

7.5.2.1 If obtaining the 95 % confidence level is critical, the adequacy of the number of sample units surveyed must be confirmed. The number of sample units was estimated based on an assumed standard deviation. Calculate the actual standard deviation(s) as follows (**1**):

$$s = \sqrt{\sum_{i=1}^{n} \frac{(PCI_i - PCI_f)^2}{(n-1)}} \quad (2)$$


AIRFIELD CONCRETE PAVEMENTS
CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT

BRANCH______ SECTION______ SAMPLE UNIT______
SURVEYED BY______ DATE______ SAMPLE AREA______

Distress Types

1. Blow up
2. Corner Break
3. Long/Trans/ Diagonal Crack
4. Durability Crack
5. Joint Seal Damage
6. Patching, 5 sf
7. Patching/Utility Cut
8. Popouts
9. Pumping
10. Scaling/Map Crack/ Crazing
11. Settlement/Fault
12. Shattered Slab
13. Shrinkage Crack
14. Spalling-Joints
15. Spalling-Corner

DIST TYPE	SEV	NO. SLABS	DENSITY %	DEDUCT VALUE

SKETCH:

FIG. 3 Jointed Rigid Pavement Condition Survey Data Sheet for Sample Unit

where:

PCI_i = PCI of surveyed sample unit i,
PCI_f = mean PCI of surveyed sample units, and
n = total number of sample units surveyed.

7.5.2.2 Calculate the revised minimum number of sample units (Eq 1) to be surveyed using the calculated standard deviation (Eq 2). If the revised number of sample units to be surveyed is greater than the number of sample units already surveyed, select and survey additional random sample units. These sample units should be evenly spaced across the section. Repeat the process of checking the revised number of sample units and surveying additional random sample units until the total number of sample units surveyed equals or exceeds the minimum required sample units (n) in Eq 1, using the actual total sample standard deviation).

7.5.3 A lesser sampling rate than the above mentioned 95 % confidence level can be used based on the condition survey objective. As an example, one agency uses the following table for selecting the number of sample units to be inspected for other than project analysis:

Given	Survey
1 to 5 sample units	1 sample unit
6 to 10 sample units	2 sample units
11 to 15 sample units	3 sample units
16 to 40 sample units	4 sample units
over 40 sample units	10 %

7.6 Once the number of sample units to be inspected has been determined, compute the spacing interval of the units using systematic random sampling. Samples are equally spaced throughout the section with the first sample selected at random. The spacing interval (i) of the units to be sampled is calculated by the following formula rounded to the next lowest whole number:

$$i = \frac{N}{n} \tag{3}$$

where:

N = total number of sample units in the section, and
n = number of sample units to be inspected.

The first sample unit to be inspected is selected at random from sample units 1 through i. The sample units within a section that are successive increments of the interval i after the first randomly selected unit are also inspected.

7.7 Additional sample units are only to be inspected when nonrepresentative distresses are observed as defined in 2.1.1. These sample units are selected by the user.

8. Inspection Procedure

8.1 The definitions and guidelines for quantifying distresses for PCI determination are given in Appendix X1 for AC pavements. Other related references (**1**, **2**, **3**, **4**, **5**, **6**, **7**, **8**) are also available that discuss distress survey; however, when the material in these references conflict with the definitions included in this test method, the definitions in this test method are used.

8.2 *AC Surfaced Pavement, Including Porous Friction Surfaces*—Individually inspect each sample unit chosen. Sketch the sample unit, including orientation. Record the branch and section number, and number and type of the sample unit (random or additional). Record the sample unit size measured with the hand odometer. Conduct the distress inspection by walking over the sample unit being surveyed, measuring the quantity of each severity level of every distress type present, and recording the data. Distresses must correspond in types and severities to those described in Appendix X1. The method of measurement is included with each distress description. Measurements should be made to ±0.1 ft (30 mm) with the hand odometer. Summarize each distress type and severity level in either square feet or linear feet (square metres or linear metres), depending on the type of distress. Repeat this procedure for each sample unit to be inspected. A blank "Flexible Pavement Condition Survey Data Sheet for Sample Unit" is included in Appendix X5.

8.3 *PCC Pavements*—Individually inspect each sample unit chosen. Sketch the sample unit showing the location of the slabs. Record the sample unit size, branch and section number, number and type of the sample unit (random or additional), the number of slabs in the sample unit, and the slab size measured with the hand odometer. Perform the inspection by walking over each slab of the sample unit being surveyed and recording all distresses existing in the slab along with their severity level. The distress types and severities must correspond with those described in Appendix X2. Summarize the distress types, their severity levels, and the number of slabs in the sample unit containing each type and severity level. Repeat this procedure for each sample unit to be inspected. A blank "Jointed Rigid Pavement Condition Survey Data Sheet for Sample Unit" is included in Appendix X5.

9. Calculation of PCI for AC Pavement, Including Porous Friction Surfaces

9.1 Add up the total quantity of each distress type at each severity level, and record them in the "Total Severities" section. For example, Fig. 4 shows four entries for the Distress Type 8, "Longitudinal and Transverse Cracking:" 9M, 10L, 20L, and 15L. The distress at each severity level is summed and entered in the "Total Severity" section as 45 ft (14 m) of low severity, and 9 ft (3 m) of medium severity "Longitudinal and Transverse Cracking." The units for the quantities may be either in square feet (square metres), linear feet (metres), or number of occurrences, depending on the distress type.

9.2 Divide the total quantity of each distress type at each severity level from 9.1 by the total area of the sample unit and multiply by 100 to obtain the percent density of each distress type and severity.

9.3 Determine the deduct value (DV) for each distress type and severity level combination from the distress deduct value curves in Appendix X3.

9.4 Determine the maximum corrected deduct value (CDV):

9.4.1 If none or only one individual DV is greater than five, the total value is used in place of the maximum CDV in determining PCI; otherwise, maximum CDV must be determined using the procedure described in this section. The procedure for determining maximum CDV from individual DVs is identical for both AC and PCC pavement types.

9.5 *PCI Calculation:*

9.5.1 If none or only one individual DV is greater than five, use the total DV in place of the maximum CDV in determining PCI; otherwise use the following procedure to determine Max CDV:

9.5.1.1 Determine m, the maximum allowable number of distresses, as follows:

$$m = 1 + (9/95)\,(100 - HDV) \leq 10 \quad (4)$$

$$m = 1 + (9/95)\,(100 - 27) = 7.92 \quad (5)$$

AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT

SKETCH:

BRANCH ____________ SECTION ________ SAMPLE UNIT ________
SURVEYED BY ____________ DATE ________ SAMPLE AREA 5000 S.F.

1. Alligator Cracking
2. Bleeding
3. Block Cracking
4. Corrugation
5. Depression
6. Jet Blast
7. Jt. Reflection (PCC)
8. Long. & Trans. Cracking
9. Oil Spillage
10. Patching
11. Polished Aggregate
12. Raveling/Weathering
13. Rutting
14. Shoving from PCC
15. Slippage Cracking
16. Swell

DISTRESS SEVERITY	QUANTITY									TOTAL	DENSITY %	DEDUCT VALUE
8L	10	20	15							45	0.90	4.8
8M	9									9	0.18	4.9
1L	50									50	1.00	21.0
13L	200	175								375	7.50	27.0
13M	25									25	0.50	20.0
5L	15									15	0.30	2.0
5M	20									20	0.40	9.0
10L	50									50	1.00	4.0

FIG. 4 Example of a Flexible Pavement Condition Survey Data Sheet

$$HDV = \text{highest individual DV} \quad (6)$$

9.5.1.2 Enter *m* largest DVs on Line 1 of the following table, including the fraction obtained by multiplying the last DV by the fractional portion of *m*. If less than *m* DVs are available, enter all of the DVs.

9.5.1.3 Sum the DVs and enter it under "Total". Count the number of DVs greater than 5.0 and enter it under "*q*".

9.5.1.4 Look up the appropriate correction curve (AC or PCC) with "Total" and "*q*" to determine CDV.

9.5.1.5 Copy DVs on current line to the next line, changing the smallest DV greater than five to five. Repeat 9.5.1.3 and 9.5.1.4 until "*q*" = 1.

9.5.1.6 Maximum CDV is the largest value in the "CDV" column.

9.5.2 List the individual DVs in descending order. For example in Fig. 4 this will be: 27.0, 21.0, 20.0, 9.0, 4.9, 4.8, 4.0, and 2.0.

9.5.3 Determine the allowable number of deducts, *m*, from Fig. 5, or using the following formulas:

$$m = 1 + (9/95)\,(100 - HDV) \quad (7)$$

where:

m = allowable number of deducts including fractions (must be less than or equal to ten), and
HDV = highest individual DV.

For the example in Fig. 4:

$$m = 1 + (9/95)\,(100 - 27.0) = 7.92 \quad (8)$$

9.5.4 The number of individual DVs is reduced to the *m* largest DVs, including the fractional part. For example, for the values in Fig. 4, the values are: 27.0, 21.0, 20.0, 9.0, 4.9, 4.8, 4.0, and 1.8 (the 1.8 was obtained by multiplying 2.0 by (7.92 – 7 = 0.92)). If less than *m* DVs are available, all of the DVs are used.

9.5.5 Determine maximum CDV iteratively as follows: (see Fig. 6):

9.5.5.1 Determine the total DV by summing individual DVs. The total DV is obtained by adding the individual DVs in 9.5.4, that is 92.5.

9.5.5.2 Determine *q; q* is the number of deducts with a value greater than 5.0. For the example in Fig. 4, *q* = 4.

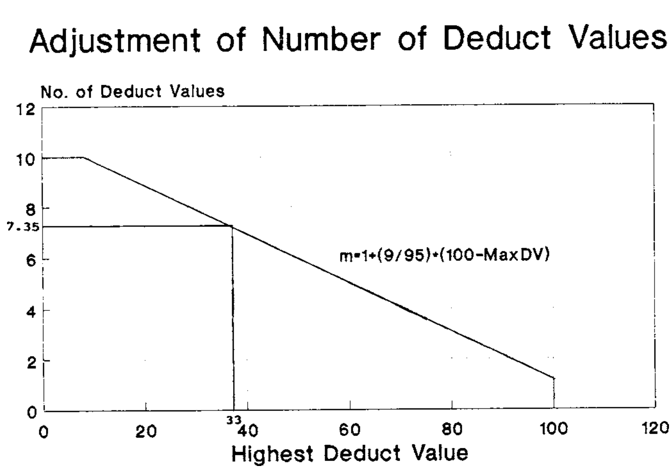


FIG. 5 Adjustment of Number of DVs

#	Deduct Values										Total	q	CDV
1	27.0	21.0	20.0	9.0	4.9	4.8	4.0	1.8			92.5	4	50.0
2	27.0	21.0	20.0	5.0	4.9	4.8	4.0	1.8			38.5	3	56.0
3	27.0	21.0	5.0	5.0	4.9	4.8	4.0	1.8			73.5	2	51.0
4	27.0	5.0	5.0	5.0	4.9	4.8	4.0	1.8			57.5	1	57.5
5													
6													
7													
8													
9													
10													

Max CDV = 57.5

PCI = 100 – Max CDV = 42.5

RATING = FAIR

NOTE 1—Fig. 4 contains both low and high severity depression, long/trans cracking, and rutting distresses. Using the algorithm in 9.6.2 it was verified that no correction is needed for any of the distress types.

FIG. 6 Calculation of Corrected PCI Value—Flexible Pavement

9.5.5.3 Determine the CDV from *q* and total DV determined in 9.5.5.1 and 9.5.5.2 by looking up the appropriate correction curve for AC pavements in Fig. X3.20 in Appendix X3.

9.5.5.4 Reduce the smallest individual DV greater than 5.0 to 5.0 and repeat 9.5.5.1-9.5.5.4 until *q* = 1.

9.5.5.5 Maximum CDV is the largest of the CDVs determined in 9.5.5.1-9.5.5.4.

9.6 Calculating the PCI

9.6.1 Calculate the PCI by subtracting the maximum CDV from 100: PCI = 100-max CDV.

9.6.2 PCI correction if there is a distress with multiple severities.

9.6.2.1 *Two Severity Case:* When there are two severities of one distress in the same sample unit, the calculations need to be computed as seen below.

x_1 = distress percent of lower severity
x_2 = distress percent of higher severity
$X_2 = x_1 + x_2$

The value of PCI (x_1, x_2) should be higher when compared with PCI (0, X_2) since PCI (0, X_2) has more distress percentage of higher severity. So if this not the case, the PCI of the sample unit will be computed based on X_2 and not x_1 and x_2.

9.6.2.2 *Three Severity Case:* When there are three severities of one distress in the same sample unit, the calculations need to be computed as seen below.

l or L = percent density of low severity distress percent
m or M = percent density of medium severity distress percent

h or H = percent density of high severity distress percent

PCI (l, m, h) = PCI of the section with distress quantities of *l, m, h*

	Distresses	PCI Value
Start with:	*l, m, h*	→ PCI (*l, m, h*)
Set *(l + m) = M*	→*0, M, h*	→ PCI (*0, M, h*)
Set *(m + h) = H*	→*l, 0, H*	→ PCI (*l, 0, H*)
Set *(l + h) = H*	→ *0, m, H*	→ PCI (*0, m, H*)
Set *(l + m + h) = H*	→ *0, 0, H*	→ PCI (*0, 0, H*)

The value of PCI (*l, m, h*) should be higher when compared with PCI (*0, M, h*), PCI (*l, 0, H*), PCI (*m, H*), or PCI (*H*). So the correct or new PCI of the sample unit should be based on the combination that provides the highest PCI.

9.7 Fig. 6 shows a summary of PCI calculation for the example AC pavement data in Fig. 4. A blank PCI calculation form is included in Appendix X5.

10. Calculation of PCI for PCC Pavement

10.1 For each unique combination of distress type and severity level, add up the total number of slabs in which they occur. For example in Fig. 7, there are two slabs containing low-severity corner break.

10.2 Divide the number of slabs from 10.1 by the total number of slabs in the sample unit and multiply by 100 to obtain the percent density of each distress type and severity combination.

10.3 *PCI Calculation:*

10.3.1 If none or only one individual DV is greater than five, use the total DV in place of the maximum CDV in determining PCI; otherwise use the following procedure to determine max CDV:

10.3.1.1 Determine *m*, the maximum allowable number of distresses, as follows:

$$m = 1 + (9/95)\,(100 - HDV) \leq 10 \tag{9}$$

$$m = 1 + (9/95)\,(100 - 32.0) = 7.44 \tag{10}$$

$$\text{HDV} = \text{highest individual DV} \tag{11}$$

10.3.1.2 Enter *m* largest DVs on Line 1 of the following table, including the fraction obtained by multiplying the last DV by the fractional portion of *m*. If less than *m* DVs are available, enter all of the DVs.

10.3.1.3 Sum the DVs and enter it under "Total". Count the number of DVs greater than 5.0 and enter it under "*q*".

10.3.1.4 Look up the appropriate correction curve (AC or PCC) with "Total" and "q" to determine CDV.

10.3.1.5 Copy DVs on current line to the next line, changing the smallest DV greater than five to five. Repeat 10.3.1.3 and 10.3.1.4 until "*q*" = 1.

10.3.1.6 Maximum CDV is the largest value in the "CDV" column.

10.4 Determine the DVs for each distress type severity level combination using the corresponding deduct curve in Appendix X4.

10.5 Determine PCI by following the procedures in 9.5 and 9.6, using the correction curve for PCC pavements (see Fig. X4.17) in place of the correction curve for AC pavements in 9.5.5.3.

10.6 Fig. 8 shows a summary of PCI calculation for the example PCC pavement distress data in Fig. 7.

11. Determination of Section PCI

11.1 If all surveyed sample units are selected randomly, then the PCI of the section (PCI_s) is calculated as the area weighted PCI of the randomly surveyed sample units ($\overline{PCI_r}$) using Eq 12:

$$PCI_S = \overline{PCI_r} = \frac{\sum_{i=1}^{n} (PCI_{ri} \cdot A_{ri})}{\sum_{i=1}^{n} A_{ri}} \tag{12}$$

where:

$\overline{PCI_r}$ = area weighted PCI of randomly surveyed sample units,
PCI_{ri} = PCI of random sample unit *i*,
A_{ri} = area of random sample unit *i*,
n = number of random sample units surveyed.

If additional sample units, as defined in 2.1.1, are surveyed, the area weighted PCI of the surveyed additional units ($\overline{PCI_a}$) is calculated using Eq 13. The PCI of the pavement section is calculated using Eq 14.

$$\overline{PCI_a} = \frac{\sum_{i=1}^{m} (PCI_{ai} \cdot A_{ai})}{\sum_{i=1}^{m} A_{ai}} \tag{13}$$

AIRFIELD CONCRETE PAVEMENTS
CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT

BRANCH______ SECTION______ SAMPLE UNIT______
SURVEYED BY LMB DATE 18 JAN 92 SAMPLE AREA 12.5' × 25'

Distress Types

1. Blow up
2. Corner Break
3. Long/Trans/Diagonal Crack
4. Durability Crack
5. Joint Seal Damage
6. Patching, 5 sf
7. Patching/Utility Cut
8. Popouts
9. Pumping
10. Scaling/Map Crack/Crazing
11. Settlement/Fault
12. Shattered Slab
13. Shrinkage Crack
14. Spalling–Joints
15. Spalling–Corner

DIST TYPE	SEV	NO. SLABS	DENSITY %	DEDUCT VALUE
5	H	20	100	12.0
2	L	2	10	8.0
2	M	1	5	9.0
3	L	3	15	11.0
3	M	5	25	32.0
15	L	3	15	6.0
14	L	2	10	3.0
12	L	1	5	10.0

SKETCH:

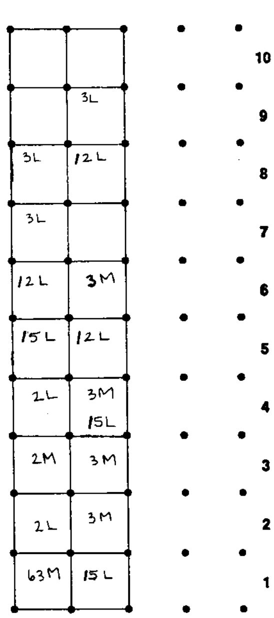


FIG. 7 Example of a Jointed Rigid Pavement Condition Survey Data Sheet

#	Deduct Values										Total	q	CDV
1	32.0	12.0	11.0	10.0	9.0	8.0	6.0	1.3			89.3	7	56.0
2	32.0	12.0	11.0	10.0	9.0	8.0	5.0	1.3			88.3	6	58.0
3	32.0	12.0	11.0	10.0	9.0	5.0	5.0	1.3			85.3	5	58.0
4	32.0	12.0	11.0	10.0	5.0	5.0	5.0	1.3			81.3	4	58.0
5	32.0	12.0	11.0	5.0	5.0	5.0	5.0	1.3			76.3	3	57.0
6	32.0	12.0	5.0	5.0	5.0	5.0	5.0	1.3			70.3	2	61.0
7	32.0	5.0	5.0	5.0	5.0	5.0	5.0	1.3			63.3	1	63.3
8													
9													
10													

Max CDV = 63.3

PCI = 100 − Max CDV = 36.7

RATING = POOR

NOTE 1—Fig. 7 contains both low and medium severity longitudinal/ transverse/ diagonal cracking. Using the algorithm in 9.6.2 it was verified that no correction is needed.

FIG. 8 Calculation of Corrected PCI Value—Jointed Rigid Pavement

$$PCI_s = \frac{\overline{PCI_r}\left(A - \sum_{i=1}^{m} A_{ai}\right) + \overline{PCI_a}\left(\sum_{i=1}^{m} A_{ai}\right)}{A} \quad (14)$$

$\overline{PCI_a}$ = area weighted PCI of additional sample units,
PCI_{ai} = PCI of additional sample unit i,
A_{ai} = area of additional sample unit i,
A = area of section,
m = number of additional sample units surveyed, and
PCI_s = area weighted PCI of the pavement section.

11.2 Determine the overall condition rating of the section by using the section PCI and the condition rating scale in Fig. 1.

12. Report

12.1 Develop a summary report for each section. The summary lists section location, size, total number of sample units, the sample units inspected, the PCIs obtained, the average PCI for the section, and the section condition rating.

13. Precision and Bias

13.1 *Precision*—At this time, no precision estimate has been obtained from statistically designed tests. This statement is subject to change in the next five years (see Note 1).

13.2 *Bias*—No statement concerning the bias of the test method can be established at this time.

NOTE 1—Using this test method, inspectors should identify distress types accurately 95 % of the time. Linear measurements should be considered accurate when they are within 10 % if remeasured, and area measurements should be considered accurate when they are within 20 % if remeasured.

APPENDIXES

(Nonmandatory Information)

X1. PAVEMENT CONDITION INDEX (PCI) AC AIRFIELDS

NOTE X1.1—The sections in this appendix are arranged in the following order:

X1.1 Distresses in Asphalt Pavement— Sixteen distress types for AC pavements are listed alphabetically. During the field condition surveys and the validation of the PCI, several questions were often asked regarding the identification and measurement of some of the distresses. The answers to most of these questions are included under the section "How To Measure" for each distress. For convenience, however, the items that are frequently referenced are listed as follows:

X1.1.1 Spalling as used in this test method is the further breaking of pavement or loss of materials around cracks or joints.

X1.1.2 A crack filler is in satisfactory condition if it is intact. An intact filler prevents water and incompressibles from entering the crack.

X1.1.3 If a crack does not have the same severity level along its entire length, each portion of the crack having a different severity level should be recorded separately. If however, the different levels of severity in a portion of a crack cannot be easily divided, that portion should be rated at the highest severity level present.

X1.1.4 If "alligator cracking" and "rutting" occur in the same area, each is recorded at its respective severity level.

X1.1.5 If "bleeding" is counted, "polished aggregate" is not counted in the same area.

X1.1.6 "Block cracking" includes all of the "longitudinal and transverse cracking" within the area; however, "joint reflection cracking" is recorded separately.

X1.1.7 Any distress, including cracking, found in a patched area is not recorded; however, its effect on the patch is considered in determining the severity level of the patch.

X1.1.8 A significant amount of polished aggregate should be present before it is counted.

X1.1.9 Conducting a PCI survey immediately after the application of surface treatment is not meaningful, because surface treatments mask existing distresses.

X1.1.10 A surface treatment that is coming off should be counted as "raveling."

X1.1.11 A distress is said to have "foreign object damage" (FOD) potential when surficial material is in a broken or loose state, such that the possibility of ingestion of the material into an engine is present, or the potential for freeing the material due to trafficking is present.

X1.1.12 Sections X1.1.1-X1.1.11 are not intended to be a complete list. To properly measure each distress type, the inspector must be familiar with its individual measurement criteria.

X1.2 *Alligator or Fatigue Cracking:*

X1.2.1 *Description*—Alligator or fatigue cracking is a series of interconnecting cracks caused by fatigue failure of the AC surface under repeated traffic loading. The cracking initiates at the bottom of the AC surface (or stabilized base) where tensile stress and strain are highest under a wheel load. The cracks propagate to the surface initially as a series of parallel cracks. After repeated traffic loading, the cracks connect, forming many-sided, sharp-angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are less than 2 ft (0.6 m) on the longest side.

X1.2.2 Alligator cracking occurs only in areas that are subjected to repeated traffic loadings, such as wheel paths. Therefore, it would not occur over an entire area unless the entire area was subjected to traffic loading. (Pattern-type cracking that occurs over an entire area that is not subjected to loading is rated as block cracking, that is, not a load-associated distress.)

X1.2.3 Alligator cracking is considered a major structural distress.

X1.2.4 *Severity Levels:*

X1.2.4.1 *L (Low)*—Fine, longitudinal hairline cracks running parallel to one another with none or only a few interconnecting cracks. The cracks are not spalled (see Figs. X1.1-X1.3).

X1.2.4.2 *M (Medium)*—Further development of light alligator cracking into a pattern or network of cracks that may be lightly spalled. Medium-severity alligator cracking is defined by a well-defined pattern of interconnecting cracks, where all pieces are securely held in place (good aggregate interlock between pieces) (see Figs. X1.4-X1.8).

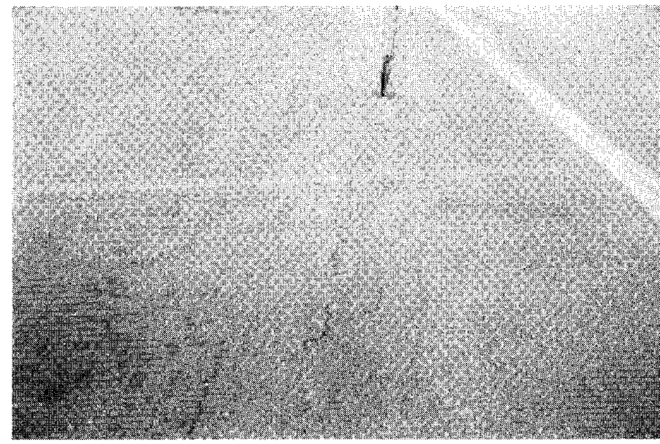


FIG. X1.1 Low-Severity Alligator Cracking

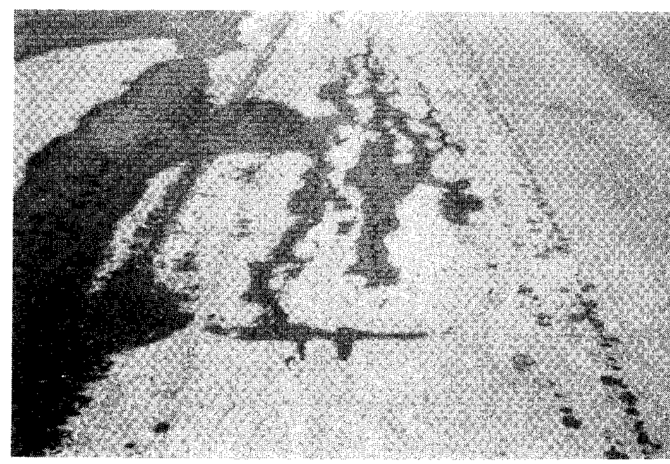


FIG. X1.2 Low-Severity Alligator Cracking

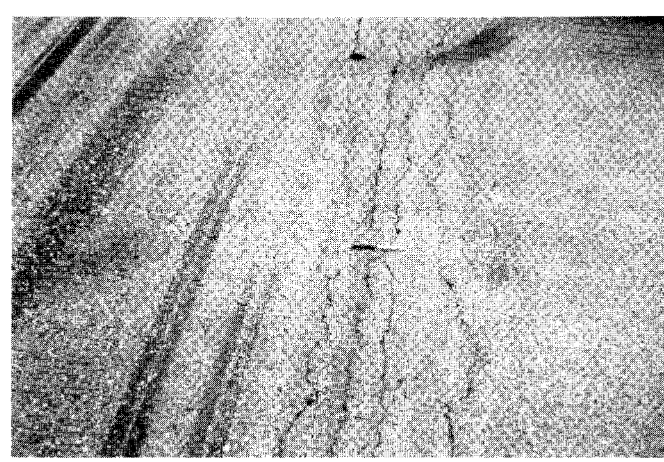


FIG. X1.3 Low-Severity Alligator Cracking, Approaching Medium Severity

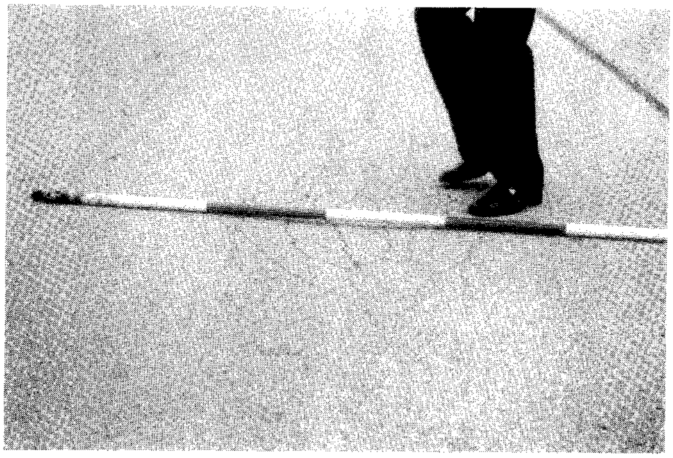


FIG. X1.4 Medium-Severity Alligator Cracking (Note the Depression Occurring with the Cracking)

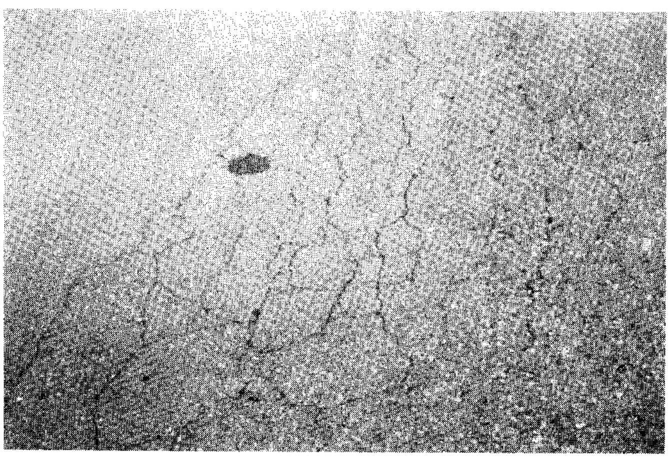


FIG. X1.5 Medium-Severity Alligator Cracking

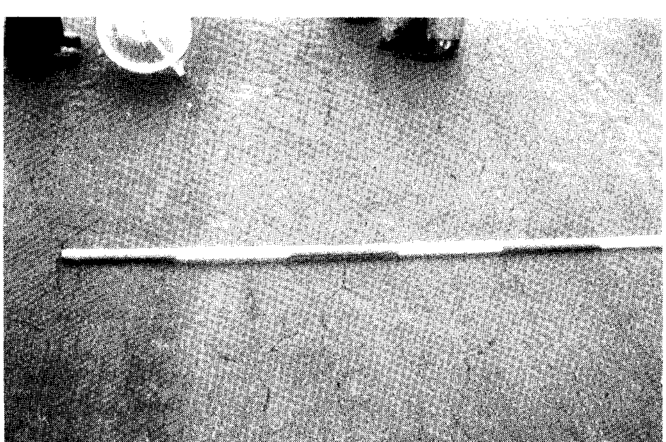


FIG. X1.6 Medium-Severity Alligator Cracking

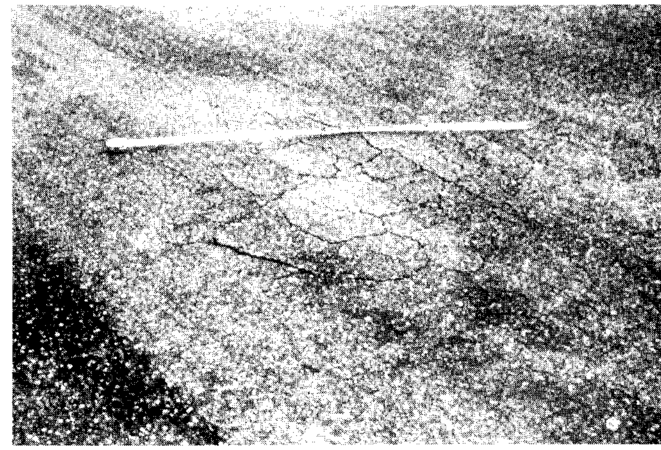


FIG. X1.7 Medium-Severity Alligator Cracking, Approaching High Severity (Example 1)

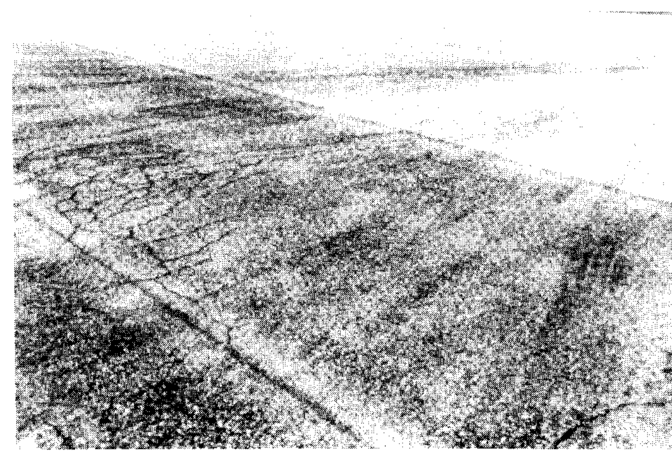


FIG. X1.8 Medium-Severity Alligator Cracking, Approaching High Severity (Example 2)

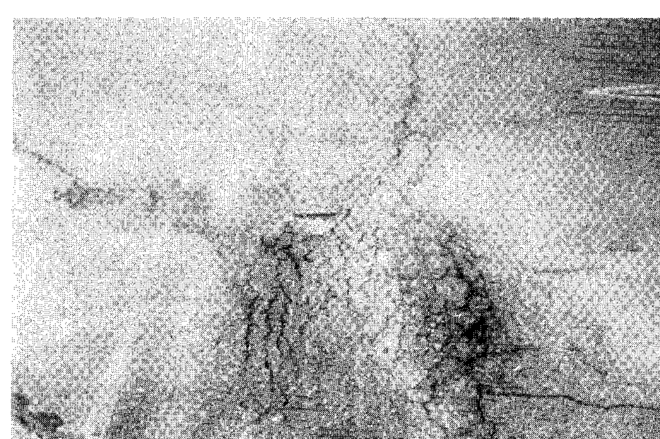


FIG. X1.9 High-Severity Alligator Cracking

X1.2.4.3 *H (High)*—Network or pattern cracking has progressed so that the pieces are well defined and spalled at the edges; some of the pieces rock under traffic and may cause FOD potential (see Fig. X1.9).

X1.2.5 *How to Measure*—Alligator cracking is measured in square feet (square metres) of surface area. The major difficulty in measuring this type of distress is that many times two or three levels of severity exist within one distressed area. If these portions can be easily distinguished from one another, they should be measured and recorded separately. However, if the different levels of severity cannot be easily divided, the entire area should be rated at the highest severity level present. If alligator cracking and rutting occur in the same area, each is recorded separately as its respective severity level.

X1.3 *Bleeding:*

X1.3.1 *Description*—Bleeding is a film of bituminous material on the pavement surface that creates a shiny, glass-like, reflecting surface that usually becomes quite sticky. Bleeding is caused by excessive amounts of asphaltic cement or tars in the mix or low-air void content, or both. It occurs when asphalt fills the voids of the mix during hot weather and then expands out onto the surface of the pavement. Since the bleeding process is not reversible during cold weather, asphalt or tar will accumulate on the surface.

X1.3.2 *Severity Levels*—No degrees of severity are defined (see Fig. X1.10 and Fig. X1.11).

X1.3.3 *How to Measure*—Bleeding is measured in square feet (square metres) of surface area.

X1.4 *Block Cracking:*

X1.4.1 *Description*—Block cracks are interconnected cracks that divide the pavement into approximately rectangular pieces. The blocks may range in size from approximately 1 by 1 ft to 10 by 10 ft (0.3 by 0.3 m to 3 by 3 m). Block cracking is caused mainly by shrinkage of the AC and daily temperature cycling (that results in daily stress/strain cycling). It is not load associated. The occurrence of block cracking usually indicates that the asphalt has hardened significantly. Block cracking normally occurs over a large portion of pavement area, but sometimes will occur only in nontraffic areas. This type of distress differs from alligator cracking in that the alligator cracks form smaller, many-sided pieces with sharp angles. Also unlike block cracks, alligator cracks are caused by repeated traffic loadings and are, therefore, located only in traffic areas (that is, wheel paths).

X1.4.2 *Severity Levels:*

X1.4.2.1 *L*—Blocks are defined by cracks that are nonspalled (sides of the crack are vertical) or lightly spalled, causing no FOD potential. Nonfilled cracks have ¼ in. (6 mm) or less mean width and filled cracks have filler in satisfactory condition (see Figs. X1.12-X1.15).

X1.4.2.2 *M*—Blocks are defined by either: filled or nonfilled cracks that are moderately spalled (some FOD potential); nonfilled cracks that are not spalled or have only minor spalling

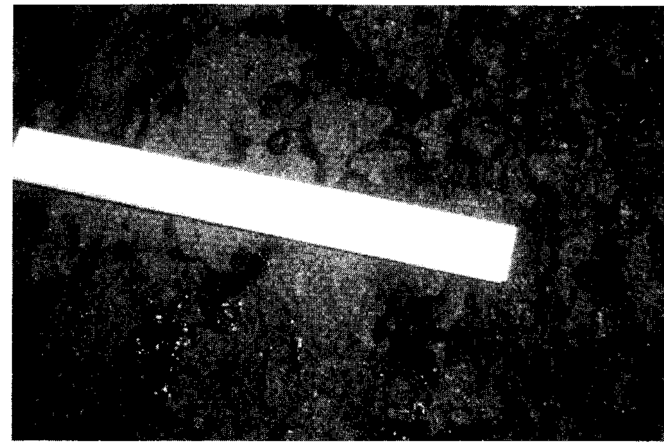


FIG. X1.11 Close-Up of Fig. X1.10

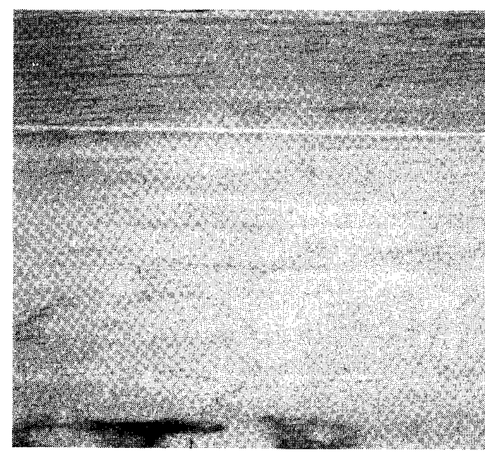


FIG. X1.12 Low-Severity Block Cracking

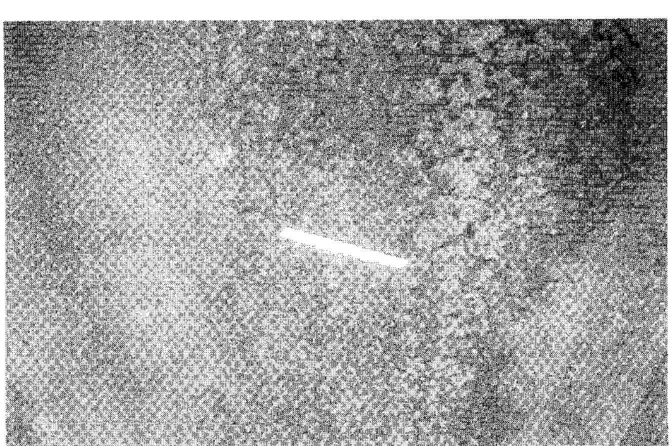


FIG. X1.10 Bleeding

FIG. X1.13 Low-Severity Block Cracking, Filled Cracks

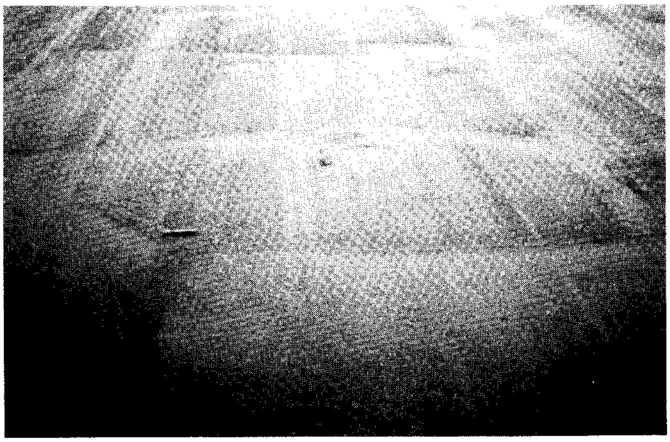


FIG. X1.14 Low-Severity Block Cracking, Filled Cracks

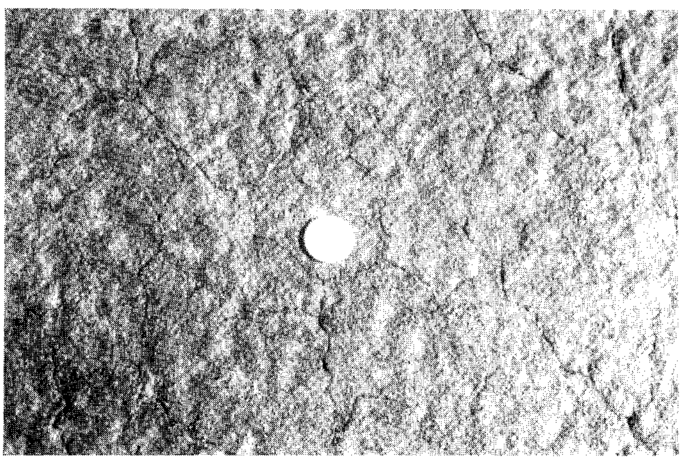


FIG. X1.15 Low-Severity Block Cracking, Small Blocks Defined by Hairline Cracks

(some FOD potential), but have a mean width greater than approximately ¼ in. (6 mm); or filled cracks greater than ¼ in. that are not spalled or have only minor spalling (some FOD potential), but have filler in unsatisfactory condition (see Fig. X1.16 and Fig. X1.17).

FIG. X1.16 Medium-Severity Block Cracking

FIG. X1.17 Medium-Severity Block Cracking

X1.4.2.3 *H*—Blocks are well defined by cracks that are severely spalled, causing a definite FOD potential (see Figs. X1.18-X1.20).

X1.4.3 *How to Measure*—Block cracking is measured in square feet (square metres) of surface area, and usually occurs at one severity level in a given pavement section; however, any areas of the pavement section having distinctly different levels of severity should be measured and recorded separately. For asphalt pavements, not including AC over PCC, if block cracking is recorded, no longitudinal and transverse cracking should be recorded in the same area. For asphalt overlay over concrete, block cracking, joint reflection cracking, and longitudinal and transverse cracking reflected from old concrete should all be recorded separately.

X1.5 *Corrugation:*

X1.5.1 *Description*—Corrugation is a series of closely spaced ridges and valleys (ripples) occurring at fairly regular intervals (usually less than 5 ft) (1.5 m) 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.

X1.5.2 *Severity Levels:*

FIG. X1.18 High-Severity Block Cracking

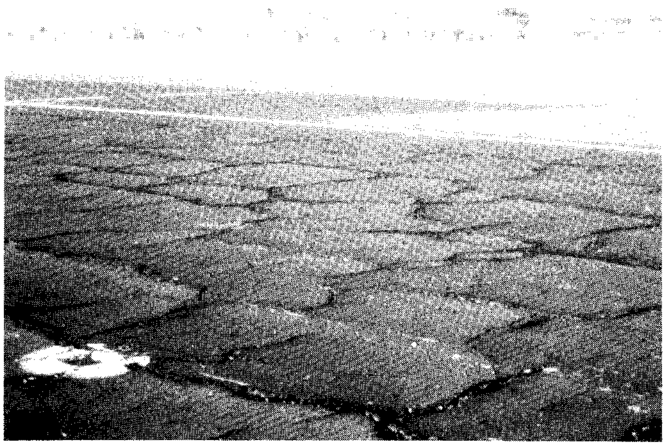


FIG. X1.19 High-Severity Block Cracking

FIG. X1.20 High-Severity Block Cracking

X1.5.2.1 *L*—Corrugations are minor and do not significantly affect ride quality (see measurement criteria below) (see Fig. X1.21).

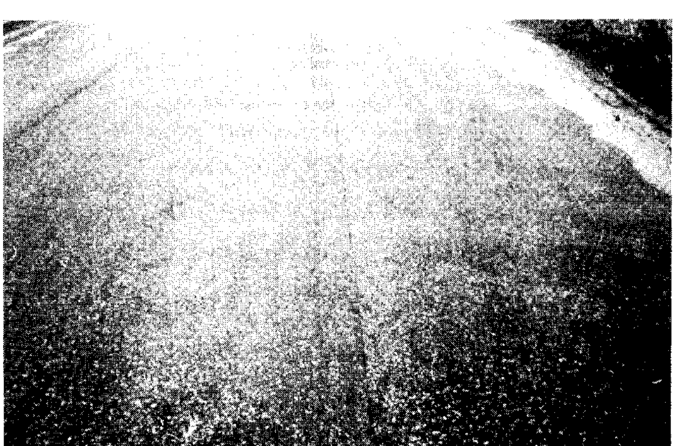


FIG. X1.21 Low-Severity Corrugation in the Foreground, Changing to Medium and High in the Background

X1.5.2.2 *M*—Corrugations are noticeable and significantly affect ride quality (see measurement criteria below) (see Fig. X1.22).

X1.5.2.3 *H*—Corrugations are easily noticed and severely affect ride quality (see measurement criteria below) (see Fig. X1.23).

X1.5.3 *How to Measure*—Corrugation is measured in square feet (square metres) of surface area. The mean elevation difference between the ridges and valleys of the corrugations indicates the level of severity. To determine the mean elevation difference, a 10-ft (3-m) straightedge should be placed perpendicular to the corrugations so that the depth of the valleys can be measured in inches (millimetres). The mean depth is calculated from five such measurements.

Severity	Runways and High-Speed Taxiways	Taxiways and Aprons
L	< ¼ in. (6 mm)	< ½ in. (13 mm)
M	¼ to ½ in. (6 to 13 mm)	½ to 1 in. (13 to 25 mm)
H	> ½ in. (13 mm)	> 1 in. (25 mm)

X1.6 *Depression:*

X1.6.1 *Description*—Depressions are localized pavement surface areas having elevations slightly lower than those of the surrounding pavement. In many instances, light depressions are not noticeable until after a rain, when ponding water creates "birdbath" areas; but the depressions can also be located without rain because of stains created by ponding of water. Depressions can be caused by settlement of the foundation soil or can be built during construction. Depressions cause roughness and, when filled with water of sufficient depth, could cause hydroplaning of aircraft.

X1.6.2 *Severity Levels:*

X1.6.2.1 *L*—Depression can be observed or located by stained areas, only slightly affects pavement riding quality, and may cause hydroplaning potential on runways (see measurement criteria below) (see Fig. X1.24).

X1.6.2.2 *M*—The depression can be observed, moderately affects pavement riding quality, and causes hydroplaning potential on runways (see measurement criteria below) (see Fig. X1.25 and Fig. X1.26).

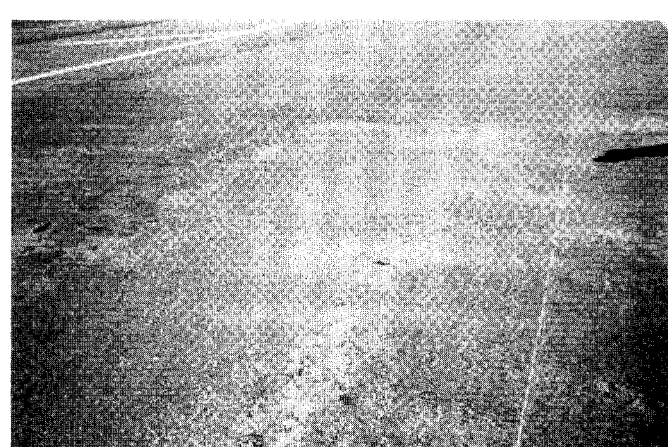


FIG. X1.22 Medium-Severity Corrugation

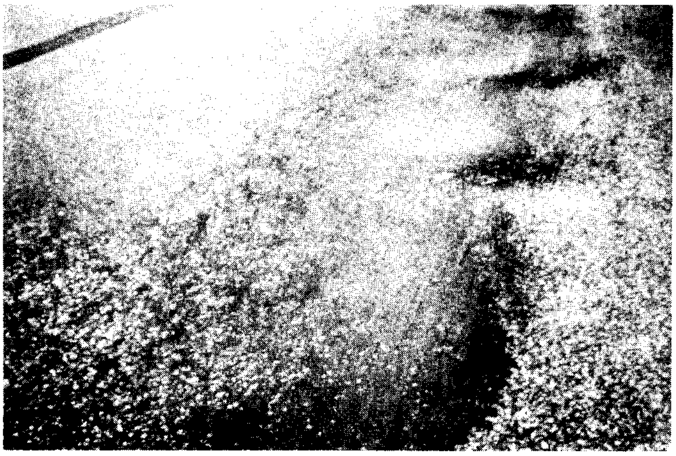


FIG. X1.23 High-Severity Corrugation

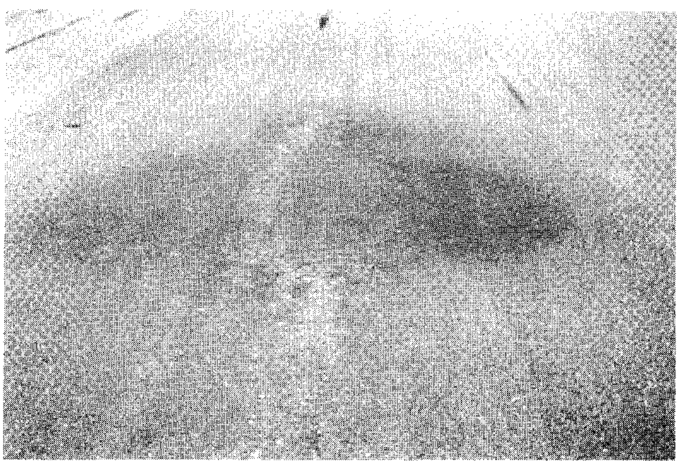


FIG. X1.24 Low-Severity Depression

FIG. X1.25 Medium-Severity Depression (1½ in. (37.5 mm))

X1.6.2.3 *H*—The depression can be readily observed, severely affects pavement riding quality, and causes definite hydroplaning potential (see measurement criteria below) (see Fig. X1.27).

FIG. X1.26 Medium-Severity Depression

FIG. X1.27 High-Severity Depression (2 in. (50 mm))

X1.6.3 *How to Measure*—Depressions are measured in square feet (square metres) of surface area. The maximum depth of the depression determines the level of severity. This depth can be measured by placing a 10-ft (3-m) straightedge across the depressed area and measuring the maximum depth in inches (millimetres). Depressions larger than 10 ft (3 m) across must be measured by using a stringline:

Severity	Maximum Depth of Depression: Runways and High-Speed Taxiways	Maximum Depth of Depression: Taxiways and Aprons
L	⅛ to ½ in. (3 to 13 mm)	½ to 1 in. (13 to 25 mm)
M	½ to 1 in. (13 to 25 mm)	1 to 2 in. (25 to 51 mm)
H	> 1 in. (> 25 mm)	> 2 in. (> 51 mm)

X1.7 *Jet-Blast Erosion:*

X1.7.1 *Description*—Jet-blast erosion causes darkened areas on the pavement surface where bituminous binder has been burned or carbonized. Localized burned areas may vary in depth up to approximately ½ in. (13 mm).

X1.7.2 *Severity Levels*—No degrees of severity are defined. It is sufficient to indicate that jet-blast erosion exists (see Fig. X1.28 and Fig. X1.29).

X1.7.3 *How to Measure*—Jet-blast erosion is measured in square feet (square metres) of surface area.

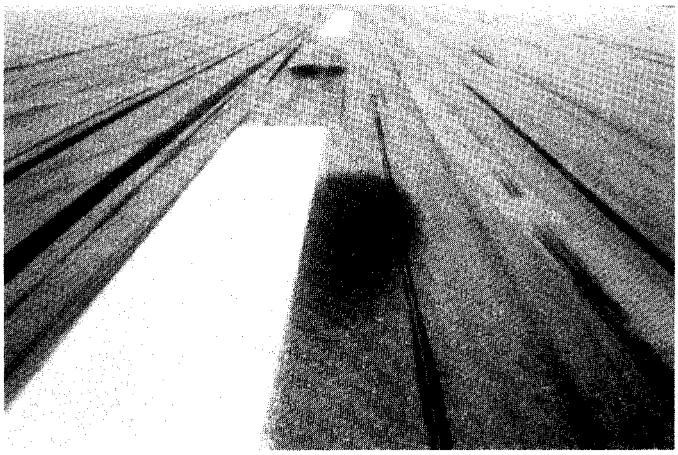


FIG. X1.28 Jet-Blast Erosion

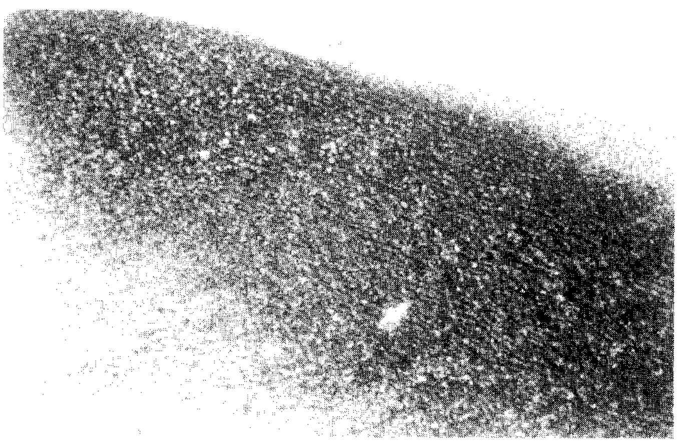


FIG. X1.29 Jet-Blast Erosion

FIG. X1.30 Low-Severity Joint Reflection Cracking

X1.8 *Joint Reflection Cracking From PCC (Longitudinal and Transverse):*

X1.8.1 *Description*—This distress occurs only on pavements having an asphalt or tar surface over a PCC slab. This category does not include reflection cracking from any other type of base (that is, cement stabilized, lime stabilized). Such cracks are listed as longitudinal and transverse cracks. Joint reflection cracking is caused mainly by movement of the PCC slab beneath the AC surface because of thermal and moisture changes; it is not load-related. However, traffic loading may cause a breakdown of the AC near the crack, resulting in spalling and FOD potential. If the pavement is fragmented along a crack, the crack is said to be spalled. A knowledge of slab dimensions beneath the AC surface will help to identify these cracks.

X1.8.2 *Severity Levels:*

X1.8.2.1 *L*—Cracks have only light spalling (little or no FOD potential) or no spalling, and can be filled or nonfilled. If nonfilled, the cracks have a mean width of ¼ in. (6 mm) or less; filled cracks are of any width, but their filler material is in satisfactory condition (see Figs. X1.30-X1.32).

X1.8.2.2 *M*—One of the following conditions exists: cracks are moderately spalled (some FOD potential) and can be either filled or nonfilled of any width; filled cracks are not spalled or are lightly spalled, but filler is in unsatisfactory condition; nonfilled cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼ in. (6 mm); or light random cracking exists near the crack or at the corners of intersecting cracks (see Figs. X1.33-X1.35).

X1.8.2.3 *H*—Cracks are severely spalled with pieces loose or missing causing definite FOD potential. Cracks can be either filled or nonfilled of any width (see Fig. X1.36).

X1.8.3 *How to Measure*—Joint reflection cracking is measured in linear feet (metres). The length and severity level of each crack should be identified and recorded. If the crack does not have the same severity level along its entire length, each portion should be recorded separately. For example, a crack that is 50 ft (15 m) long may have 10 ft (3 m) of a high severity, 20 ft (6 m) of a medium severity, and 20 ft (6 m) of a light severity. These would all be recorded separately. If the different levels of severity in a portion of a crack cannot be easily divided, that portion should be rated at the highest severity present.

X1.9 *Longitudinal and Transverse Cracking (Non-PCC Joint Reflective):*

FIG. X1.31 Low-Severity Joint Reflection Cracking, Filled Crack

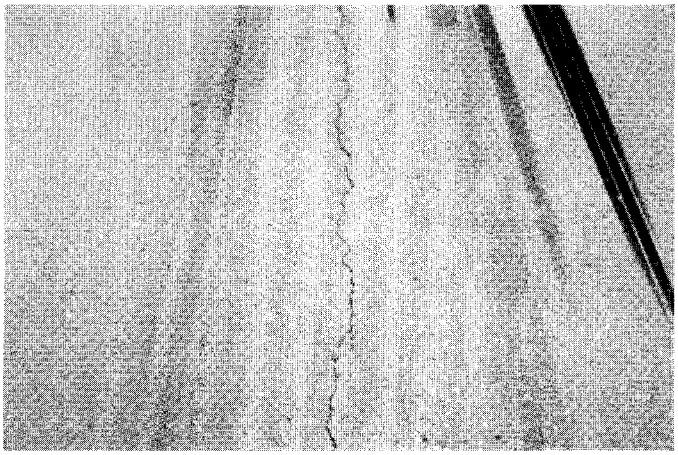


FIG. X1.32 Low-Severity Joint Reflection Cracking, Nonfilled Crack

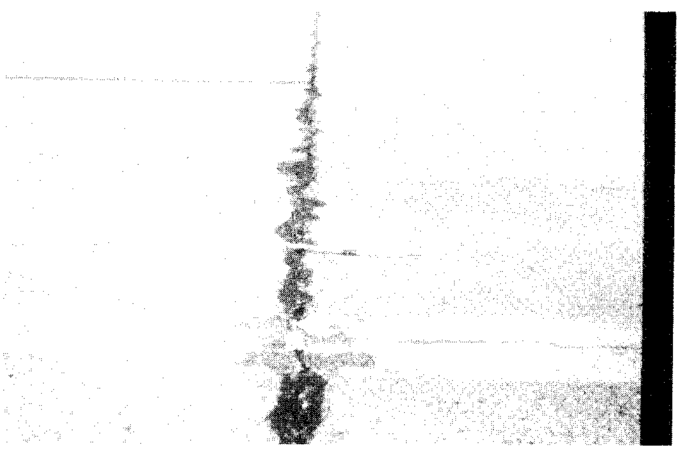


FIG. X1.33 Medium-Severity Joint Reflection Cracking

FIG. X1.34 Medium-Severity Joint Reflection Cracking

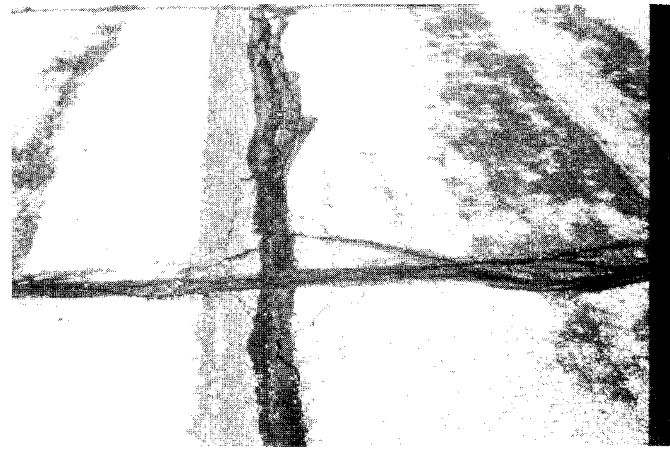


FIG. X1.35 Medium-Severity Joint Reflection Cracking

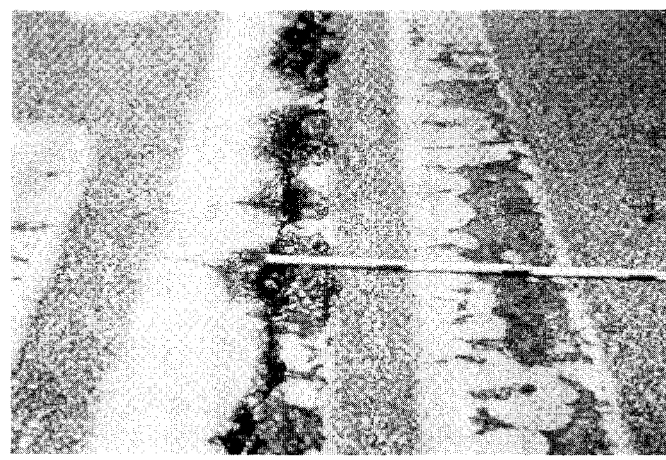


FIG. X1.36 High-Severity Joint Reflection Cracking

X1.9.1 *Description*—Longitudinal cracks are parallel to the pavement's center line or laydown direction. They may be caused by (*1*) a poorly constructed paving lane joint, (*2*) shrinkage of the AC surface due to low temperatures or hardening of the asphalt, or (*3*) a reflective crack caused by cracks beneath the surface course, including cracks in PCC slabs (but not at PCC joints). Transverse cracks extend across the pavement at approximately right angles to the pavement's center line or direction of laydown. They may be caused by (*2*) or (*3*). These types of cracks are not usually load associated. If the pavement is fragmented along a crack, the crack is said to be spalled.

X1.9.2 *Severity Levels:*

X1.9.2.1 *L*—Cracks have only light spalling (little or no FOD potential) or no spalling, and can be filled or nonfilled. If nonfilled, the cracks have a mean width of ¼ in. (6 mm) or less; filled cracks are of any width, but their filler material is in satisfactory condition (see Fig. X1.37 and Fig. X1.38).

X1.9.2.2 *M*—One of the following conditions exists: (*1*) cracks are moderately spalled (some FOD potential) and can be either filled or nonfilled of any width; (*2*) filled cracks are not spalled or are lightly spalled, but filler is in unsatisfactory condition; (*3*) nonfilled cracks are not spalled or are only lightly spalled, but the mean crack width is greater than ¼ in. (6 mm), or (*4*) light random cracking exists near the crack or at the corners of intersecting cracks (see Figs. X1.39-X1.41).

X1.9.2.3 *H*—Cracks are severely spalled and pieces are loose or missing causing definite FOD potential. Cracks can be either filled or nonfilled of any width (see Fig. X1.42).

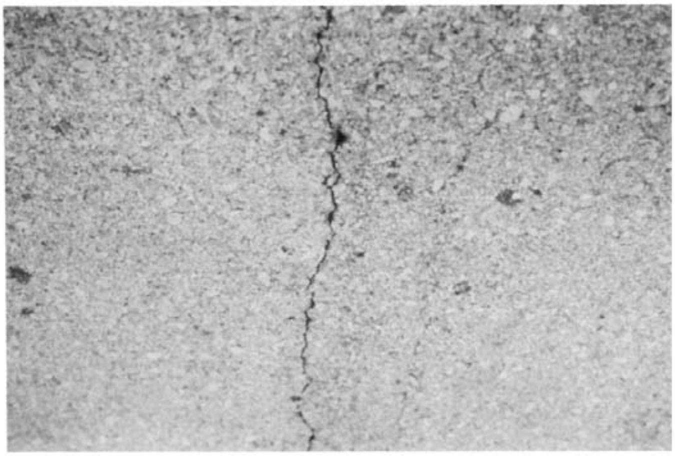


FIG. X1.37 Low-Severity Longitudinal Crack

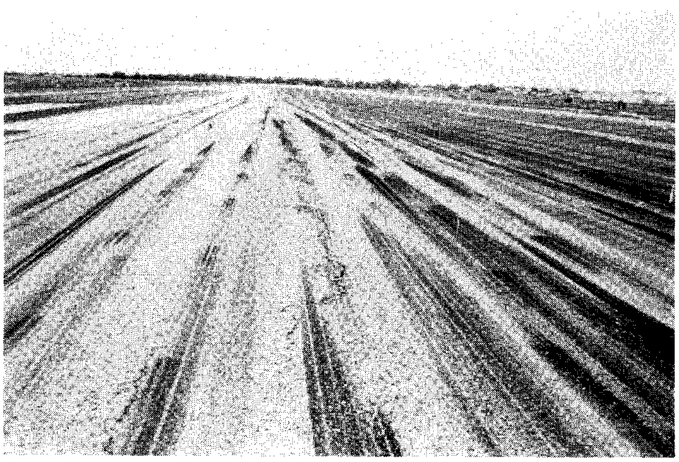


FIG. X1.38 Low-Severity Longitudinal Cracks, Approaching Medium

FIG. X1.39 Medium-Severity Longitudinal Construction Joint Crack

FIG. X1.40 Medium-Severity Longitudinal Crack (Note the Crack is Reflective But Not at the Joint of Slab)

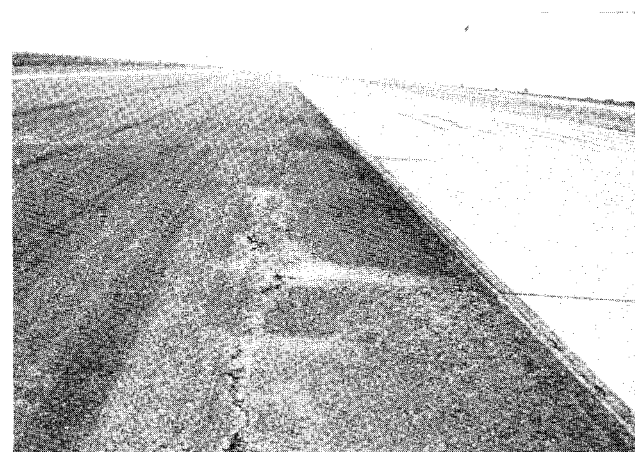


FIG. X1.41 Medium-Severity Longitudinal Crack

FIG. X1.42 High-Severity Longitudinal Crack

X1.9.3 *Porous Friction Courses: Severity Levels:*

X1.9.3.1 *L*—Average raveled area around the crack is less than ¼ in. (6 mm) wide (see Fig. X1.43).

X1.9.3.2 *M*—Average raveled area around the crack is between ¼ to 1 in. (6 to 25 mm) wide (see Fig. X1.44).

X1.9.3.3 *H*—Average raveled area around the crack is greater than 1 in. (25 mm) wide (see Fig. X1.45).

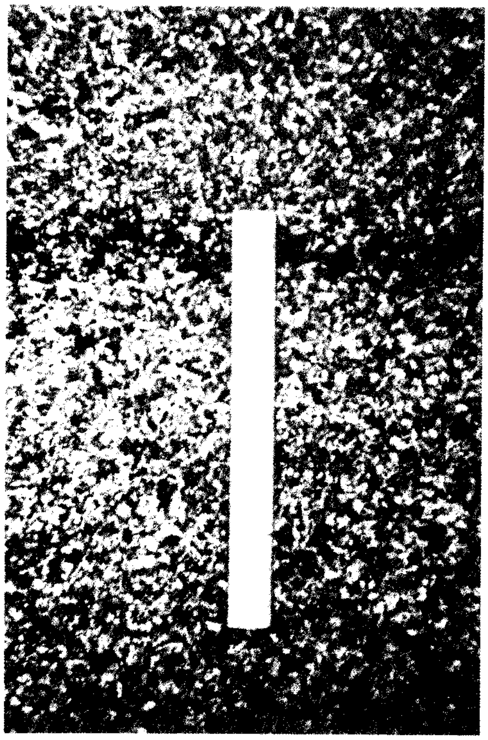


FIG. X1.43 Low-Severity Crack in Porous Friction Course

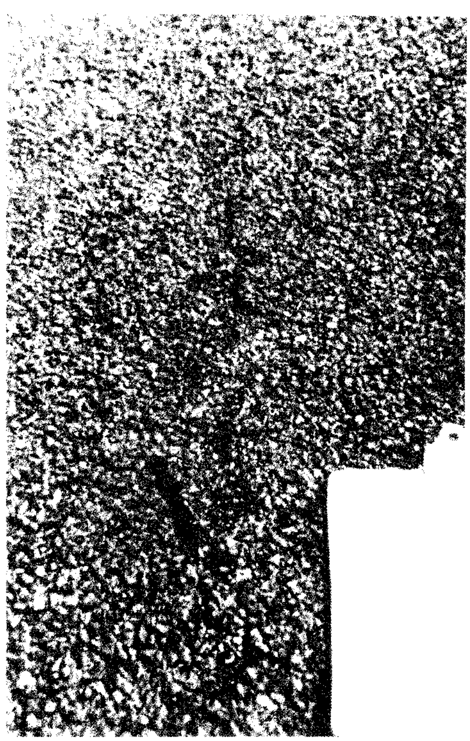


FIG. X1.44 Medium-Severity Crack in Porous Friction Course

X1.9.4 *How to Measure*—Longitudinal and transverse cracks are measured in linear feet (metres). The length and severity of each crack should be identified and recorded. If the crack does not have the same severity level along its entire length, each portion of the crack having a different severity level should be recorded separately. For an example see "Joint Reflection Cracking." If block cracking is recorded, longitudinal and transverse cracking is not recorded in the same area.

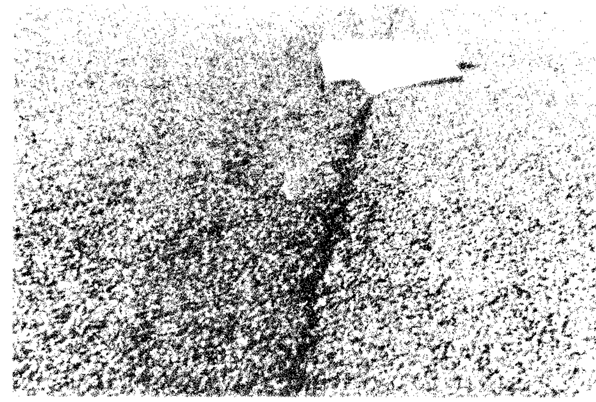


FIG. X1.45 High-Severity Crack in Porous Friction Course

X1.10 *Oil Spillage:*

X1.10.1 *Description*—Oil spillage is the deterioration or softening of the pavement surface caused by the spilling of oil, fuel, or other solvents.

X1.10.2 *Severity Levels*—No degrees of severity are defined. It is sufficient to indicate that oil spillage exists (see Fig. X1.46 and Fig. X1.47).

X1.10.3 *How to Measure*—Oil spillage is measured in square feet (square metres) of surface area. A stain is not a distress unless material has been lost or binder has been softened. If hardness is approximately the same as on surrounding pavement, and if no material has been lost, do not record as a distress.

X1.11 *Patching and Utility Cut Patch:*

X1.11.1 *Description*—A patch is considered a defect, no matter how well it is performing.

X1.11.2 *Severity Levels:*

X1.11.2.1 *L*—Patch is in good condition and is performing satisfactorily (see Figs. X1.48-X1.50).

FIG. X1.46 Oil Spillage

FIG. X1.47 Oil Spillage

FIG. X1.48 Low-Severity Patch

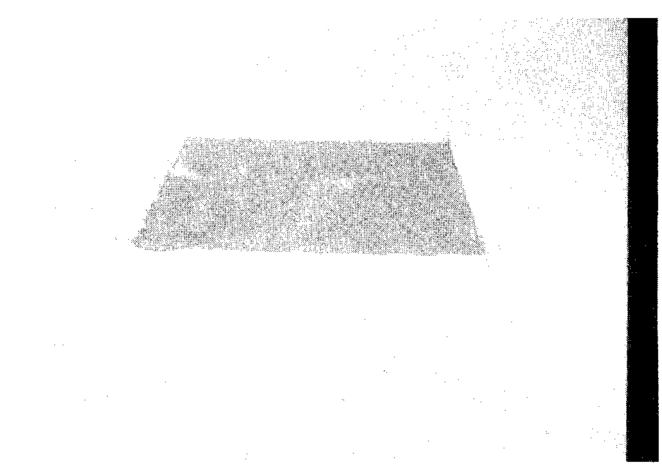


FIG. X1.49 Low-Severity Patch

FIG. X1.50 Low-Severity Patch with Medium-Severity Portion

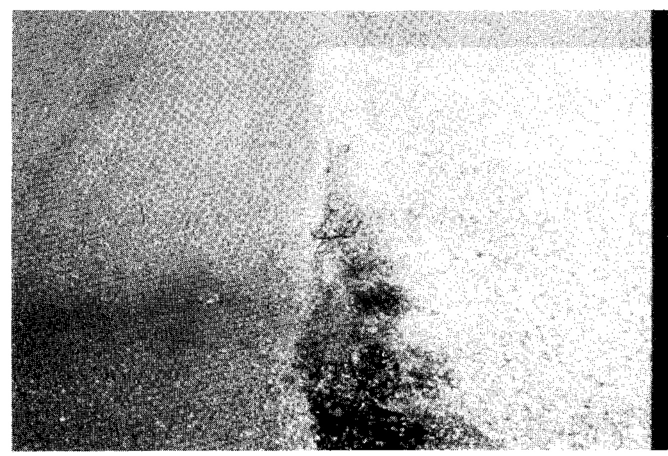


FIG. X1.51 Medium-Severity Patch

FIG. X1.52 High-Severity Patch

X1.11.2.2 *M*—Patch is somewhat deteriorated and affects ride quality to some extent. Moderate amount of distress is present within the patch or has FOD potential, or both. (see Fig. X1.51).

X1.11.2.3 *H*—Patch is badly deteriorated and affects ride quality significantly or has high FOD potential. Patch soon needs replacement.

X1.11.3 *Porous Friction Courses*—The use of dense-graded AC patches in porous friction surfaces causes a water damming effect at the patch which contributes to differential skid

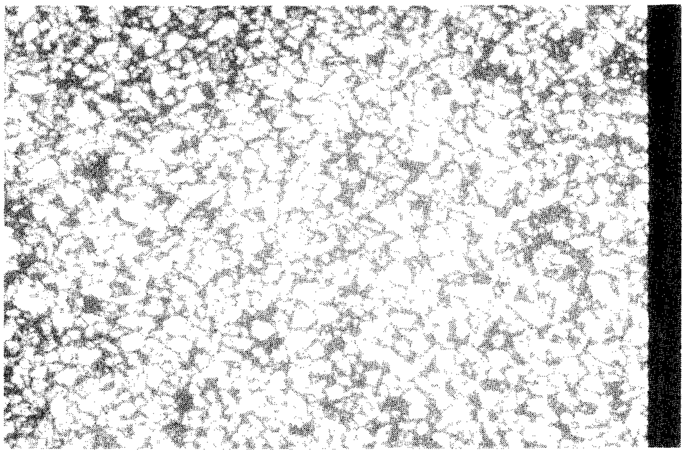


FIG. X1.53 Polished Aggregate

resistance of the surface. Low-severity dense-graded patches should be rated as medium severity due to the differential friction problem. Medium- and high-severity patches are rated the same as above.

X1.11.4 *How to Measure:*

X1.11.4.1 Patching is measured in square feet (square metres) of surface area. However, if a single patch has areas of differing severity levels, these areas should be measured and recorded separately. For example, a 25-ft^2 (2.5-m^2) patch may have 10 ft^2 (1 m^2) of medium severity and 15 ft^2 (1.5 m^2) of low severity. These areas should be recorded separately. Any distress found in a patched area will not be recorded; however, its effect on the patch will be considered when determining the patch's severity level.

X1.11.4.2 A very large patch, (area > 2500 ft^2 (230 m^2)) or feathered-edge pavement, may qualify as an additional sample unit or as a separate section.

X1.12 *Polished Aggregate:*

X1.12.1 *Description*—Aggregate polishing is caused by repeated traffic applications. Polished aggregate is present when close examination of a pavement reveals that the portion of aggregate extending above the asphalt is either very small, or there are no rough or angular aggregate particles to provide good skid resistance.

X1.12.2 *Severity Levels*—No degrees of severity are defined. However, the degree of polishing should be clearly evident in the sample unit, in that the aggregate surface should be smooth to the touch.

X1.12.3 *How to Measure*—Polished aggregate is measured in square feet (square metres) of surface area. Polished aggregate areas should be compared visually with adjacent nontraffic areas. If the surface texture is substantially the same in both traffic and nontraffic areas, polished aggregate should not be counted.

X1.13 *Raveling:*

X1.13.1 *Description*—Raveling is the dislodging of coarse aggregate particles from the pavement surface.

X1.13.2 *Dense Mix Severity Levels*—As used herein, coarse aggregate refers to predominant coarse aggregate sizes of the asphalt mix. Aggregate clusters refer to when more than one adjoining coarse aggregate piece is missing. If in doubt about a severity level, three representative areas of one square yard each (one square meter) should be examined and the number of missing coarse aggregate particles counted.

X1.13.2.1 *L*—(*1*) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is between 5 and 20, and/or (*2*) missing aggregate clusters are less than 2 percent of the examined square yard (square meter) area. In low severity raveling, there is little or no FOD potential (see Figs. X1.54 and X1.55).

X1.13.2.2 *M*—(*1*) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is between 21 and 40, and/or (*2*) missing aggregate clusters are between 2 and 10 percent of the examined square yard (square meter) area. In medium severity raveling, there is some FOD potential (see Fig. X1.56).

X1.13.2.3 *H*—(*1*) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is over 40, and/or (*2*) missing aggregate clusters are more than 10 percent of the examined square yard (square meter) area. In high severity raveling, there is significant FOD potential (see Fig. X1.57).

X1.13.3 *Slurry Seal/Coal Tar Over Dense Mix Severity Levels*

X1.13.3.1 *L*—(*1*) The scaled area is less than 1 %. (*2*) In the case of coal tar where pattern cracking has developed, the surface cracks are less than ¼ in. (6 mm) wide (see Fig. X1.58).

X1.13.3.2 *M*—(*1*) The scaled area is between 1 and 10 %. (*2*) In the case of coal tar where pattern cracking has developed, the cracks are ¼ in. (6 mm) wide or greater (see Fig. X1.59).

X1.13.3.3 *H*—(*1*) The scaled area is over 10 %. (*2*) In the case of coal tar the surface is peeling off (see Fig. X1.60).

X1.13.4 *Porous Friction Course Severity Levels (see Figs. X1.61-X1.65):*

FIG. X1.54 Low-Severity Raveling, Dense Mix

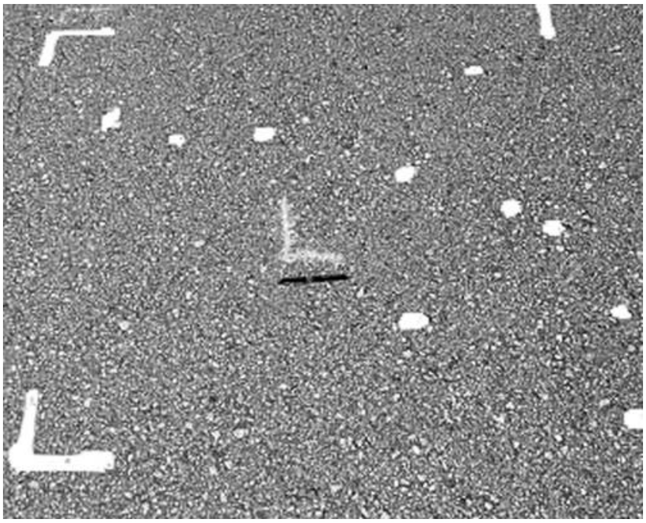


FIG. X1.55 Low-Severity Raveling, Dense Mix

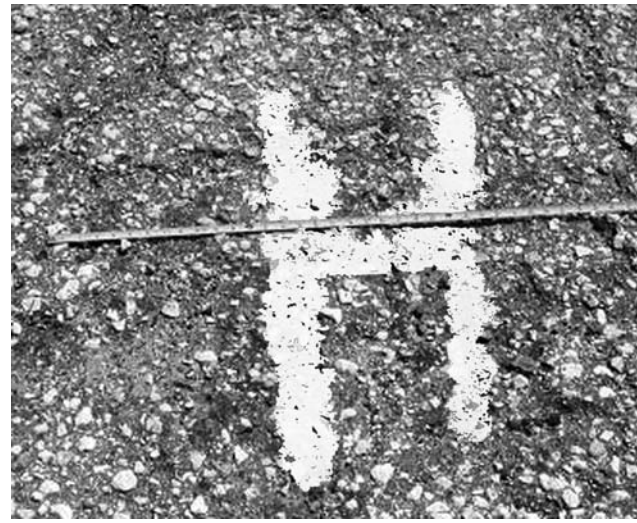


FIG. X1.57 High-Severity Raveling, Dense Mix

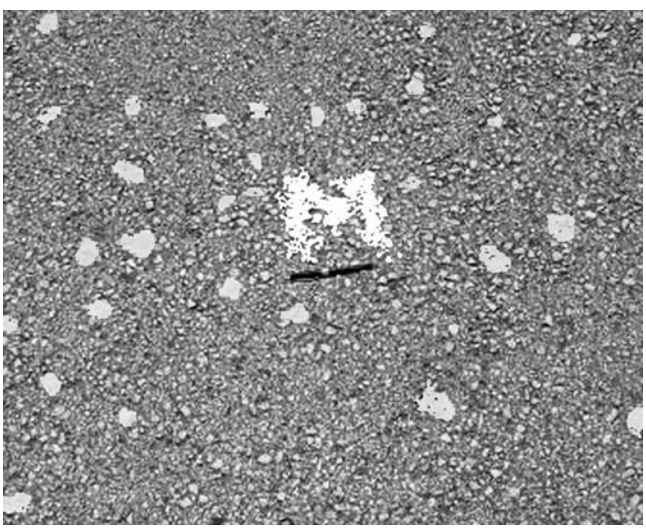


FIG. X1.56 Medium-Severity Raveling, Dense Mix

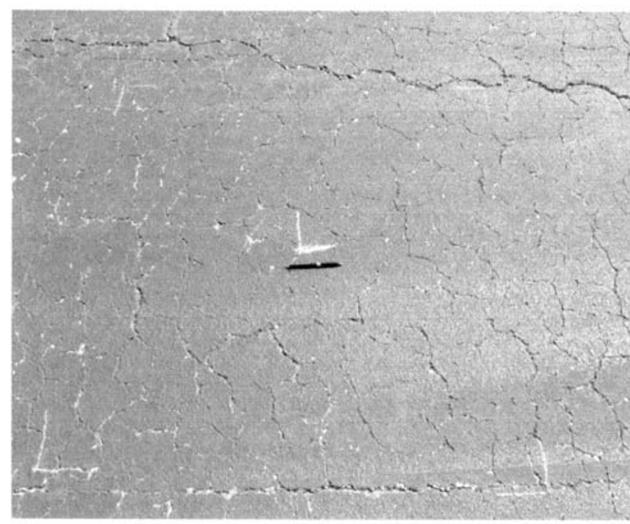


FIG. X1.58 Low-Severity Raveling, Cold Tar

X1.13.4.1 *L*—(*1*) In a square foot (1⁄10 square meter) representative sample, the number of aggregate pieces missing is between 5 and 20 and/or the number of missing aggregate clusters does not exceed 1 (see Fig. X1.63).

X1.13.4.2 *M*—(*1*) In a square foot (1⁄10 square meter) representative sample, the number of aggregate pieces missing is between 21 and 40 and/or the number of missing aggregate clusters is greater than 1 but does not exceed 25 % of the area (see Fig. X1.64).

X1.13.4.3 *H*—(*1*) In a square foot (1⁄10 square meter) representative sample, the number of aggregate pieces missing is over 40 and/or the number of missing aggregate clusters is greater than 25 % of the area (see Fig. X1.65).

X1.13.5 *How to Measure*—Raveling is measured in square feet (square metres) of surface area. Mechanical damage caused by hook drags, tire rims, or snowplows is counted as areas of high severity raveling.

X1.14 *Rutting:*

X1.14.1 *Description*—A rut is a surface depression in the wheel path. Pavement uplift may occur along the sides of the rut; however, in many instances ruts are noticeable only after a rainfall, when the wheel paths are filled with water. Rutting stems from a permanent deformation in any of the pavement layers or subgrade, usually caused by consolidation or lateral movement of the materials due to traffic loads. Significant rutting can lead to major structural failure of the pavement.

X1.14.2 *Severity Levels:*

Severity	Mean Rut Depth Criteria All Pavement Sections	Figure
L	¼ to ½ in. (< 6 to 13 mm)	Fig. X1.66 and Fig. X1.67
M	> ½ to 1 in. (> 13 to < 25 mm)	Fig. X1.68
H	> 1 in. (> 25 mm)	Fig. X1.69 and Fig. X1.70

X1.14.3 *How to Measure*—Rutting is measured in square feet (square metres) of surface area, and its severity is determined by the mean depth of the rut. To determine the mean depth, a straightedge should be laid across the rut and the

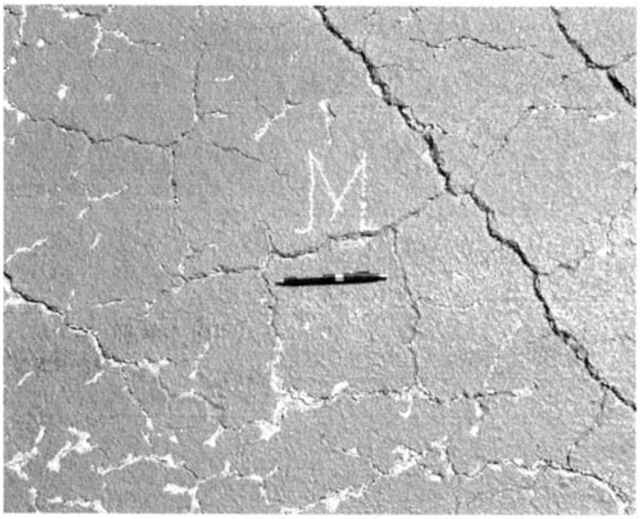


FIG. X1.59 Medium-Severity Raveling, Cold Tar

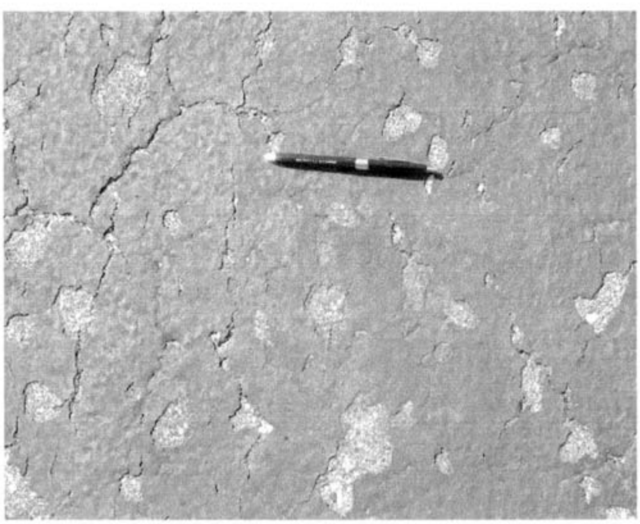


FIG. X1.60 High-Severity Raveling, Cold Tar

depth measured. The mean depth in inches (millimetres) should be computed from measurements taken along the length of the rut. If alligator cracking and rutting occur in the same area, each is recorded at the respective severity level.

X1.15 *Shoving of Asphalt Pavement by PCC Slabs:*

X1.15.1 *Description*—PCC pavements occasionally increase in length at ends where they adjoin flexible pavements (commonly referred to as "pavement growth"). This "growth" shoves the asphalt- or tar-surfaced pavements, causing them to swell and crack. The PCC slab "growth" is caused by a gradual opening up of the joints as they are filled with incompressible materials that prevent them from reclosing.

X1.15.2 *Severity Level:*

Severity	Height Differential
L	< ¾ in. (< 20 mm)
M	¾ to 1½ in. (> 20 to 40 mm)
H	> 1½ in. (> 40 mm)

FIG. X1.61 Typical Porous Friction Course Surface with No Raveling

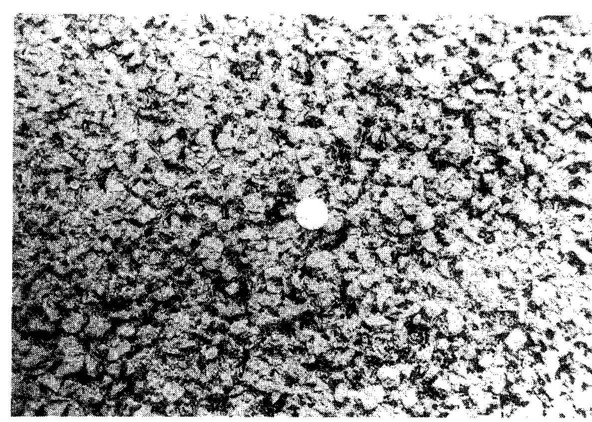


FIG. X1.62 Typical Porous Friction Course Surface with No Raveling

NOTE X1.2—As a guide, the swell table (above) may be used to determine the severity levels of shoving. At the present time, no significant research has been conducted to quantify levels of severity of shoving.

X1.15.2.1 *L*—A slight amount of shoving has occurred and no breakup of the asphalt pavement (see Fig. X1.71).

X1.15.2.2 *M*—A significant amount of shoving has occurred, causing moderate roughness and little or no breakup of the asphalt pavement (see Fig. X1.71).

X1.15.2.3 *H*—A large amount of shoving has occurred, causing severe roughness or breakup of the asphalt pavement (see Fig. X1.72).

X1.15.2.4 *How to Measure*—Shoving is measured by determining the area in square feet (square metres) of the swell caused by shoving.

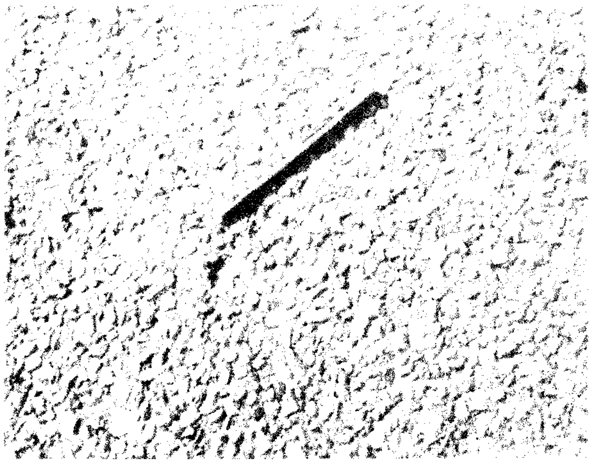


FIG. X1.63 Low-Severity Raveling on a Porous Friction Course Surface

FIG. X1.64 Medium-Severity Raveling on a Porous Friction Course Surface

X1.16 *Slippage Cracking:*

X1.16.1 *Description*—Slippage cracks are crescent- or half-moon-shaped cracks having two ends pointed away from the direction of traffic. They are produced when braking or turning wheels cause the pavement surface to slide and deform. This usually occurs when there is a low-strength surface mix or poor bond between the surface and next layer of pavement structure.

X1.16.2 *Severity Levels*—No degrees of severity are defined. It is sufficient to indicate that a slippage crack exists (see Fig. X1.73 and Fig. X1.74).

X1.16.3 *How to Measure*—Slippage cracking is measured in square feet (square metres) of surface area.

X1.17 *Swell-Distress:*

X1.17.1 *Description*—Swell is characterized by an upward bulge in the pavement's surface. A swell may occur sharply over a small area or as a longer, gradual wave. Either type of swell can be accompanied by surface cracking. A swell is usually caused by frost action in the subgrade or by swelling soil, but a small swell can also occur on the surface of an asphalt overlay (over PCC) as a result of a blowup in the PCC slab.

FIG. X1.65 High-Severity Raveling on a Porous Friction Course Surface

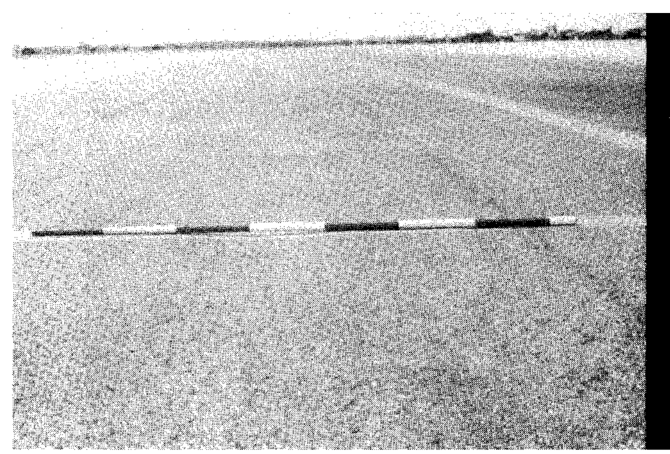


FIG. X1.66 Low-Severity Rutting

X1.17.2 *Severity Levels:*

X1.17.2.1 *L*—Swell is barely visible and has a minor effect on the pavement's ride quality. (Low-severity swells may not always be observable, but their existence can be confirmed by driving a vehicle over the section. An upward acceleration will occur if the swell is present) (see Fig. X1.75).

X1.17.2.2 *M*—Swell can be observed without difficulty and has a significant effect on the pavement's ride quality (see Fig. X1.76).

X1.17.2.3 *H*—Swell can be readily observed and severely affects the pavement's ride quality (see Fig. X1.77 and Fig. X1.78).

X1.17.3 *How to Measure:*

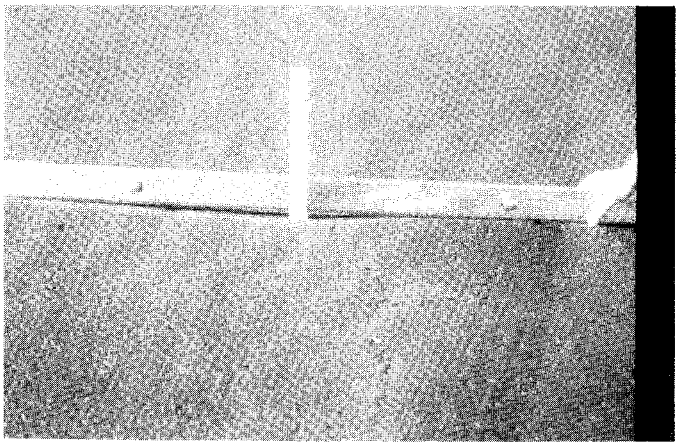


FIG. X1.67 Low-Severity Rutting

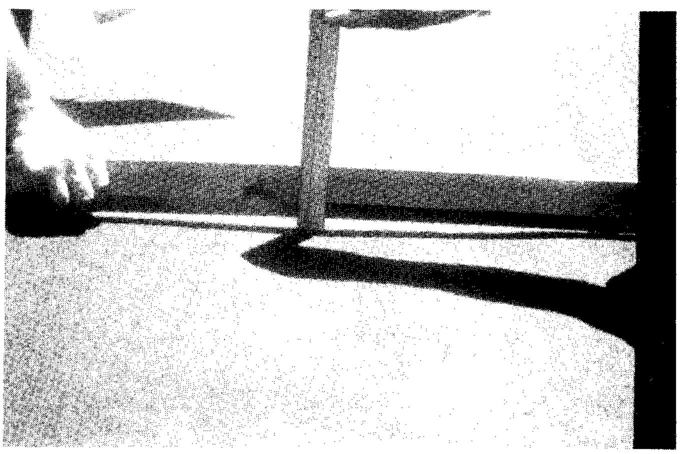


FIG. X1.68 Medium-Severity Rutting

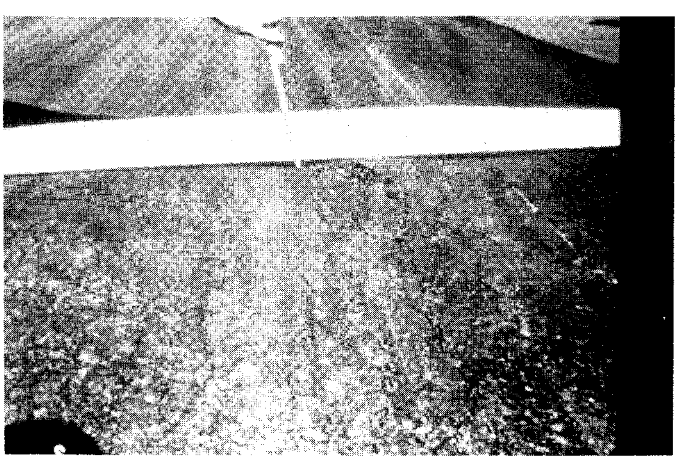


FIG. X1.69 High-Severity Rutting (Note Alligator Cracking Associated With Rutting)

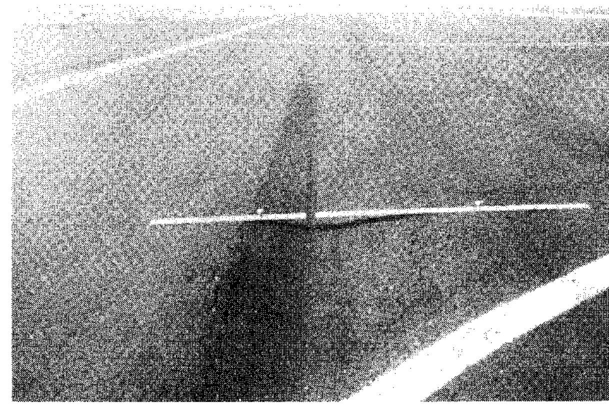


FIG. X1.70 High-Severity Rutting

FIG. X1.71 Shove of Low Severity on the Outside and Medium Severity in the Middle

FIG. X1.72 High-Severity Shoving

X1.17.3.1 The surface area of the swell is measured in square feet (square metres). The severity rating should consider the type of pavement section (that is, runway, taxiway, or apron). For example, a swell of sufficient magnitude to cause considerable roughness on a runway at high speeds would be rated as more severe than the same swell located on an apron or taxiway where the normal aircraft operating speeds are much lower.

FIG. X1.73 Slippage Cracking

FIG. X1.74 Slippage Cracking

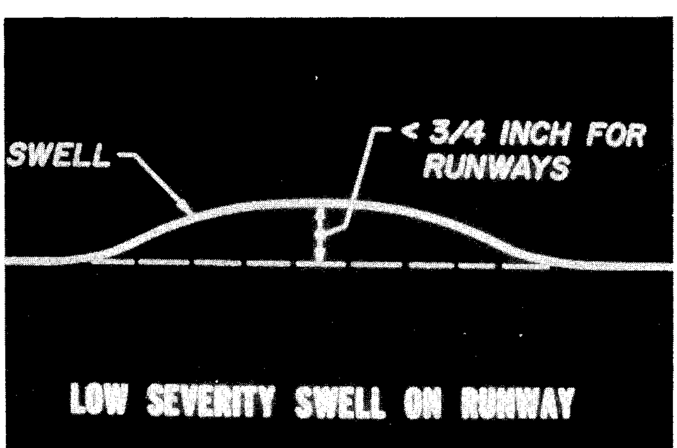


FIG. X1.75 Low-Severity Swell

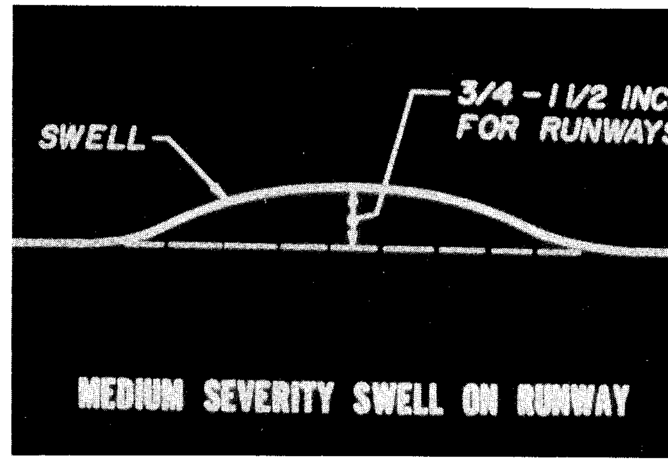


FIG. X1.76 Medium-Severity Swell

FIG. X1.77 High-Severity Swell

FIG. X1.78 High-Severity Swell

X1.17.3.2 For short wavelengths, locate the highest point of the swell. Rest at 10-ft (3-m) straightedge on that point so that both ends are equal distance above pavement. Measure this distance to establish severity rating.

X1.17.3.3 The following guidance is provided for runways:

Severity	Height Differential
L	< ¾ in. (20 mm)
M	¾ to 1½ in. (20 to 40 mm)
H	> 1½ in. (40 mm)

Rate severity on high-speed taxiways using measurement criteria provided above. Double the height differential criteria for other taxiways and aprons.

X1.18 *Weathering (Surface Wear)—Dense Mix Asphalt*

X1.18.1 *Description*—The wearing away of the asphalt binder and fine aggregate matrix from the pavement surface.

X1.18.2 *Severity Levels:*

X1.18.2.1 *L*—Asphalt surface beginning to show signs of aging which may be accelerated by climatic conditions. Loss is the fine aggregate matrix is noticeable and may be accompanied by fading of the asphalt color. Edges of the coarse aggregates are beginning to be exposed (less than 1 mm or 0.05 inches). Pavement may be relatively new (as new as 6 months old) (see Fig. X1.79).

X1.18.2.2 *M*—Loss of fine aggregate matrix is noticeable and edges of coarse aggregate have been exposed up to ¼ width (of the longest side) of the coarse aggregate due to the loss of fine aggregate matrix (see Fig. X1.80).

X1.18.2.3 *H*—Edges of coarse aggregate have been exposed greater than ¼ width (of the longest side) of the coarse aggregate. There is considerable loss of fine aggregate matrix leading to potential or some loss of coarse aggregate (see Fig. X1.81).

FIG. X1.79 Low-Severity Weathering (Surface Wear)

FIG. X1.80 Medium-Severity Weathering (Surface Wear)

FIG. X1.81 High-Severity Weathering (Surface Wear)

X1.18.3 *How to Measure*—Surface wear is measured in square feet (square meters). Surface wear is not recorded if medium or high severity raveling is recorded.

X2. PCI CONCRETE-SURFACED AIRFIELDS

NOTE X2.1—The sections in this appendix are arranged in the following order:

X2.1 *Distresses in Jointed Concrete Pavement:*

X2.1.1 Fifteen distress types for jointed concrete pavements are listed alphabetically. The distress definitions apply to both plain and reinforced jointed concrete pavements, with the exception of linear cracking distress, that is defined separately for plain and reinforced jointed concrete pavements.

X2.1.2 During field condition surveys and validation of the PCI, several questions were often asked regarding the identification and counting method of some of the distresses. The answers to most of these questions are included under the section "How to Count" for each distress. For convenience, however, the items that are frequently referenced are listed as follows:

X2.1.2.1 Spalling as used in this test method is the further breaking of the pavement or loss of materials around cracks and joints.

X2.1.2.2 The cracks in reinforced concrete slabs that are less than ⅛ in. (3 mm) wide are counted as "shrinkage cracks." The "shrinkage cracks" should not be counted in determining whether or not the slab is broken into four or more pieces (or "shattered").

X2.1.2.3 Crack widths should be measured between the vertical walls, not from the edge of spalls. Spalling and associated FOD potential are considered in determining the severity level of cracks, but they should not influence the crack width measurements.

X2.1.2.4 A crack filler is in satisfactory condition if it prevents water and incompressibles from entering the crack or joint.

X2.1.2.5 "Joint seal damage" is not counted on a slab-by-slab basis. Instead, the severity level is assigned based on the overall condition of the joint seal in the sample unit.

X2.1.2.6 Do not count a joint as spalled if it can be filled with joint filler.

X2.1.2.7 A premolded joint sealant is in satisfactory condition if it is pliable, firmly against the joint wall, and not extruded.

X2.1.2.8 A fragmented crack is actually two or more cracks in close proximity that meet below the surface forming a single channel to subbase. The multiple cracks are interconnected to form small fragments, or pieces, of pavement.

X2.1.2.9 A crack wider than 3 in. (75 mm) rates at high severity regardless of filler condition.

X2.1.2.10 A spalled or chipped crack edge is defined by secondary cracks, with or without missing pieces, nearly parallel to the primary crack. Individual stones or particles that are dislodged do not constitute spalling.

X2.1.2.11 Little, light, or minor crack edge spalling is defined by secondary cracks typically less than 6 in. (150 mm) long and affecting less than 10 % of the crack length.

X2.1.2.12 Moderate spalling means secondary cracks can be of any length but both ends must intersect the primary crack. Individual pieces wider than 3 in. (75 mm) are not cracked and broken. Some loose particles means loose pieces can be of any length but must be less than 3 in. wide (75 mm) (chips). Missing pieces wider than 3 in. (75 mm) must affect less than 10 % of the crack length.

X2.1.2.13 A distress is said to have FOD potential when surficial material is in a broken or loose state, such that the possibility of ingestion of the material into an engine is present, or the potential for freeing the material due to trafficking is present.

X2.1.3 Sections X2.1.2.1-X2.1.2.13 are not intended to be a complete list. To properly count each distress type, the inspector must be familiar with its individual counting criteria.

X2.2 *Blowup:*

X2.2.1 *Description*—Blowups occur in hot weather, usually at a transverse crack or joint that is not wide enough to permit expansion of the concrete slabs. The insufficient width is usually caused by inflation of incompressible materials into the joint space. When expansion cannot relieve enough pressure, a localized upward movement of the slab edges (buckling) or shattering will occur in the vicinity of the joint. Blowups can also occur at utility cuts and drainage inlets. This type of distress is almost always repaired immediately because of severe damage potential to aircraft. The main reason blowups are included here is for reference when closed sections are being evaluated for reopening.

X2.2.2 *Severity Levels:*

X2.2.2.1 At the present time, no significant research has been conducted to quantify severity levels for blowups. Future research may provide measurement guidelines:

	Difference in Elevation	
	Runways and High-Speed Taxiways	Aprons and Other Taxiways
L	< ½ in. (< 13 mm)	¼ < 1 in. (6 to 25 mm)
M	½ to 1 in. (13 to 25 mm)	1 to 2 in. (25 to 51 mm)
H	inoperable	inoperable

NOTE X2.2—The elevations are twice the heights used for settlement/faulting. These are preliminary elevations, and subject to change.

X2.2.2.2 *L (Low)*—Buckling or shattering has not rendered the pavement inoperable, and only a slight amount of roughness exists (see Fig. X2.1).

NOTE 1—This would only be considered low severity if the shattering in the foreground was the only part existing and the foreign material removed.

FIG. X2.1 Low-Severity Blowup

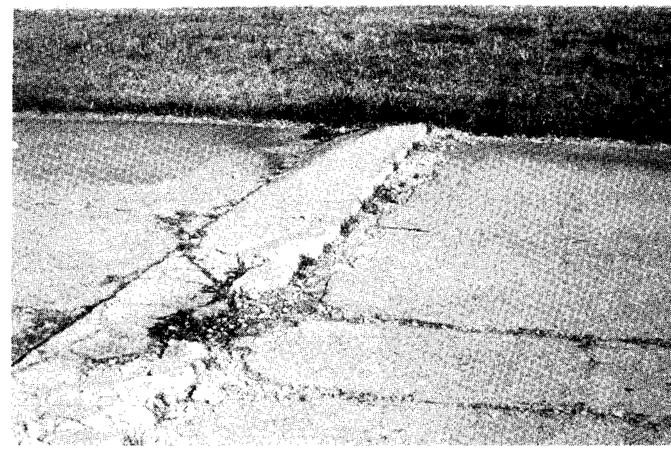


FIG. X2.3 High-Severity Blowup

X2.2.2.3 *M (Medium)*—Buckling or shattering has not rendered the pavement inoperable, but a significant amount of roughness exists (see Fig. X2.2).

X2.2.2.4 *H (High)*—Buckling or shattering has rendered the pavement inoperable (see Fig. X2.3).

X2.2.2.5 For the pavement to be considered operational, all foreign material caused by the blowup must have been removed.

X2.2.3 *How to Count:*

X2.2.3.1 A blowup usually occurs at a transverse crack or joint. At a crack, it is counted as being in one slab, but at a joint, two slabs are affected and the distress should be recorded as occurring in two slabs.

X2.2.3.2 Record blowup on a slab only if the distress is evident on that slab. Severity may be different on adjacent slabs. If blowup has been repaired by patching, establish severity by determining the difference in elevation between the two slabs.

X2.3 *Corner Break:*

X2.3.1 *Description*—A corner break is a crack that intersects the joints at a distance less than or equal to one half of the slab length on both sides, measured from the corner of the slab. For example, a slab with dimensions of 25 by 25 ft (7.5 by 7.5 m) that has a crack intersecting the joint 5 ft (1.5 m) from the corner on one side and 17 ft (5 m) on the other side is not considered a corner break; it is a diagonal crack. However, a crack that intersects 7 ft (2 m) on one side and 10 ft (3 m) on the other is considered a corner break. A corner break differs from a corner spall in that the crack extends vertically through the entire slab thickness, while a corner spall intersects the joint at an angle. Load repetition combined with loss of support and curling stresses usually cause corner breaks.

X2.3.2 *Severity Levels:*

X2.3.2.1 *L*—Crack has little or minor spalling (no FOD potential). If nonfilled, it has a mean width less than approximately ⅛ in. (3 mm). A filled crack can be of any width, but the filler material must be in satisfactory condition. The area between the corner break and the joints is not cracked (see Fig. X2.4 and Fig. X2.5).

X2.3.2.2 *M*—One of the following conditions exists: (*1*) filled or nonfilled crack is moderately spalled (some FOD potential); (*2*) a nonfilled crack has a mean width between ⅛

FIG. X2.2 Medium-Severity Blowup

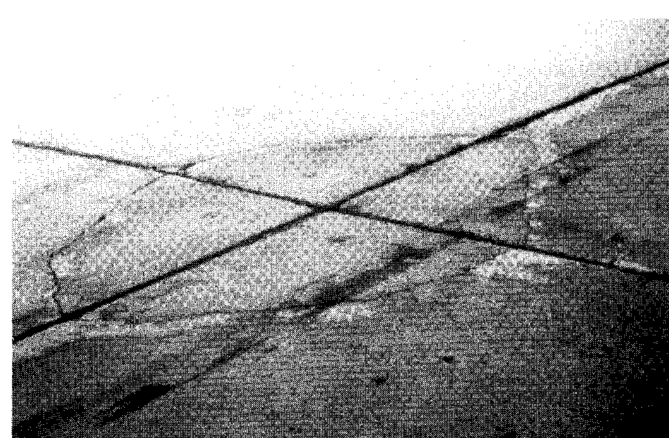


FIG. X2.4 Low-Severity Corner Break

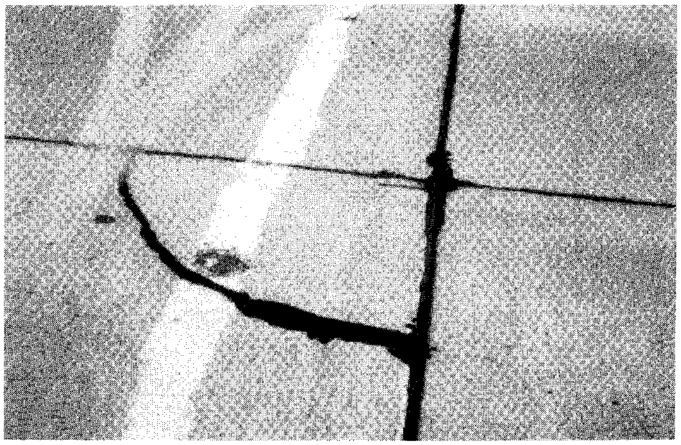


FIG. X2.5 Low-Severity Corner Break

FIG. X2.7 Medium-Severity Corner Break

and 1 in. (3 and 25 mm); (*3*) a filled crack is not spalled or only lightly spalled, but the filler is in unsatisfactory condition; or (*4*) the area between the corner break and the joints is lightly cracked (see Fig. X2.6 and Fig. X2.7). Lightly cracked means one low-severity crack dividing the corner into two pieces.

X2.3.2.3 *H*—One of the following conditions exists: (*1*) filled or nonfilled crack is severely spalled, causing definite FOD potential; (*2*) a nonfilled crack has a mean width greater than approximately 1 in. (25 mm), creating a tire damage potential; or (*3*) the area between the corner break and the joints is severely cracked (see Fig. X2.8).

X2.3.3 *How to Count:*

X2.3.3.1 A distress slab is recorded as one slab if it contains a single corner break, contains more than one break of a particular severity, or contains two or more breaks of different severities. For two or more breaks, the highest level of severity should be recorded. For example, a slab containing both light and medium-severity corner breaks should be counted as one slab with a medium corner break. Crack widths should be measured between vertical walls, not in spalled areas of the crack.

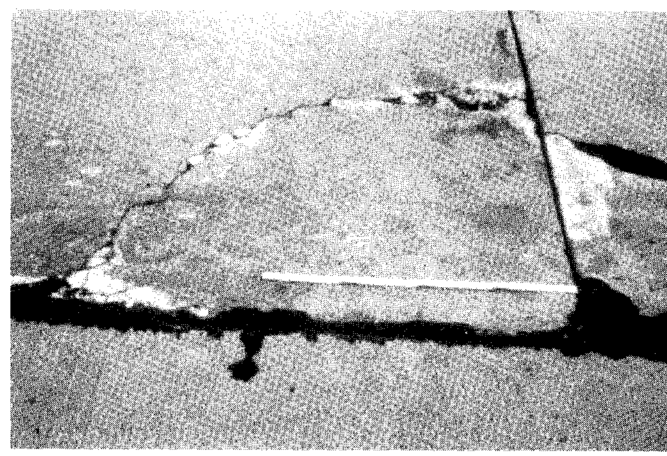


FIG. X2.8 High-Severity Corner Break

FIG. X2.9 Low-Severity Longitudinal Crack

FIG. X2.6 Medium-Severity Corner Break (Area Between the Corner Break and the Joints is Lightly Cracked)

X2.3.3.2 If the corner break is faulted ⅛ in. (3 mm) or more, increase severity to the next higher level. If the corner is faulted more than ½ in. (13 mm), rate the corner break at high severity. If faulting in corner is incidental to faulting in the slab, rate faulting separately.

X2.3.3.3 The angle of crack into the slab is usually not evident at low severity. Unless the crack angle can be determined, to differentiate between the corner break and corner spall, use the following criteria. If the crack intersects both joints more than 2 ft (600 mm) from the corner, it is a corner break. If it is less than 2 ft, unless you can verify the crack is vertical, call it a spall.

X2.4 *Longitudinal, Transverse, and Diagonal Cracks:*

X2.4.1 *Description*—These cracks, that divide the slab into two or three pieces, are usually caused by a combination of load repetition, curling stresses, and shrinkage stresses. (For slabs divided into four or more pieces, see X2.13.) Low-severity cracks are usually warping- or friction-related and are not considered major structural distresses. Medium- or high-severity cracks are usually working cracks and are considered major structural distresses.

NOTE X2.3—Hairline cracks that are only a few feet long and do not extend across the entire slab are rated as shrinkage cracks.

X2.4.2 *Severity Levels:*

X2.4.2.1 *L*—Crack has little or minor spalling (no FOD potential). If nonfilled, it has a mean width less than approximately ⅛ in. (3 mm). A filled crack can be of any width, but the filler material must be in satisfactory condition; or the slab is divided into three pieces by low-severity cracks (see Figs. X2.9-X2.11).

X2.4.2.2 *M*—One of the following conditions exists: (*1*) filled or nonfilled crack is moderately spalled (some FOD potential); (*2*) a nonfilled crack has a mean width between ⅛ and 1 in. (3 and 25 mm); (*3*) a filled crack is not spalled or only lightly spalled, but the filler is in unsatisfactory condition; or (*4*) the slab is divided into three pieces by two or more cracks, one of which is at least medium severity (see Figs. X2.12-X2.14).

X2.4.2.3 *H*—One of the following conditions exists: (*1*) filled or nonfilled crack is severely spalled, causing definite FOD potential; (*2*) a nonfilled crack has a mean width greater than approximately 1 in. (25 mm), creating a tire damage potential; or (*3*) the slab is divided into three pieces by two or more cracks, one of which is at least high severity (see Figs. X2.15-X2.17).

FIG. X2.10 Low-Severity Filled Longitudinal Cracks

FIG. X2.11 Low-Severity Diagonal Crack

FIG. X2.12 Medium-Severity Longitudinal Crack

X2.4.3 *How to Count:*

X2.4.3.1 Once the severity has been identified, the distress is recorded as one slab. If the slab is divided into four or more pieces by cracks, refer to the distress type given in X2.13.

X2.4.3.2 Cracks used to define and rate corner breaks, "D" cracks, patches, shrinkage cracks, and spalls are not recorded as L/T/D cracks.

FIG. X2.13 Medium-Severity Transverse Crack

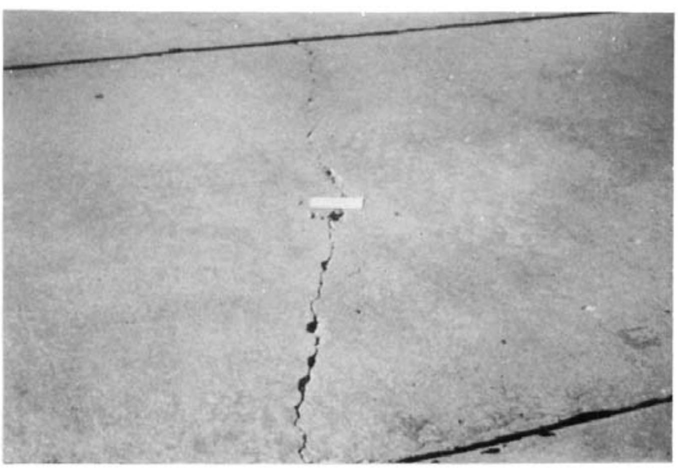


FIG. X2.14 Medium-Severity Transverse Crack

FIG. X2.15 High-Severity Crack

X2.5 *Durability ("D") Cracking:*

X2.5.1 *Description*—Durability cracking is caused by the concrete's inability to withstand environmental factors, such as freeze-thaw cycles. It usually appears as a pattern of cracks

FIG. X2.16 High-Severity Longitudinal Cracks

FIG. X2.17 High-Severity Crack

running parallel to a joint or linear crack. A dark coloring can usually be seen around the fine durability cracks. This type of cracking may eventually lead to disintegration of the concrete within 1 to 2 ft (0.3 to 0.6 m) of the joint or crack.

X2.5.2 *Severity Levels:*

X2.5.2.1 *L*—"D" cracking is defined by hairline cracks occurring in a limited area of the slab, such as one or two corners or along one joint. Little or no disintegration has occurred. No FOD potential (see Fig. X2.18 and Fig. X2.19).

X2.5.2.2 *M*—"D" cracking has developed over a considerable amount of slab area with little or no disintegration or FOD potential; or "D" cracking has occurred in a limited area of the slab, such as one or two corners or along one joint, but pieces are missing and disintegration has occurred. Some FOD potential (see Fig. X2.20 and Fig. X2.21).

X2.5.2.3 *H*—"D" cracking has developed over a considerable amount of slab area with disintegration or FOD potential (see Fig. X2.22 and Fig. X2.23).

X2.5.3 *How to Count*—When the distress is located and rated at one severity, it is counted as one slab. If more than one severity level is found, the slab is counted as having the higher severity distress. For example, if low- and medium-durability cracking are located on one slab, the slab is counted as having

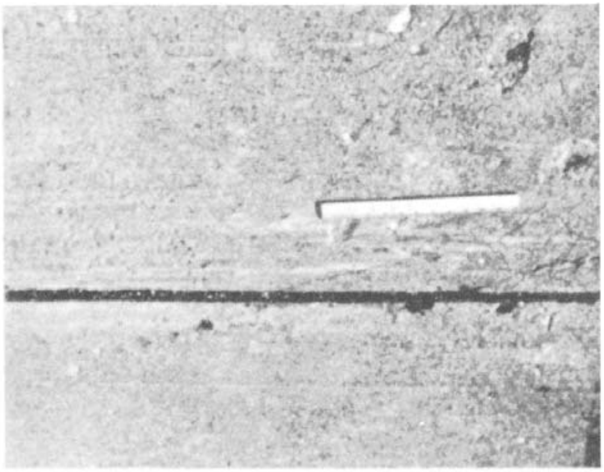
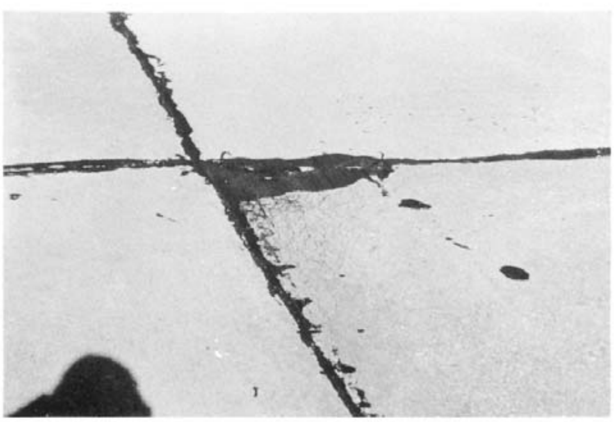


FIG. X2.18 Low-Severity "D" Cracking



NOTE 1—Slab is beginning to break up near corner.

FIG. X2.19 Low-Severity "D" Cracking Approaching Medium Severity

FIG. X2.20 Medium-Severity "D" Cracking

medium only. If "D" cracking is counted, scaling on the same slab should not be recorded.

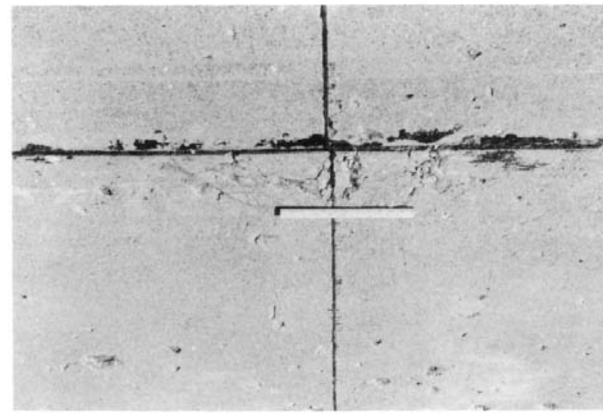
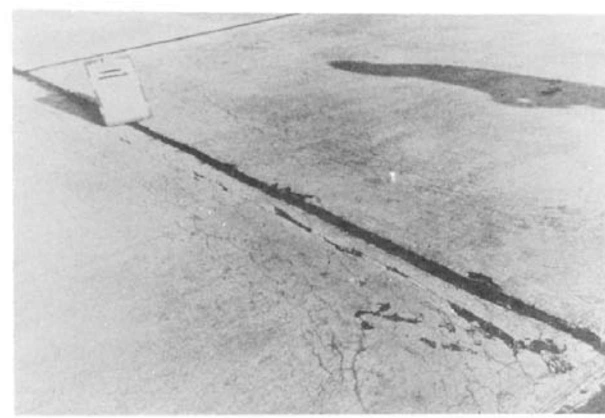


FIG. X2.21 Medium-Severity "D" Cracking Occurring in Limited Area of Slab



NOTE 1—The "D" cracking occurs over more than one joint with some disintegration.

FIG. X2.22 High-Severity "D" Cracking

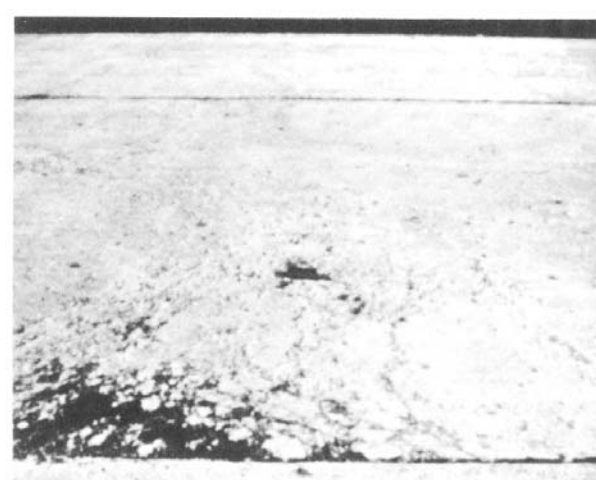


FIG. X2.23 High-Severity "D" Cracking

X2.6 *Joint Seal Damage:*

X2.6.1 *Description*—Joint seal damage is any condition that enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. A pliable joint filler bonded to the edges of the slabs protects the joints from accumulation of materials and also prevents water from seeping down and softening the foundation supporting the slab. Typical types of joint seal damage are: (*1*) stripping of joint sealant, (*2*) extrusion of joint sealant, (*3*) weed growth, (*4*) hardening of the filler (oxidation), (*5*) loss of bond to the slab edges, and (*6*) lack or absence of sealant in the joint.

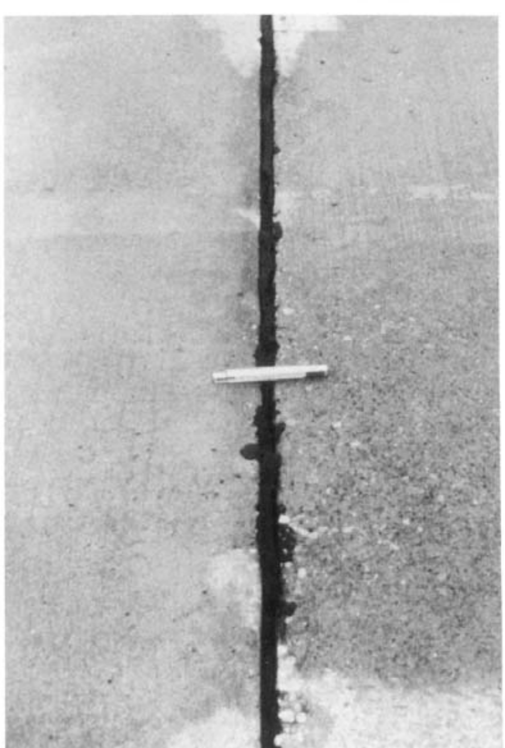
X2.6.2 *Severity Levels:*

X2.6.2.1 *L*—Joint sealer is in generally good condition throughout the sample. Sealant is performing well with only a minor amount of any of the above types of damage present (see Fig. X2.24). Joint seal damage is at low severity if a few of the joints have sealer which has debonded from, but is still in contact with, the joint edge. This condition exists if a knife blade can be inserted between sealer and joint face without resistance.

X2.6.2.2 *M*—Joint sealer is in generally fair condition over the entire surveyed sample with one or more of the above types of damage occurring to a moderate degree. Sealant needs replacement within two years (see Fig. X2.25). Joint seal damage is at medium severity if a few of the joints have any of the following conditions: (*1*) joint sealer is in place, but water access is possible through visible openings no more than ⅛ in. (3 mm) wide. If a knife blade cannot be inserted easily between sealer and joint face, this condition does not exist; (*2*) pumping debris are evident at the joint; (*3*) joint sealer is oxidized and "lifeless" but pliable (like a rope), and generally fills the joint opening; or (*4*) vegetation in the joint is obvious, but does not obscure the joint opening.

X2.6.2.3 *H*—Joint sealer is in generally poor condition over the entire surveyed sample with one or more of the above types of damage occurring to a severe degree. Sealant needs immediate replacement (see Fig. X2.26 and Fig. X2.27). Joint seal damage is at high severity if 10 % or more of the joint sealer exceeds limiting criteria listed above, or if 10 % or more of sealer is missing.

FIG. X2.25 Medium-Severity Joint Seal Damage (Note that Sealant has Lost Bond and is Highly Oxidized)



NOTE 1—This condition existed on only a few joints in the pavement section. If all joint sealant were as shown, it would have been rated medium.

FIG. X2.24 Low-Severity Joint Seal Damage

FIG. X2.26 High-Severity Joint Seal Damage (Complete Loss of Sealant; Joint is Filled with Incompressible Material)

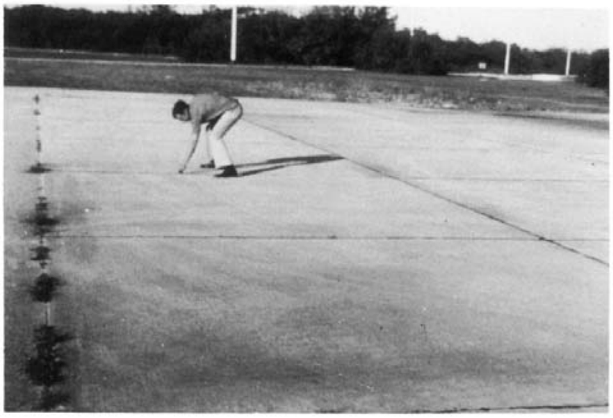


FIG. X2.27 High-Severity Joint Seal Damage (Extensive Amount of Weed Growth)

FIG. X2.28 Low-Severity Small Patch

X2.6.3 *How to Count:*

X2.6.3.1 Joint seal damage is not counted on a slab-by-slab basis, but is rated based on the overall condition of the sealant in the sample unit.

X2.6.3.2 Joint sealer is in satisfactory condition if it prevents entry of water into the joint, it has some elasticity, and if there is no vegetation growing between the sealer and joint face.

X2.6.3.3 Premolded sealer is rated using the same criteria as above except as follows: (*1*) premolded sealer must be elastic and must be firmly pressed against the joint walls; and (*2*) premolded sealer must be below the joint edge. If it extends above the surface, it can be caught by moving equipment such as snow plows or brooms and be pulled out of the joint. Premolded sealer is recorded at low severity if any part is visible above joint edge. It is at medium severity if 10 % or more of the length is above joint edge or if any part is more than ½ in. (12 mm) above joint edge. It is at high severity if 20 % or more is above joint edge or if any part is more than 1 in. (25 mm) above joint edge, or if 10 % or more is missing.

X2.6.3.4 Rate joint sealer by joint segment. Sample unit rating is the same as the most severe rating held by at least 20 % of segments rated.

X2.6.3.5 Rate only the left and upstation joints along sample unit boundaries.

X2.6.3.6 In rating oxidation, do not rate on appearance. Rate on resilience. Some joint sealer will have a very dull surface, and may even show surface cracks in the oxidized layer. If the sealer is performing satisfactorily and has good characteristics beneath the surface, it is satisfactory.

X2.7 *Patching, Small (Less Than 5 ft² (0.5 m²)):*

X2.7.1 *Description*—A patch is an area where the original pavement has been removed and replaced by a filler material. For condition evaluation, patching is divided into two types: small (less than 5 ft² (0.5 m²)) and large (over 5 ft²). Large patches are described in the next section.

X2.7.2 *Severity Levels:*

X2.7.2.1 *L*—Patch is functioning well with little or no deterioration (see Fig. X2.28 and Fig. X2.29).

X2.7.2.2 *M*—Patch that has deterioration or moderate spalling, or both, can be seen around the edges. Patch material can be dislodged with considerable effort (minor FOD potential) (see Fig. X2.30 and Fig. X2.31).

X2.7.2.3 *H*—Patch deterioration, either by spalling around the patch or cracking within the patch, to a state that warrants replacement (see Fig. X2.32).

X2.7.3 *How to Count:*

X2.7.3.1 If one or more small patches having the same severity level are located in a slab, it is counted as one slab containing that distress. If more than one severity level occurs, it is counted as one slab with the higher severity level being recorded.

X2.7.3.2 If a crack is repaired by a narrow patch (that is, 4 to 10 in. (102 to 254 mm) wide), only the crack and not the patch should be recorded at the appropriate severity level.

X2.8 *Patching, Large (Over 5 ft² (0.5 m²)) and Utility Cut:*

X2.8.1 *Description*—Patching is the same as defined in the previous section. A utility cut is a patch that has replaced the original pavement because of placement of underground utilities. The severity levels of a utility cut are the same as those for regular patching.

FIG. X2.29 Low-Severity Small Patch

FIG. X2.30 Medium-Severity Small Patch

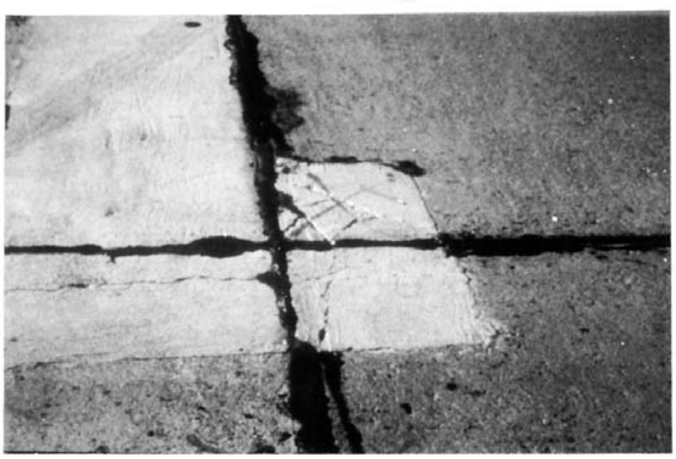


FIG. X2.31 Medium-Severity Small Patch

FIG. X2.32 High-Severity Small Patch

X2.8.2 *Severity Levels:*

X2.8.2.1 *L*—Patch is functioning well with very little or no deterioration (see Figs. X2.33-X2.35).

FIG. X2.33 Low-Severity Patch

FIG. X2.34 Low-Severity Patch

X2.8.2.2 *M*—Patch deterioration or moderate spalling, or both, can be seen around the edges. Patch material can be dislodged with considerable effort, causing some FOD potential (see Fig. X2.36).

X2.8.2.3 *H*—Patch has deteriorated to a state that causes considerable roughness or high FOD potential, or both. The extent of the deterioration warrants replacement of the patch (see Fig. X2.37).

X2.8.3 *How to Count*—The criteria are the same as for small patches.

X2.9 *Popouts:*

X2.9.1 *Description*—A popout is a small piece of pavement that breaks loose from the surface due to freeze-thaw action in combination with expansive aggregates. Popouts usually range from approximately 1 to 4 in. (25 to 100 mm) in diameter and from ½ to 2 in. (13 to 51 mm) deep.

X2.9.2 *Severity Levels*—No degrees of severity are defined for popouts. However, popouts must be extensive before they are counted as a distress; that is, average popout density must

FIG. X2.35 Low-Severity Utility Cut

FIG. X2.36 Medium-Severity Utility Cut

FIG. X2.37 High-Severity Patch

exceed approximately three popouts per square yard (per square metre) over the entire slab area (see Fig. X2.38).

X2.9.3 *How to Count*—The density of the distress must be measured. If there is any doubt about the average being greater than three popouts per square yard (per square metre), at least three random 1-yd^2 (1-m^2) areas should be checked. When the average is greater than this density, the slab is counted.

FIG. X2.38 Popouts

X2.10 *Pumping:*

X2.10.1 *Description*—Pumping is the ejection of material by water through joints or cracks caused by deflection of the slab under passing loads. As water is ejected, it carries particles of gravel, sand, clay, or silt resulting in a progressive loss of pavement support. Surface staining and base or subgrade material on the pavement close to joints or cracks are evidence of pumping. Pumping near joints indicates poor joint sealer and loss of support, which will lead to cracking under repeated loads. The joint seal must be identified as defective before pumping can be said to exist. Pumping can occur at cracks as well as joints.

X2.10.2 *Severity Levels*—No degrees of severity are defined. It is sufficient to indicate that pumping exists (see Figs. X2.39-X2.42).

FIG. X2.39 Pumping (Note Fine Material on Surface That has Been Pumped Out Causing Corner Break)

FIG. X2.40 Pumping (Note Stains on Pavement)

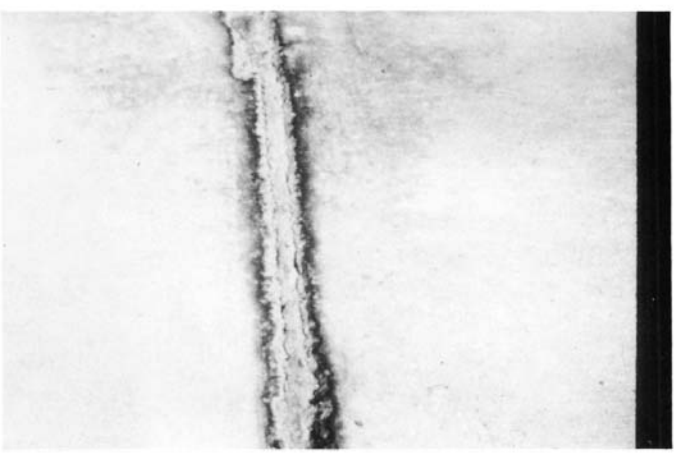


FIG. X2.41 Pumping (Close-Up of Fine Materials Collecting in the Joint)

FIG. X2.42 Pumping

X2.10.3 *How to Count*—Slabs are counted as follows: (see Fig. X2.43) one pumping joint between two slabs is counted as two slabs. However, if the remaining joints around the slab are also pumping, one slab is added per additional pumping joint.

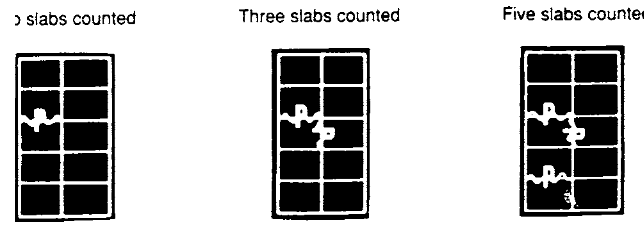


FIG. X2.43 Slab Counting Procedure for Distresses

X2.11 *Scaling:*

X2.11.1 *Description*—Surface deterioration caused by construction defects, material defects and environmental factors. Generally scaling is exhibited by delamination or disintegration of paste on the slab surface to the depth of the defect. Construction defects include: over-finishing, addition of water to the pavement surface during finishing, lack of curing, attempted surface repairs of fresh concrete with mortar. Generally this occurs over a portion of a slab. Material defects include: inadequate air entrainment for the climate. Generally this occurs over several slabs that were affected by the concrete batches. Environmental factors: freezing of concrete before adequate strength gained or thermal cycles from certain aircraft. Generally over a large area for freezing, and isolated areas for thermal effects. Typically, the FOD from scaling is removed by sweeping, but the concrete will continue to scale until the affected depth is removed or expended.

X2.11.2 *Severity Levels:*

X2.11.2.1 *L*—Minimal loss of surface paste that poses no FOD hazard, limited to less than 1% of the slab area. No FOD potential (see Fig. X2.44).

X2.11.2.2 *M*—The loss of surface paste that poses some FOD potential including isolated fragments of loose mortar, exposure of the sides of coarse aggregate (Less than ¼ of the width of coarse aggregate), or evidence of coarse aggregate coming loose from the surface (see Fig. X2.45). Surface paste loss is greater than 1% of the slab area but less than 10%.

FIG. X2.44 Low-Severity Scaling

FIG. X2.45 Medium-Severity Scaling

FIG. X2.47 Close-Up of High-Severity Scaling

X2.11.2.3 *H*—High severity is associated with low durability concrete that will continue to pose a high FOD hazard; normally the layer of surface mortar is observable at the perimeter of the scaled area, and is likely to continue to delaminate or disintegrate due to environmental or other factors. Routine sweeping is not sufficient to avoid FOD issues, is an indication that high FOD hazard is present. Surface paste loss is greater than 10% of the slab area (see Figs. X2.46 and X2.47).

X2.11.3 *How to Count*—If two or more levels of severity exist on a slab, the slab is counted as one slab having the maximum level of severity. For example, if both low-severity crazing and medium scaling exist on one slab, the slab is counted as one slab containing medium scaling. If "D" cracking is counted, scaling is not counted.

X2.12 *Settlement or Faulting:*

X2.12.1 *Description*—Settlement or faulting is a difference of elevation at a joint or crack caused by upheaval or consolidation.

X2.12.2 *Severity Levels*—Severity levels are defined by the difference in elevation across the fault and the associated decrease in ride quality and safety as severity increases:

	Difference in Elevation		
	Runways/Taxiways	Aprons	Figures
L	< ¼ in. (6 mm)	⅛ < ½ in. (3 to 13 mm)	Fig. X2.48 and Fig. X2.49
M	¼ to ½ in. (6 to 13 mm)	½ to 1 in. (13 to 25 mm)	Fig. X2.50
H	> ½ in. (13 mm)	> 1 in. (25 mm)	Fig. X2.51 and Fig. X2.52

X2.12.3 *How to Count:*

X2.12.3.1 In counting settlement, a fault between two slabs is counted as one slab. A straightedge or level should be used to aid in measuring the difference in elevation between the two slabs.

X2.12.3.2 Construction-induced elevation differential is not rated in PCI procedures. Where construction differential exists, it can often be identified by the way the high side of the joint was rolled down by finishers (usually within 6 in. (150 mm) of the joint) to meet the low-slab elevation.

X2.13 *Shattered Slab/Intersecting Cracks:*

FIG. X2.46 High-Severity Scaling

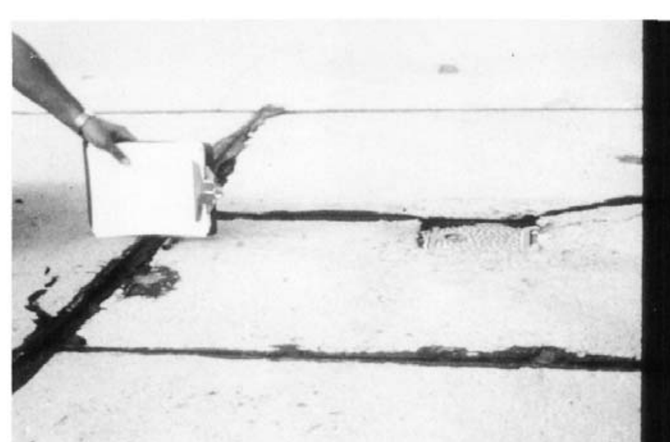


FIG. X2.48 Low-Severity Settlement (⅜ in. (9 mm)) on Apron

FIG. X2.49 Low-Severity Settlement on Apron

FIG. X2.50 Medium-Severity Settlement on Apron (>½ in. (13 mm))

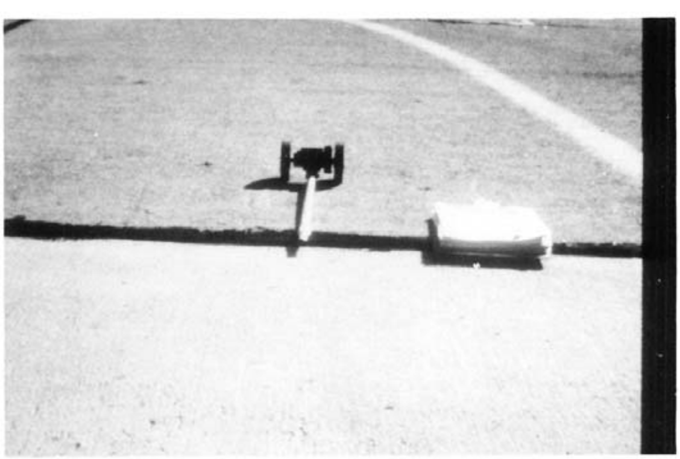


FIG. X2.51 High-Severity Settlement on Taxiway/Runway (¾ in. (18 mm))

X2.13.1 *Description*—Intersecting cracks are cracks that break the slab into four or more pieces due to overloading or inadequate support, or both. The high-severity level of this distress type, as defined as follows, is referred to as shattered slab. If all pieces or cracks are contained within a corner break, the distress is categorized as a severe corner break.

FIG. X2.52 High-Severity Settlement

X2.13.2 *Severity Levels:*

X2.13.2.1 *L*—Slab is broken into four or five pieces predominantly defined by low-severity cracks (see Fig. X2.53 and Fig. X2.54).

X2.13.2.2 *M*—Slab is broken into four or five pieces with over 15 % of the cracks of medium severity (no high-severity cracks); slab is broken into six or more pieces with over 85 % of the cracks of low severity (see Fig. X2.55 and Fig. X2.56).

X2.13.2.3 *H*—At this level of severity, the slab is called shattered: (*1*) slab is broken into four or five pieces with some or all cracks of high severity; or (*2*) slab is broken into six or more pieces with over 15 % of the cracks of medium or high severity (see Fig. X2.57).

X2.13.3 *How to Count*—No other distress such as scaling, spalling, or durability cracking should be recorded if the slab is medium- or high-severity level since the severity of this distress would affect the slab's rating substantially. Shrinkage cracks should not be counted in determining whether or not the slab is broken into four or more pieces.

X2.14 *Shrinkage Cracking:*

FIG. X2.53 Low-Severity Intersecting Cracks

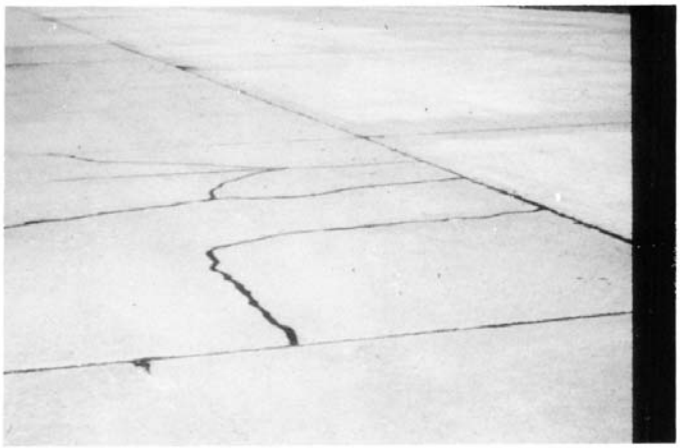


FIG. X2.54 Low-Severity Intersecting Cracks

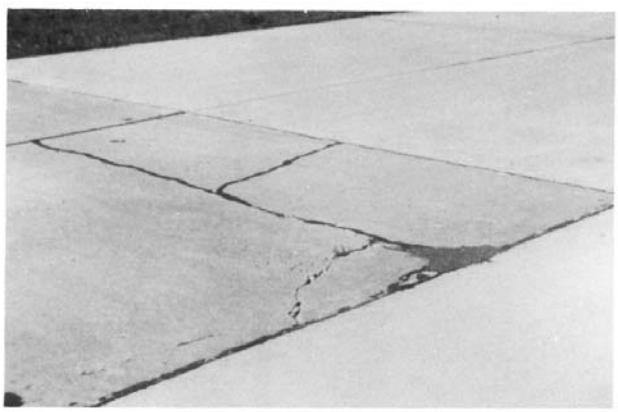


FIG. X2.55 Medium-Severity Intersecting Cracks

FIG. X2.56 Medium-Severity Intersecting Cracks

X2.14.1 *Description*—Shrinkage cracking is typically categorized in two forms; drying shrinkage that occurs over time as moisture leaves the pavement and plastic shrinkage that occurs shortly after the pavement is placed and rapid drying of the surface occurs while the pavement is still plastic. Drying shrinkage cracks occur when a hardened pavement continues to shrink as excess water not needed for cement hydration evaporates. They form when subsurface resistance to the shrinkage is present and may extend through the entire depth of the slab. Plastic shrinkage occurs when there is a rapid loss of water in the surface of a recently placed pavement caused by evaporation. High winds, low humidity, and/or high ambient and/or concrete temperatures are contributing factors to evaporation. These cracks can appear as a series of parallel cracks, usually 1 to 3 feet (.3 to .9 meters) apart and do not extend very deep into the pavement's surface. Another form of plastic shrinkage occurs while a pavement is still plastic and can result from overfinishing/overworking the pavement during construction or finishing the pavement while bleed water is on the surface. This results in an increase in mortar and fines and higher water content at the surface, making the immediate surface weak and susceptible to shrinkage. These shrinkage cracks appear as a series of inter-connected hairline cracks, or pattern cracking, and are often observed over a majority of the slab surface. This condition is also referred to as map cracking or crazing.

FIG. X2.57 Shattered Slab

X2.14.2 *Severity Levels*—No degrees of severity are defined. It is sufficient to indicate that shrinkage cracking exists (see Figs. X2.58-X2.60).

X2.14.3 *How to Count*—If one or more shrinkage cracks or area of pattern cracking (map cracking) exist on one particular

FIG. X2.58 Shrinkage Crack

FIG. X2.59 Shrinkage Cracks

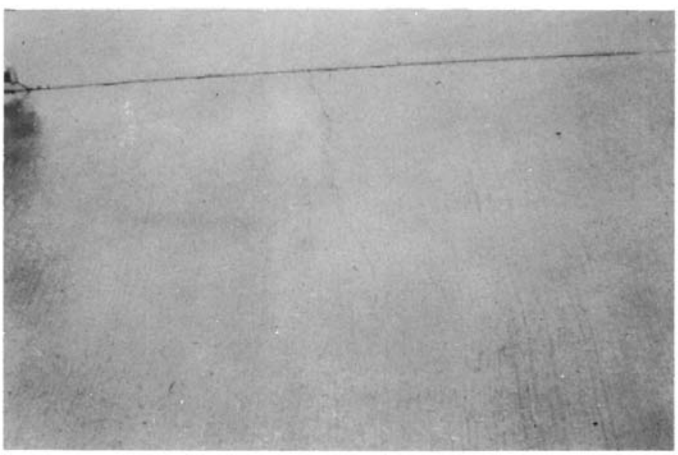


FIG. X2.60 Shrinkage Cracks

slab, and a FOD hazard or potential is not present, the slab is counted as one slab with shrinkage cracking.

X2.15 *Spalling (Transverse and Longitudinal Joint):*

X2.15.1 *Description*—Joint spalling is the breakdown of the slab edges within 2 ft (0.6 m) of the side of the joint. A joint spall usually does not extend vertically through the slab but intersects the joint at an angle. Spalling results from excessive stresses at the joint or crack caused by infiltration of incompressible materials or traffic load. Weak concrete at the joint (caused by overworking) combined with traffic loads is another cause of spalling.

NOTE X2.4—Frayed condition as used in this test method indicates material is no longer in place along a joint or crack. Spalling indicates material may or may not be missing along a joint or crack.

X2.15.2 *Severity Levels:*

X2.15.2.1 *L*—Spall over 2 ft (0.6 m) long: (*1*) spall is broken into no more than three pieces defined by low- or medium-severity cracks; little or no FOD potential exists; or (*2*) joint is lightly frayed; little or no FOD potential (see Fig. X2.61 and Fig. X2.62). Spall less than 2 ft long is broken into pieces or fragmented with little FOD or tire damage potential exists (see Fig. X2.63).

FIG. X2.61 Low-Severity Joint Spalling (If the Frayed Area was Less Than 2 ft (0.6 m) Long it Would not be Counted)

X2.15.2.2 Lightly frayed means the upper edge of the joint is broken away leaving a spall no wider than 1 in. (25 mm) and no deeper than ½ in. (13 mm). The material is missing and the joint creates little or no FOD potential.

X2.15.2.3 *M*—Spall over 2 ft (0.6 m) long: (*1*) spall is broken into more than three pieces defined by light or medium cracks; (*2*) spall is broken into no more than three pieces with one or more of the cracks being severe with some FOD potential existing; or (*3*) joint is moderately frayed with some FOD potential (see Fig. X2.64). Spall less than 2 ft long: spall is broken into pieces or fragmented with some of the pieces loose or absent, causing considerable FOD or tire damage potential (see Fig. X2.65).

X2.15.2.4 Moderately frayed means the upper edge of the joint is broken away leaving a spall wider than 1 in. (25 mm) or deeper than ½ in. (13 mm). The material is mostly missing with some FOD potential.

X2.15.2.5 *H*—Spall over 2 ft (0.6 m) long: (*1*) spall is broken into more than three pieces defined by one or more high-severity cracks with high FOD potential and high possibility of the pieces becoming dislodged, or (*2*) joint is severely frayed with high FOD potential (see Fig. X2.66 and Fig. X2.67).

X2.15.3 *How to Count*—If the joint spall is located along the edge of one slab, it is counted as one slab with joint

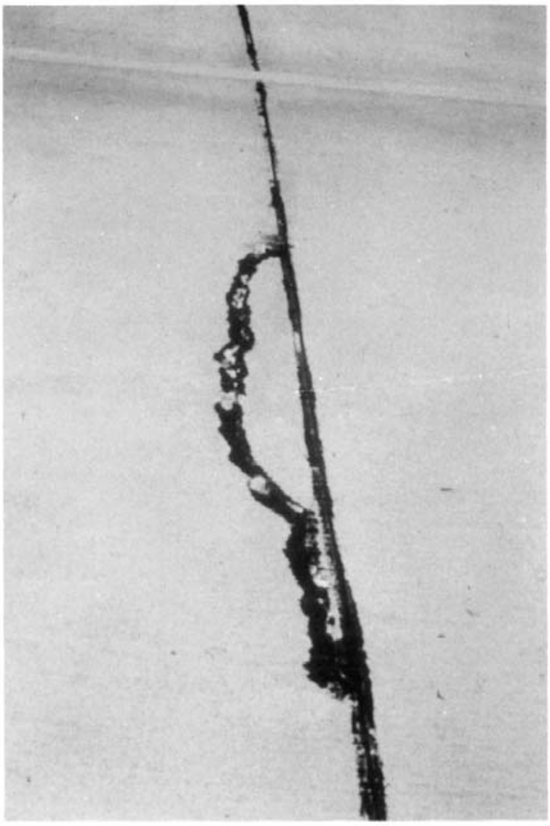


FIG. X2.62 Low-Severity Joint Spall

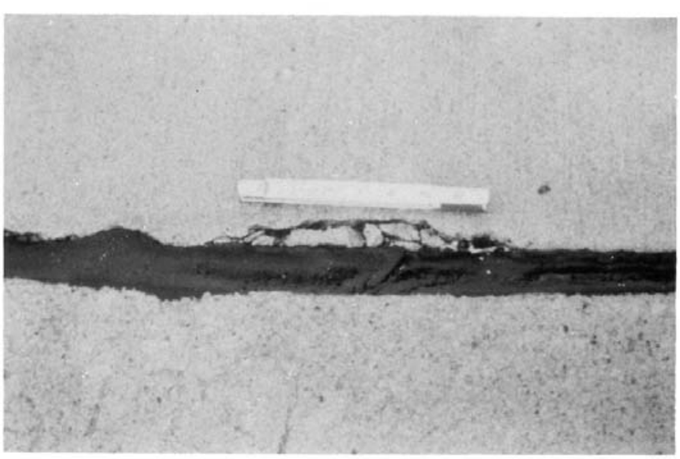


FIG. X2.63 Low-Severity Joint Spall

FIG. X2.64 Medium-Severity Joint Spall

FIG. X2.65 Medium-Severity Joint Spall

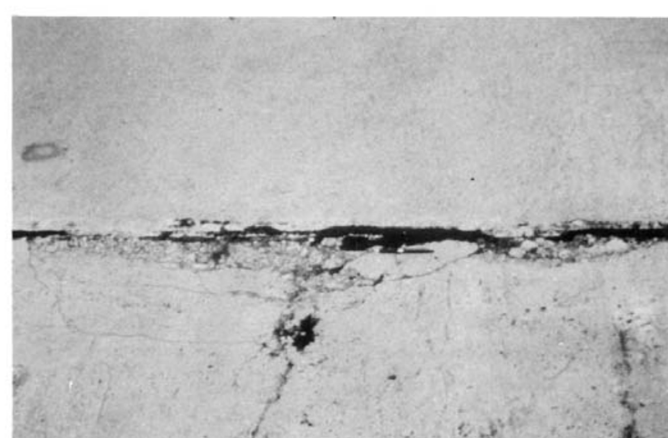


FIG. X2.66 High-Severity Joint Spall

spalling. If spalling is located on more than one edge of the same slab, the edge having the highest severity is counted and recorded as one slab. Joint spalling can also occur along the edges of two adjacent slabs. If this is the case, each slab is counted as having joint spalling. If a joint spall is small enough, less than 3 in. (76 mm) wide, to be filled during a joint seal repair, it should not be recorded.

NOTE X2.5—If less than 2 ft (0.6 m) of the joint is lightly frayed, the spall should not be counted.

X2.16 *Spalling (Corner):*

X2.16.1 *Description*—Corner spalling is the raveling or breakdown of the slab within approximately 2 ft (0.6 m) of the corner. A corner spall differs from a corner break in that the spall usually angles downward to intersect the joint, while a break extends vertically through the slab.

FIG. X2.67 High-Severity Joint Spall

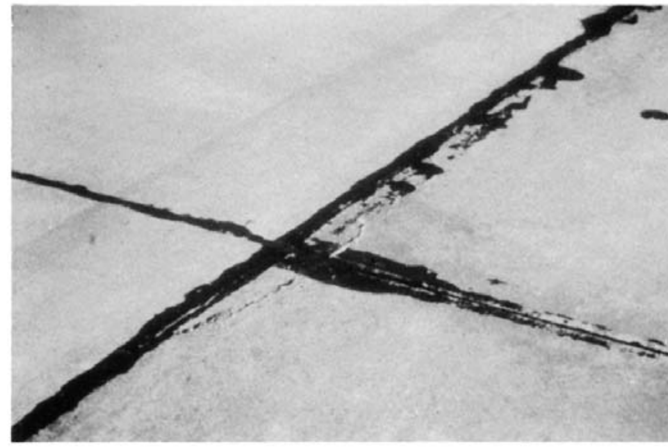


FIG. X2.69 Low-Severity Corner Spall

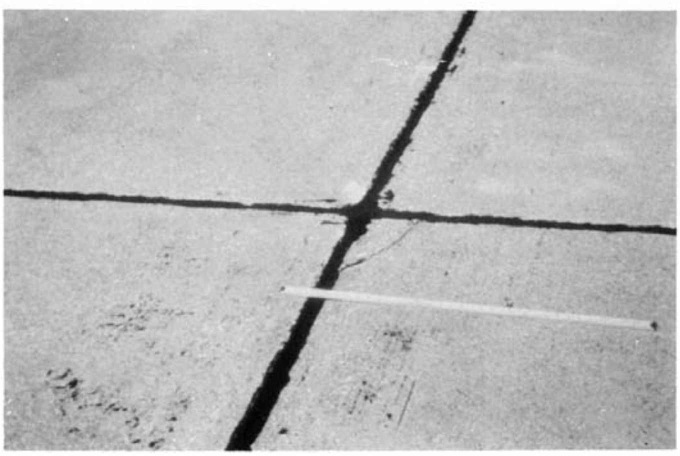


FIG. X2.68 Low-Severity Corner Spall

FIG. X2.70 Medium-Severity Corner Spall

X2.16.2 *Severity Levels:*

X2.16.2.1 *L*—One of the following conditions exists: (*1*) spall is broken into one or two pieces defined by low-severity cracks (little or no FOD potential); or (*2*) spall is defined by one medium-severity crack (little or no FOD potential) (see Fig. X2.68 and Fig. X2.69).

X2.16.2.2 *M*—One of the following conditions exists: (*1*) spall is broken into two or more pieces defined by medium-severity crack(s), and a few small fragments may be absent or loose; (*2*) spall is defined by one severe, fragmented crack that may be accompanied by a few hairline cracks; or, (*3*) spall has deteriorated to the point where loose material is causing some FOD potential (see Fig. X2.70 and Fig. X2.71).

X2.16.2.3 *H*—One of the following conditions exists: (*1*) spall is broken into two or more pieces defined by high-severity fragmented crack(s) with loose or absent fragments; (*2*) pieces of the spall have been displaced to the extent that a tire damage hazard exists; or (*3*) spall has deteriorated to the point where loose material is causing high FOD potential (see Fig. X2.72 and Fig. X2.73).

X2.16.3 *How to Count:*

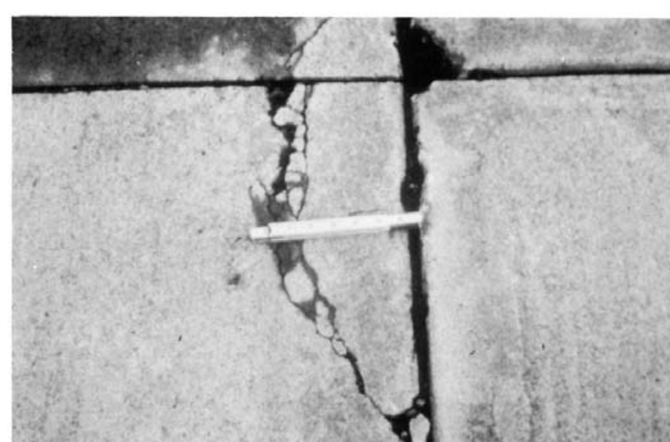


FIG. X2.71 Medium-Severity Corner Spall

X2.16.3.1 If one or more corner spalls having the same severity level are located in a slab, the slab is counted as one slab with corner spalling. If more than one severity level occurs, it is counted as one slab having the higher severity level.

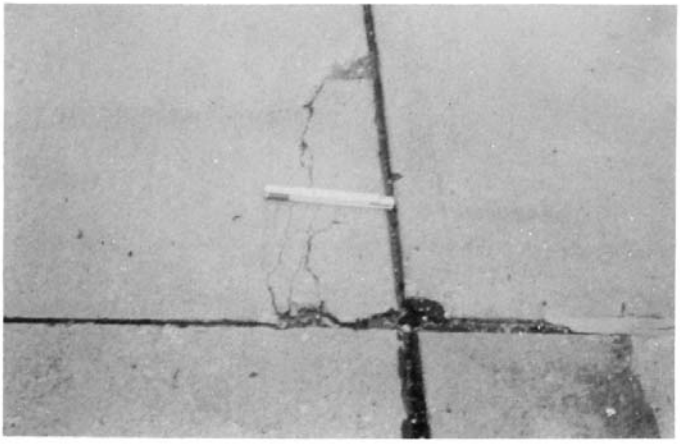


FIG. X2.72 High-Severity Corner Spall

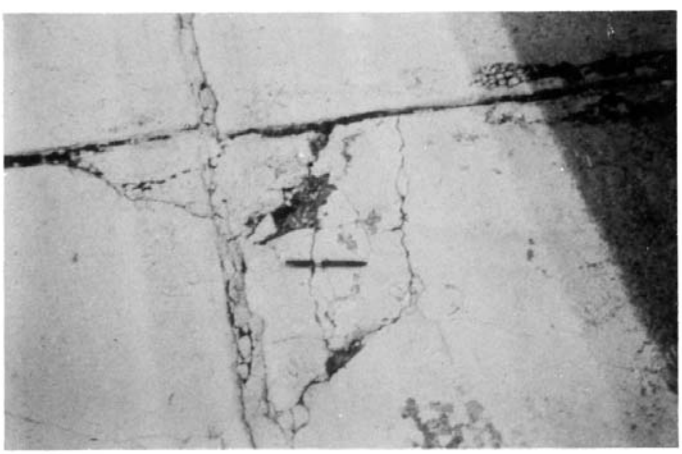


FIG. X2.73 High-Severity Corner Spall

X2.16.3.2 A corner spall smaller than 3 in. (76 mm) wide, measured from the edge of the slab, and filled with sealant is not recorded.

X2.17 *Alkali Silica Reaction (ASR)*

X2.17.1 *Description*—ASR is caused by chemical reaction between alkalis and certain reactive silica minerals which form a gel. The gel absorbs water, causing expansion which may damage the concrete and adjacent structures. Alkalis are most often introduced by the portland cement within the pavement. ASR cracking may be accelerated by chemical pavement deicers. Visual indicators that ASR may be present include:

(1) Cracking of the concrete pavement (often in a map pattern)

(2) White, brown, gray or other colored gel or staining may be present at the crack surface

(3) Aggregate popouts

(4) Increase in concrete volume (expansion) that may result in distortion of adjacent or integral structures or physical elements. Examples of expansion include shoving of asphalt pavements, light can tilting, slab faulting, joint misalignment, and extrusion of joint seals or expansion joint fillers.

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

(1) Generally ASR distresses are not observed in the first few years after construction. In contrast, plastic shrinkage cracking can occur the day of construction and is apparent within the first year.

(2) ASR is differentiated from D-Cracking by the presence of cracking perpendicular to the joint face. D-Cracking predominantly develops as a series of parallel cracks to joint faces and linear cracking within the slab.

(3) ASR is differentiated from Map Cracking/Scaling by the presence of visual signs of expansion.

X2.17.2 *Severity Levels:*

X2.17.2.1 *L*—Minimal to no FOD potential from cracks, joints or ASR-related popouts; cracks at the surface are tight (predominantly 1.0 mm or less). Little to no evidence of movement in pavement or surrounding structures or elements (see Fig. X2.74).

X2.17.2.2 *M*—Some FOD potential; but increased sweeping or other FOD removal methods may be required. May be evidence of slab movement or some damage (or both) to adjacent structures or elements. Medium ASR distress is differentiated from low by having one or more of the following: increased FOD potential, crack density increases, some fragments along cracks or at crack intersections present, surface popouts of concrete may occur, pattern of wider cracks (predominantly 1.0 mm or wider) that may be subdivided by tighter cracks (see Fig. X2.75).

X2.17.2.3 *H*—One or both of the following exist: (*1*) Loose or missing concrete fragments and poses high FOD potential, (*2*) Slab surface integrity and function significantly degraded and pavement requires immediate repairs; may also require repairs to adjacent structures or elements (see Fig. X2.76).

X2.17.3 *How to Count*—No other distresses should be recorded if high severity ASR is recorded.

FIG. X2.74 Low-Severity ASR

FIG. X2.75 Medium-Severity ASR

FIG. X2.76 High-Severity ASR

X3. AC PAVEMENT DEDUCT CURVES

X3.1 See Figs. X3.1-X3.20.

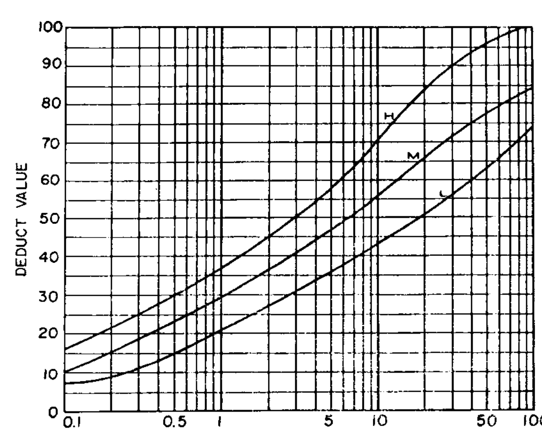


FIG. X3.1 Distress 1, Alligator Cracking

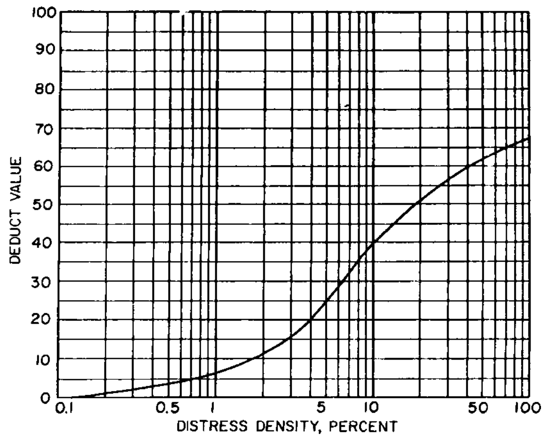


FIG. X3.2 Distress 2, Bleeding

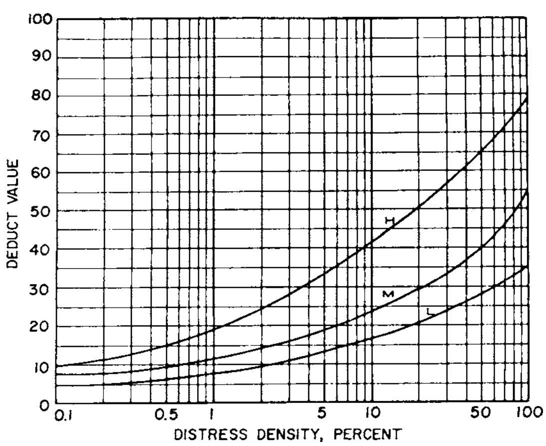


FIG. X3.3 Distress 3, Block Cracking

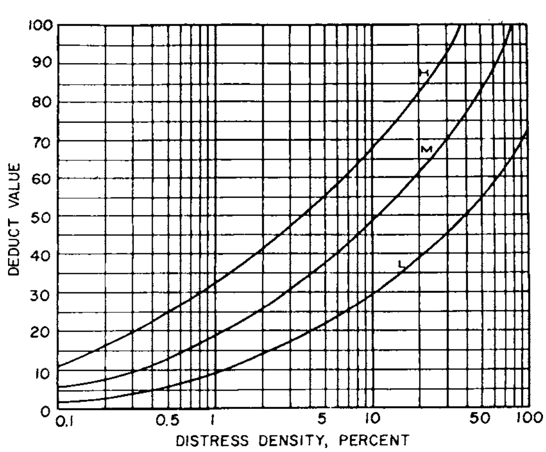


FIG. X3.4 Distress 4, Corrugation

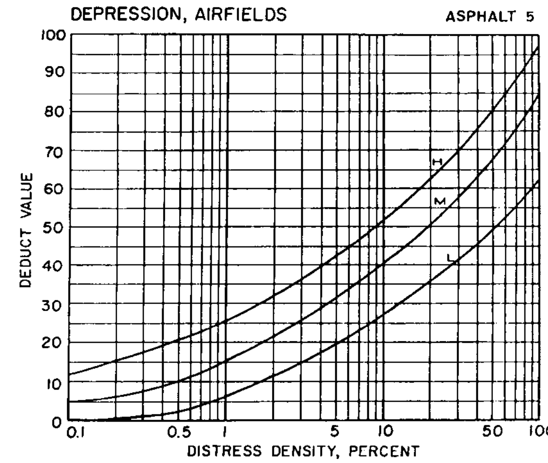


FIG. X3.5 Depression

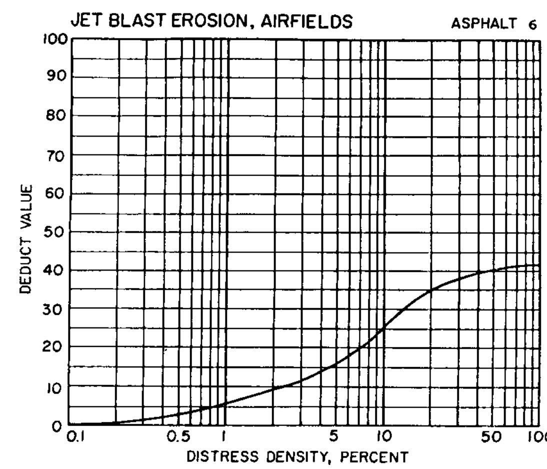


FIG. X3.6 Jet Blast

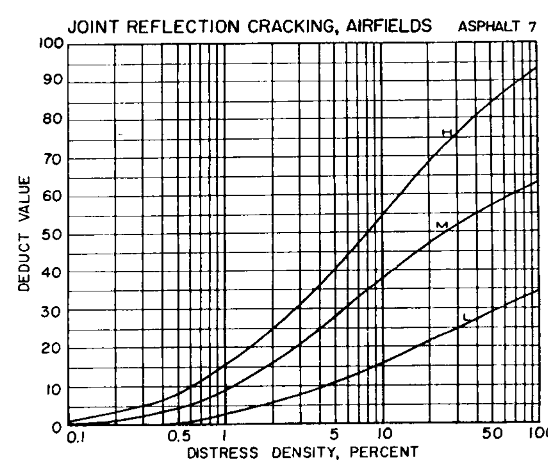


FIG. X3.7 Joint Reflection Cracking

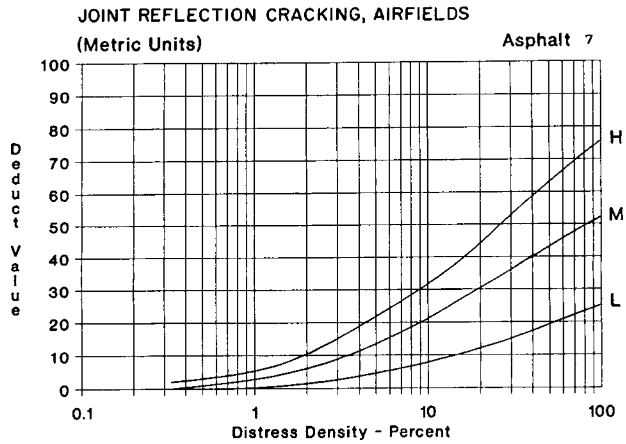


FIG. X3.8 Joint Reflection Cracking (Metric)

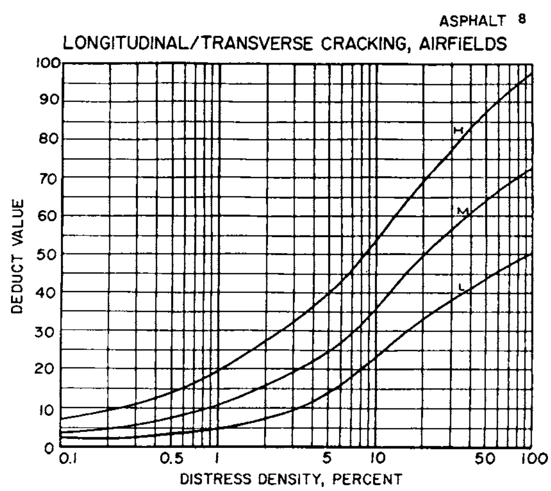


FIG. X3.9 Longitudinal/Transverse Cracking

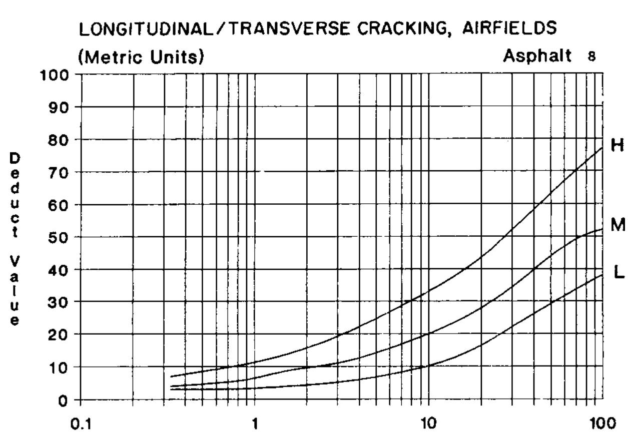


FIG. X3.10 Longitudinal/Transverse Cracking (Metric)

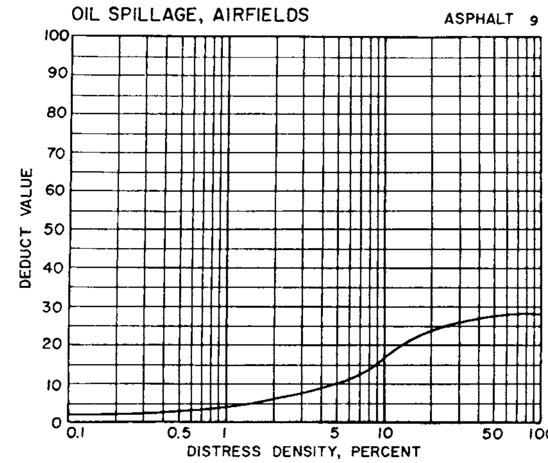


FIG. X3.11 Oil Spillage

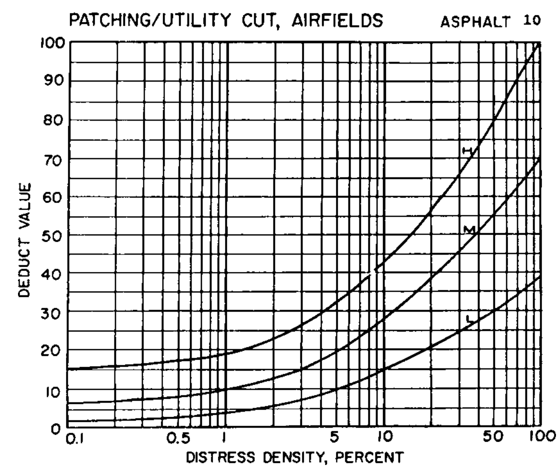


FIG. X3.12 Patching

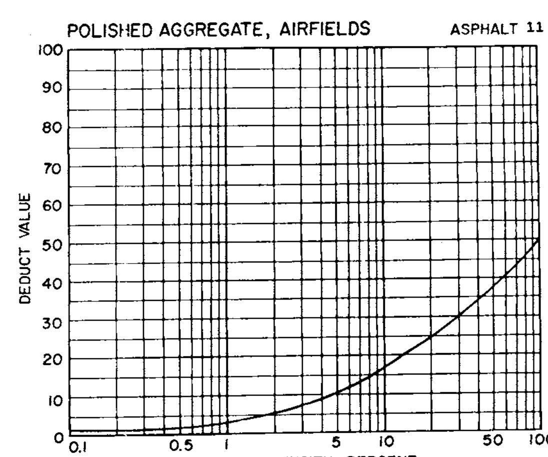


FIG. X3.13 Polished Aggregate

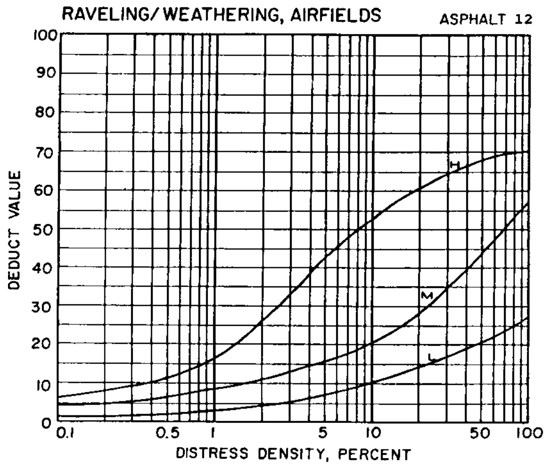


FIG. X3.14 Weathering/Raveling

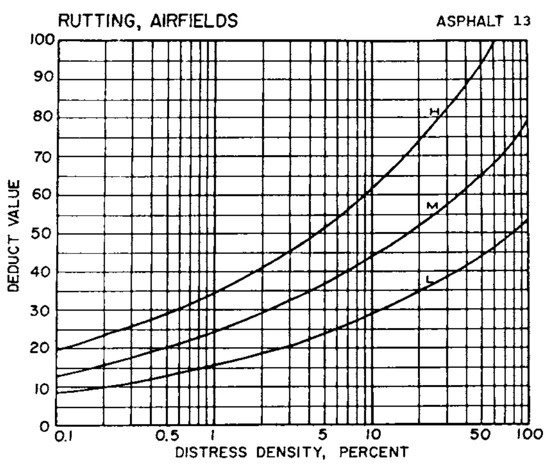


FIG. X3.15 Rutting

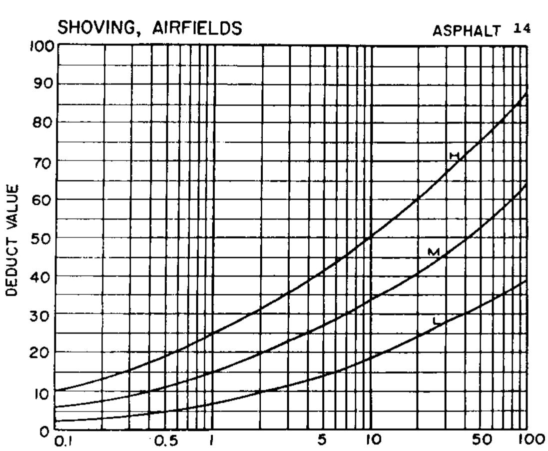


FIG. X3.16 Shoving

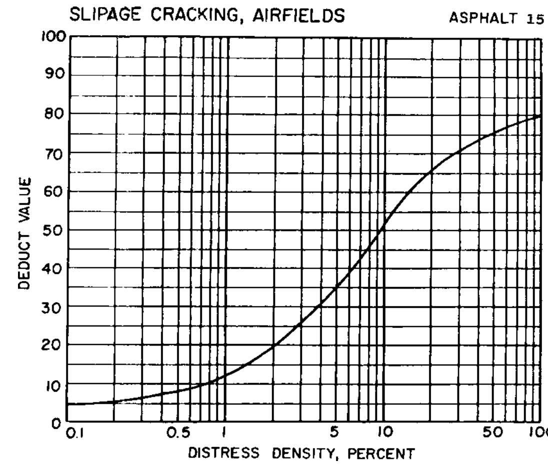


FIG. X3.17 Slippage Cracking

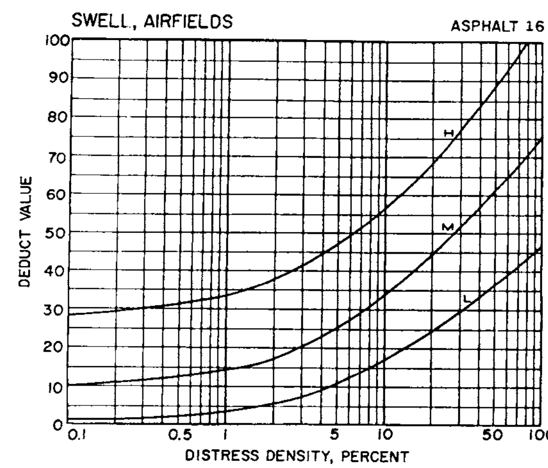


FIG. X3.18 Swelling

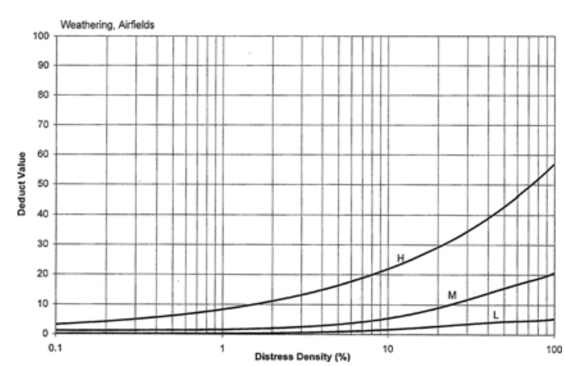


FIG. X3.19 Weathering

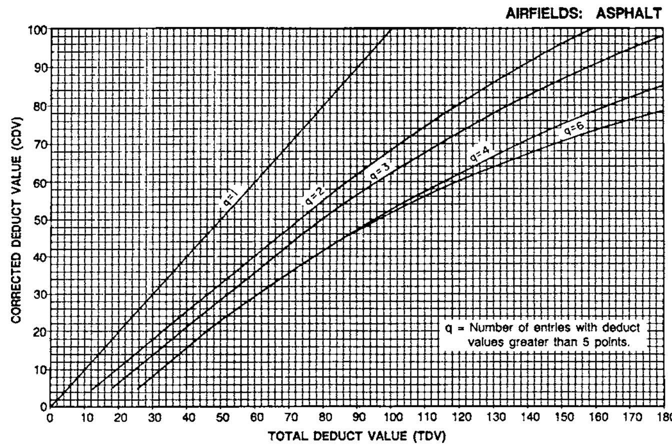


FIG. X3.20 Corrected DVs for Flexible Airfield Pavement

X4. PCC PAVEMENT DEDUCT CURVES

X4.1 See Figs. X4.1-X4.17.

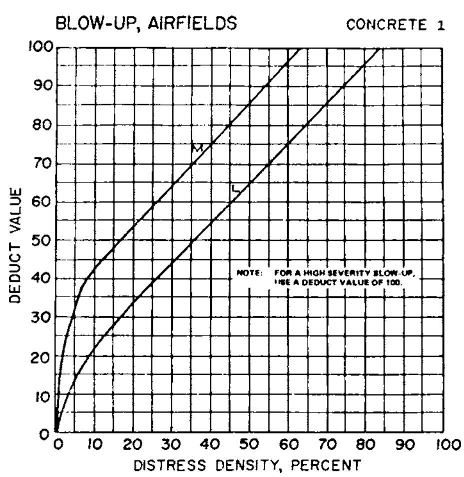


FIG. X4.1 Blowup

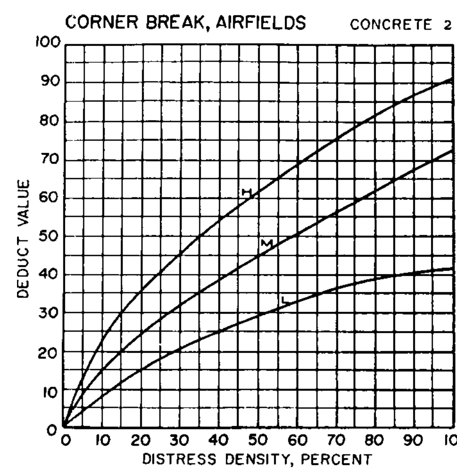


FIG. X4.2 Corner Break

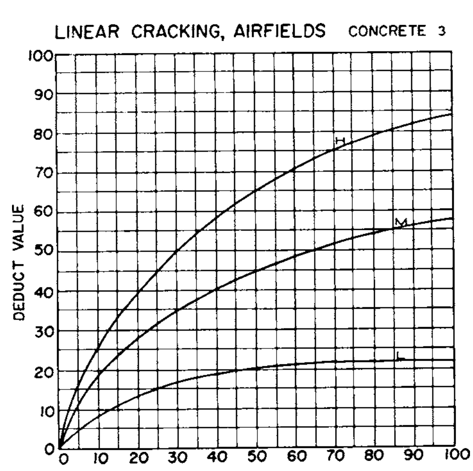


FIG. X4.3 Linear Cracking

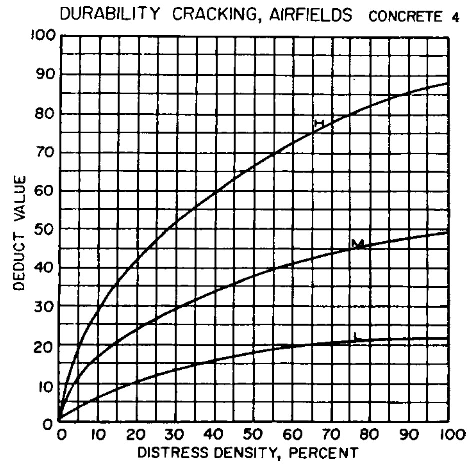


FIG. X4.4 Durability Cracking

JOINT SEAL DAMAGE **CONCRETE 5**

Joint seal damage is not rated by density. The severity of the distress is determined by the sealant's overall condition for a particular section.

The deduct values for the three levels of severity are as follows:

1. High Severity - 12 Points
2. Medium Severity - 7 Points
3. Low Severity - 2 Points

FIG. X4.5 Joint Seal Damage

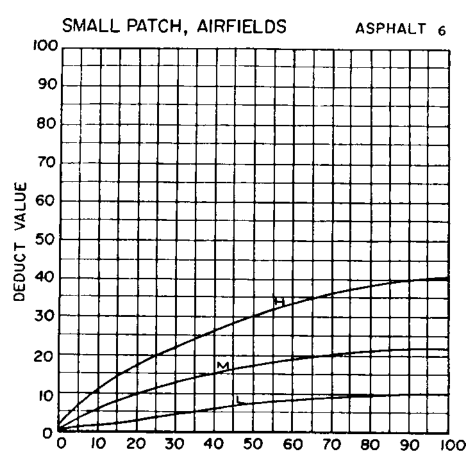


FIG. X4.6 Small Patch

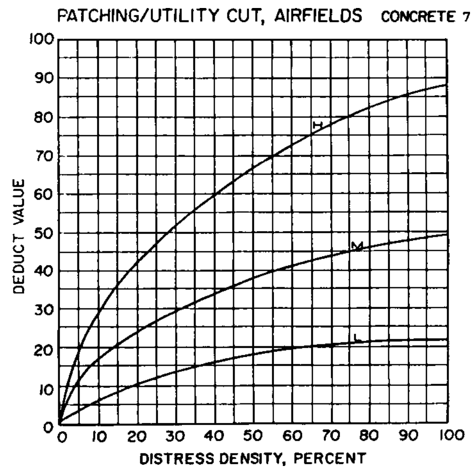


FIG. X4.7 Patching/Utility Cut

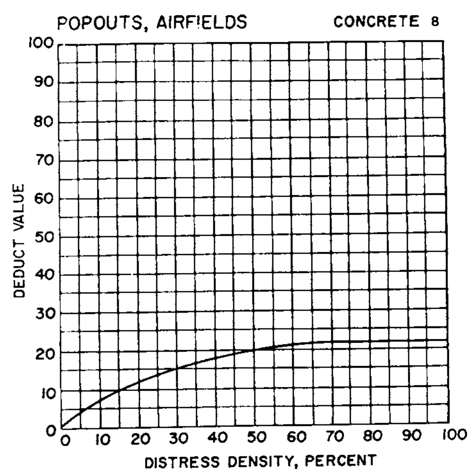


FIG. X4.8 Popouts

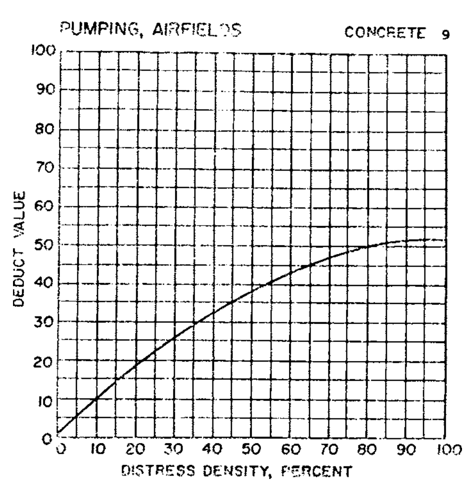


FIG. X4.9 Pumping

X5. BLANK FORMS

X5.1 See Figs. X5.1 and X5.2.

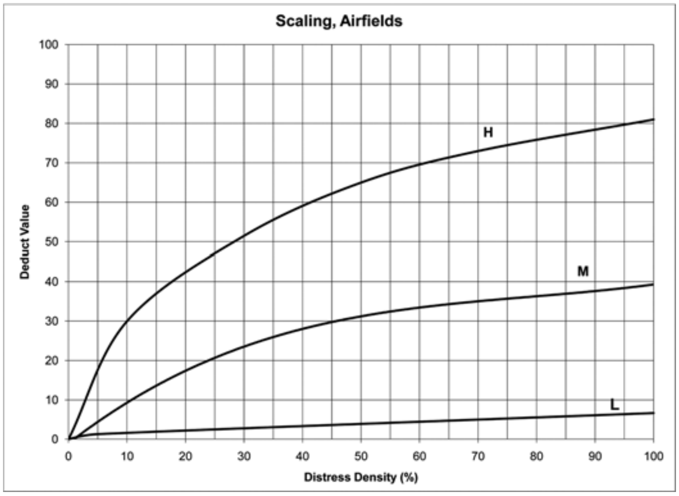


FIG. X4.10 Scaling/Crazing

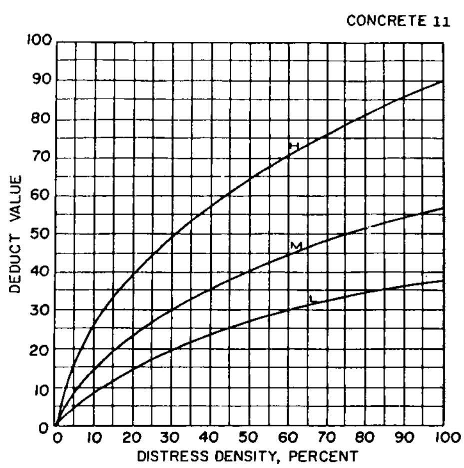


FIG. X4.11 Faulting

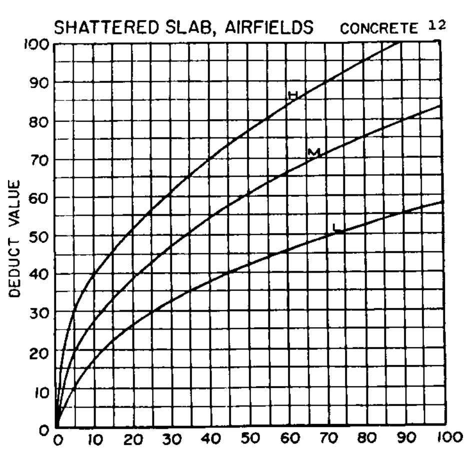


FIG. X4.12 Shattered Slab

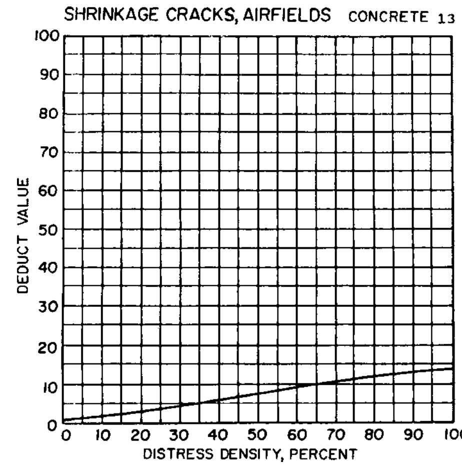


FIG. X4.13 Shrinkage Cracking

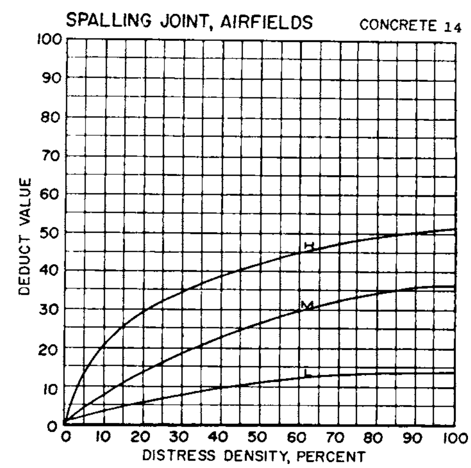


FIG. X4.14 Joint Spalling

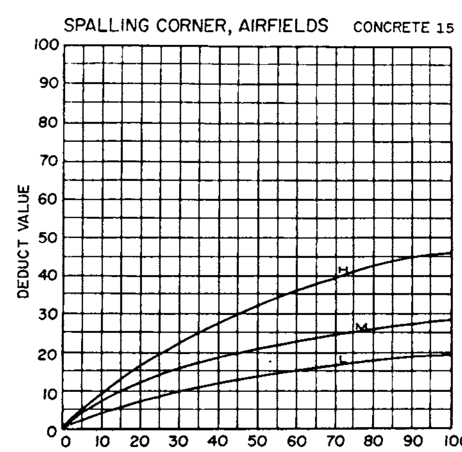


FIG. X4.15 Corner Spalling

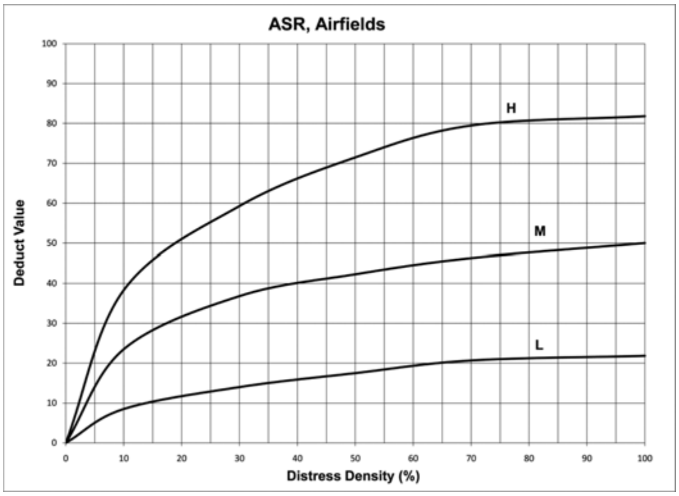


FIG. X4.16 Alkali Silica Reaction

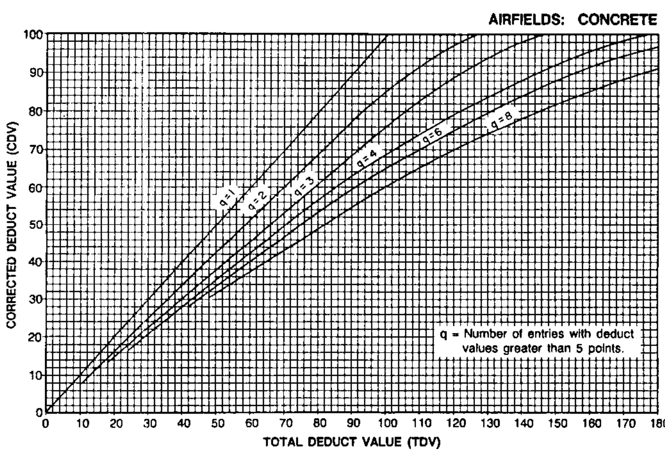


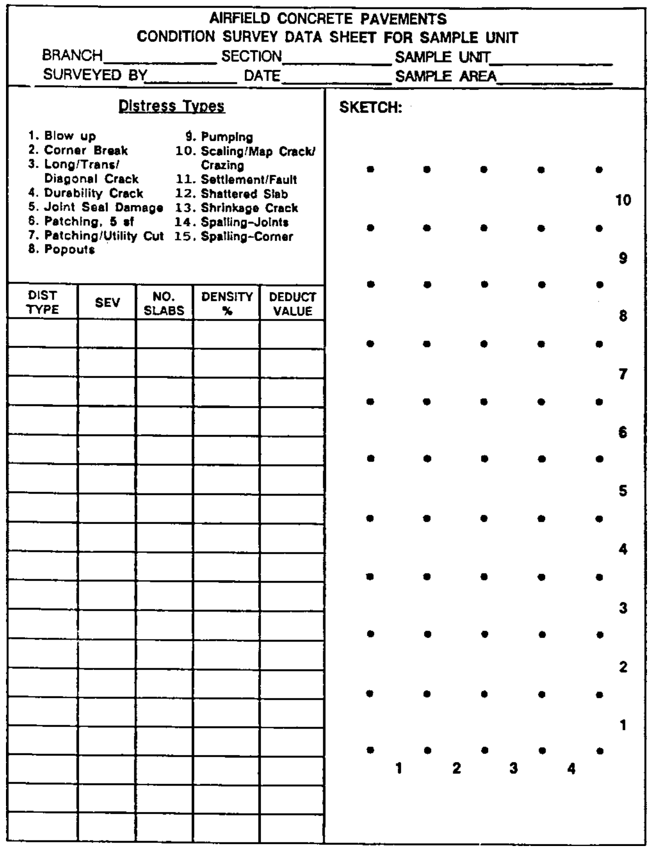
FIG. X4.17 Corrected DVs for Jointed Rigid Airfield Pavements

AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT	SKETCH:
BRANCH____________ SECTION_________ SAMPLE UNIT_________ SURVEYED BY___________ DATE_________ SAMPLE AREA_________	

1. Alligator Cracking	5. Depression	9. Oil Spillage	13. Rutting
2. Bleeding	6. Jet Blast	10. Patching	14. Shoving from PCC
3. Block Cracking	7. Jt. Reflection (PCC)	11. Polished Aggregate	15. Slippage Cracking
4. Corrugation	8. Long. & Trans. Cracking	12. Raveling/Weathering	16. Swell

DISTRESS SEVERITY	QUANTITY									TOTAL	DENSITY %	DEDUCT VALUE

FIG. X5.1 Flexible Pavement Condition Survey Data Sheet for Sample Unit



AIRFIELD CONCRETE PAVEMENTS
CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT

BRANCH__________ SECTION__________ SAMPLE UNIT__________
SURVEYED BY__________ DATE__________ SAMPLE AREA__________

Distress Types

1. Blow up
2. Corner Break
3. Long/Trans/ Diagonal Crack
4. Durability Crack
5. Joint Seal Damage
6. Patching, 5 sf
7. Patching/Utility Cut
8. Popouts
9. Pumping
10. Scaling/Map Crack/ Crazing
11. Settlement/Fault
12. Shattered Slab
13. Shrinkage Crack
14. Spalling-Joints
15. Spalling-Corner

DIST TYPE	SEV	NO. SLABS	DENSITY %	DEDUCT VALUE

SKETCH:

FIG. X5.2 Jointed Rigid Pavement Condition Survey Data Sheet for Sample Unit

REFERENCES

(1) Shahin, M. Y., Darter, M. I., and Kohn, S. D., "Development of a Pavement Maintenance Management System, Vol I, II, V," *Airfield Pavement Condition Rating*, US Air Force Civil Engineering Center, 1976.

(2) Kohn, S. D., and Shahin, M. Y., "Evolution of the Pavement Condition Index for Use on Porous Friction Surfaces," *Technical Report No. M-351*, US Army Construction Engineering Research Laboratory, Champaign, IL, 1984.

(3) Air Force Regulation 93-5, *Airfield Pavement Evaluation Program*, Department of the Air Force, Headquarters US Air Force, Washington, D.C.

(4) Advisory Circular No: 150/5380-6, *Guidelines and Procedures for Maintenance of Airport Pavements*, Federal Aviation Administration, US Department of Transportation.

(5) U.S. Naval Facilities Engineering Command Military Handbook 1021/2, "General Concepts for Airfield Pavement Design," 1988.

(6) *Pavement Condition Index (PCI) Field Manuals for Asphalt Surfaced Airfields*, American Public Works Association.

(7) *Pavement Condition Index (PCI) Field Manuals for Concrete Surfaced Airfields*, American Public Works Association.

(8) Green, W. H., and Eckrose, R. A., *Airport Pavement Inspection by PCI*, 2nd edition, Eckrose/Green Associates, Madison, WI, 1988.

U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: Airport Pavement Management Program (PMP)	**Date:** 10/10/2014 **Initiated by:** AAS-100	**AC No:** 150/5380-7B **Change:**

1. What is the purpose of this advisory circular (AC)?

This advisory circular (AC) discusses the Airport Pavement Management Program (PMP) concept, its basic essential components, and how it is used to make cost-effective decisions about pavement maintenance and rehabilitation (M&R). The terms "pavement management program (PMP)," "pavement maintenance-management program (PMMP)," and "pavement management system (PMS)" are interchangeable.

A PMP is a set of defined procedures for collecting, analyzing, maintaining, and reporting pavement data. A PMP assists airports in finding optimum strategies for maintaining pavements in a safe serviceable condition over a given period for the least cost. A PMP should take into account not only inspection procedures and condition assessment, maintenance protocols and procedures, management and oversight of completed works, but also staff competence needs.

This AC is for airport sponsors, state aviation organizations, engineers, and maintenance personnel responsible for implementing a PMP. Federally obligated airports must perform a detailed inspection of airfield pavements at least once a year for the PMP. If a pavement condition index (PCI) survey is performed, as set forth in ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys, the frequency of the detailed inspections by PCI surveys may be extended to three years. The PMP inspections are in addition to routine maintenance inspections for operations.

2. Does this AC cancel any prior ACs?

This AC cancels AC 150/5380-7A, Airport Pavement Management Program, dated September 1, 2006.

3. To whom does this AC apply?

The Federal Aviation Administration (FAA) recommends the guidance in this AC. In general, use of this AC is not mandatory. However, use of this AC is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charges (PFC) Program. See Grant Assurance No. 11, Pavement Preventive Maintenance, No. 34, Policies, Standards, and Specifications, and PFC Assurance No. 9, Standards and Specifications.

FAA Order 5100.38, Airport Improvement Program Handbook, provides guidance and sets forth policies and procedures for the administration of the AIP including eligibility and justification requirements.

4. What are the principal changes in this AC?

a. Included airfield inspection frequency requirement in paragraph 1, above, and Appendix A.

b. Added information on requirements to implement a PMP in paragraph 3, i.e., AIP Grant Assurance 11.

c. Added discussion on pavement preservation concept and new Figure 2 to paragraph 2.0.

d. Added new Appendix A, Pavement Management Program (PMP), which addresses minimum PMP requirements. This information was previously included in AC 150/5380-6, Guidelines and Procedures for Maintenance of Airport Pavements.

e. Added new Appendix B, Pavement Condition Index (PCI) Method.

f. Added new Appendix C, PAVER™ Distress Identification Manuals, with link to manuals.

g. Updated Appendix D, Related Reading Material.

5. Where can I send comments or suggestions to the AC?

Send comments or suggestions for improving this AC to—

Federal Aviation Administration
Airport Engineering Division (AAS-100)
800 Independence Avenue SW
Washington DC 20591

6. Where can I get copies of this AC?

All Office of Airport Safety and Standards ACs are available online at: http://www.faa.gov/airports/resources/advisory_circulars/.

Michael J. O'Donnell
Director of Airport Safety and Standards

Table of Contents

List of Figures

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1.0 Background.

Historically, some airport sponsors have made decisions about pavement maintenance and rehabilitation (M&R) based on immediate need or experience rather than long-term planning or documented data on effective M&R methods. This approach did not allow the airport sponsor to evaluate the cost effectiveness of alternative M&R strategies, and it led to the inefficient use of available M&R funds.

Every airport sponsor needs to decide the most cost effective way to allocate available funds. This has typically been done based on either experience or the evaluation of existing pavement conditions. Using the experience approach, the airport staff applies M&R procedures which their experience indicates is the best solution for the problem. This approach results in the repeated application of a few select alternatives which may not lead to a preferred rehabilitation strategy, considering pavement performance and life-cycle cost. Using the existing condition approach, the pavement network is evaluated by its condition indicators. M&R alternatives, based on these indicators, are chosen based solely on the condition of the pavement, which may not be the most efficient alternative, and does not take into account life-cycle cost comparisons between M&R alternatives.

Because these approaches have worked reasonably well in the past, some airports have adopted them as standard procedures, ignoring new methods, materials and technologies. These approaches fail to answer some basic questions for the use of limited M&R funds. For example, if you are planning a pavement rehabilitation project such as an overlay, how do you make the best decision if funds are only available to do a full 4-inch overlay over half the pavement in need of M&R in a given funding year? Will there be sufficient funds in the next funding cycle to complete the full 4-inch overlay on the remaining pavements? Should you do a 2-inch overlay over all pavement this year? What is the effect on the pavement since these decisions impact future pavement conditions? What course(s) of action do you take? What are the consequences?

The selection of the best course of action can be determined based on the predicted effects of each action. For example, by placing a thin overlay on all pavements, there will be an immediate improvement to all the pavements. However, due to rapid deterioration of the overlays, there will probably be a need for further rehabilitation in a short period of time. If, in addition to other pavements needing work, some of the overlaid pavements need rehabilitation action again next year, the overall condition of the pavement network will eventually deteriorate. Alternatively, if a few selected pavements receive the full thickness overlay, they will not need rehabilitation for many years. During subsequent years, remaining pavements can then receive full thickness overlays, so the number of pavements needing rehabilitation will ultimately decrease. With this strategy, however, overall pavement condition will be worse in the short term because pavements that were not overlaid will continue to deteriorate until they are rehabilitated.

To determine which of these actions is preferable, you must be able to predict the future consequences of the various scenarios. This requires an understanding of the life span of the M&R method selected, i.e., in our example, a thick (e.g., 4-inch) versus thin (2-inch) overlay. Airports must also have a good understanding of the rate of pavement deterioration, with and without maintenance, and the causes of current pavement deterioration such as environmental or pavement loading conditions. Predicting consequences of M&R scenarios requires experience and the application of best practices and engineering judgment in the decision-making process.

The implementation of a pavement management program (PMP) improves the decision-making process, expands its scope, allows for feedback based on choices made, and ensures that consistent decisions are made throughout an organization. If the consequences are predicted using a predetermined methodology, such as a PMP, it becomes possible to analyze previous predictions and improve on the prediction procedure over a period of time, regardless of management or staff turnover.

2.0 Airport Pavement Management Program (PMP).

A PMP provides a consistent, objective, and systematic procedure for establishing facility policies, setting priorities and schedules, allocating resources, and budgeting for pavement maintenance and rehabilitation. It can also quantify information and provide specific recommendations for actions required to maintain a pavement network at an acceptable level of service while minimizing the cost of maintenance and rehabilitation. A PMP not only evaluates the present condition of a pavement, but also predicts its future condition through the use of pavement condition indicators. By projecting the rate of deterioration, a life-cycle cost analysis can be made for various alternatives to determine the optimal time to apply the best M&R alternative and avoid higher M&R costs in the future.

Figure 1 illustrates how pavement typically deteriorates and the relative cost of rehabilitation at various times throughout its life. A pavement generally performs well for the majority of its life, after which it reaches a “critical condition” and begins to deteriorate rapidly. Maintaining and preserving a pavement in good condition versus rehabilitating a pavement in fair to poor condition is four to five times less expensive and increases pavement useful life. The number of years a pavement stays in “good” condition before reaching the point of rapid deterioration depends on several factors, including construction type and quality, pavement use, climate, and maintenance.

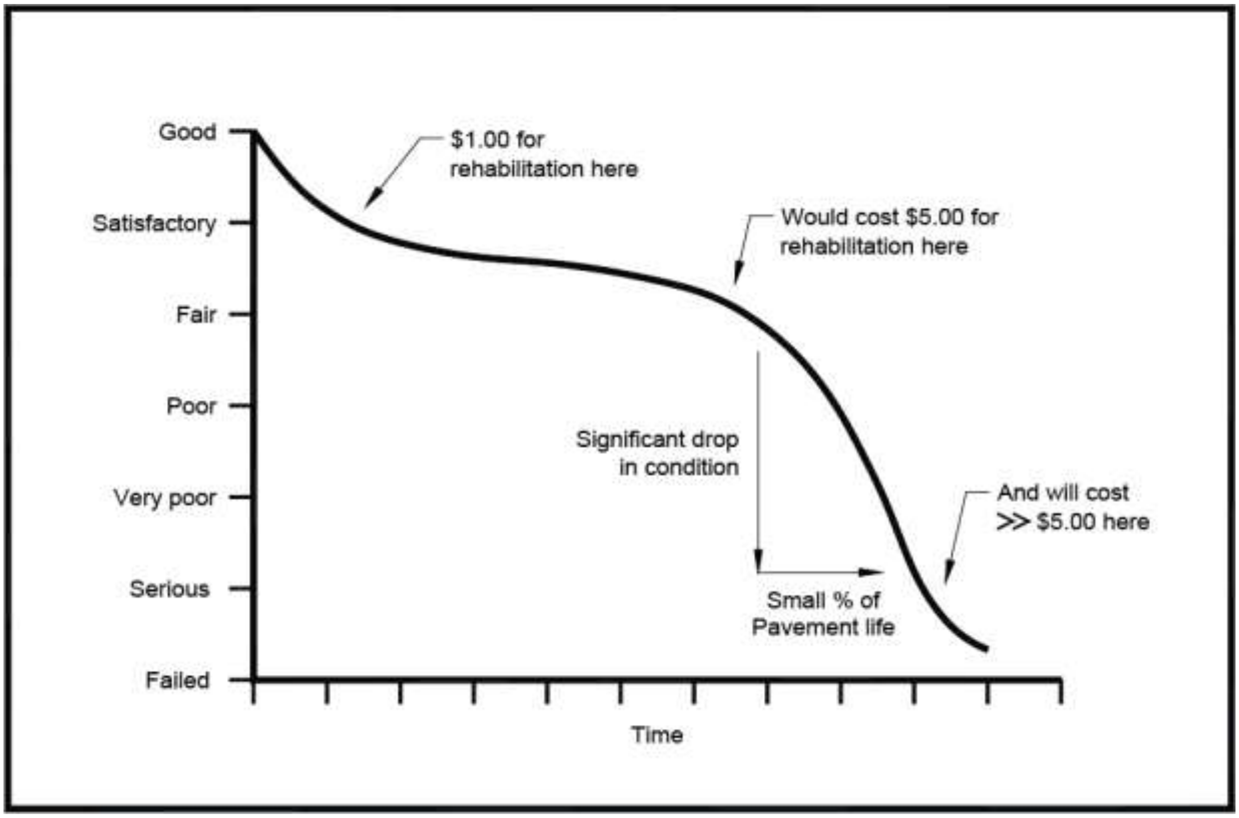

Figure 1. Typical Pavement Condition Life Cycle.

Figure 1 also shows that the ideal time for major rehabilitation is just as a pavement's rate of deterioration begins to increase. Maintenance and rehabilitation solutions would be easy to plan if pavements exhibited clear signs they had reached this point, but unfortunately, they do not. The shape of the deterioration curve, and the optimal maintenance and repair points, vary considerably within a pavement network. A pavement experiencing a sudden increase in operations or aircraft loading will have a tendency to deteriorate more rapidly than a pavement deteriorating solely from environmental causes. A pavement deteriorating from environmental damage may have a number of cracks that need filling, but still remain structurally sound. Conversely, this same pavement may be in the early stages of load damage deterioration, which can only be detected with testing. Because it is difficult to determine when a pavement has reached the critical condition, a PMP helps identify the optimal rehabilitation point and allows decision-makers to target available resources where they will be most effective. The PMP does this by making use of data from a pavement condition rating system that helps predict future conditions and indicate whether the distress is load or environmentally related.

Information on pavement deterioration, by itself, is not sufficient to answer questions involved in selecting cost-effective M&R strategies. For example, should a pavement be sealed, recycled, or resurfaced? This type of decision requires information on the cost of various M&R procedures and their effectiveness. Effectiveness in this case means the proposed solution targets the pavement deficiency, improves the pavement condition, recovers the M&R costs, and extends the useful life of the pavement.

A PMP enables a user to store pavement condition and maintenance information in a database using the program's resources to determine the most cost-effective solution for pavement maintenance issues.

Figure 2 illustrates the pavement preservation concept, which begins with an application of M&R techniques early in a pavement's life. An effective pavement preservation program addresses pavements while they are still in good condition and before any serious damage occurs. By applying a cost-effective treatment at the right time, the pavement condition is improved. The cumulative effect of systematic, successive preservation treatments is to minimize or eliminate costly repairs and postpone costly rehabilitation and reconstruction. During the life of a pavement, the cumulative cost of the series of pavement preservation treatments is substantially less than the cost of the more extensive, higher cost of reconstruction and generally more economical than the cost of major rehabilitation. Additionally, performing a series of successive pavement preservation treatments during the life of a pavement is less disruptive to users than the long closures normally associated with reconstruction projects.

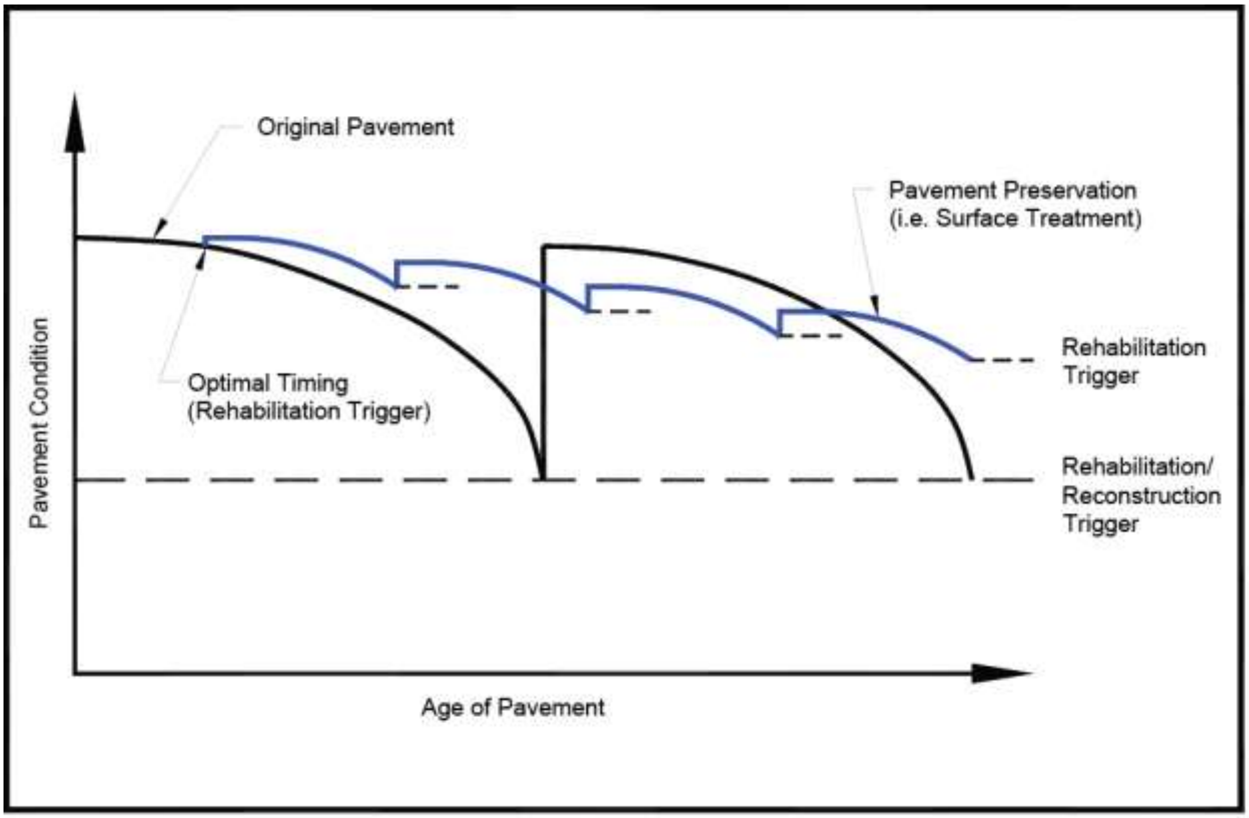

Figure 2. Pavement Preservation Concept.

When implementing a PMP, note the distinction between rehabilitation and routine maintenance activities. Routine maintenance is required to preserve the pavement to achieve the design life of the pavement. Routine maintenance consists of work planned and performed on a routine basis to maintain and preserve the condition of the airport pavements and is an integral part of the overall pavement preservation concept. This includes items such as yearly crack sealing and daily inspections of the airport pavement system.

2.1 Benefits of a PMP.

A PMP can provide several benefits, including:

- Increased pavement useful life.
- An objective and consistent evaluation of the condition of a network of pavements.
- A systematic and documentable engineering basis for determining M&R needs including consideration of future operational needs and/or planned airport expansion projects.
- Identifying budget requirements necessary to maintain pavement functionality.
- Documentation on the present and future condition of the pavements.
- Life Cycle Cost Analysis for various M&R alternatives.
- Identifying the impact on the pavement if no major repairs are performed.

2.2 Components of a PMP.

To take full advantage of a PMP, pavement condition information must be collected and continually updated to keep data current. Alternative rehabilitation strategies must be identified along with decision criteria and a maintenance policy that will determine which rehabilitation procedures are employed. Further, the PMP requires models for prediction of performance, cost of alternate strategies, and optimization procedures that consider the entire pavement life cycle.

A system for accomplishing these objectives includes:

- A systematic means for collecting and storing information regarding existing pavement structure and pavement condition.
- An objective and repeatable system for evaluating pavement condition.
- Procedures for predicting future pavement condition.
- Procedures for modeling both past and future pavement performance conditions.
- Procedures to determine the budget requirements to meet management objectives, such as the M&R budget required to keep a pavement at a specified pavement condition index (PCI) level or the M&R budget required to improve to a target PCI level.
- Procedures for formulating and prioritizing M&R projects.

The components of a PMP include:

2.2.1 Database. There are several elements critical to making good pavement M&R decisions: pavement inventory; pavement structure; M&R history, including costs; information on the condition of a pavement; and traffic data. This data can be stored in a PMP database.

2.2.1.1 Pavement Inventory. Location of all runways, taxiways, and aprons; dimensions; type of pavement; year of construction and/or most recent major rehabilitation; and whether AIP or PFC funds were used to construct, reconstruct, or repair the pavement.

2.2.1.2 Pavement structure. Knowing when the pavement was originally built, the structural composition (material and thickness), and subsequent overlays, rehabilitation, etc., is key to analyzing problems and designing solutions. “As built” records should provide this information. If they are not available or if records are suspect, it may be necessary to perform nondestructive and/or destructive testing to determine the existing pavement's thickness and composition of the structural layers. Additional information regarding the pavements structural load bearing capacity, e.g., pavement classification number (PCN) may be beneficial. Additional information on PCN is available in AC 150/5335-5, Standardized Method of Reporting Airport Pavement Strength – PCN.

2.2.1.3 M&R history. A history of all M&R performed and its associated costs will provide valuable information on the effectiveness of various M&R procedures on pavements. An airport should also track and document routine maintenance activities including the types and severities of distresses repaired, type of work, quantities, and cost of work performed to help determine the effectiveness of different maintenance and rehabilitation strategies within a PMP.

2.2.1.4 Pavement condition data. A fundamental component of any PMP is the ability to track pavement condition. This requires an evaluation process that is objective, systematic, and repeatable. A pavement condition rating system, such as the PCI rating system described in ASTM International (ASTM) D5340, Standard Test Method for Airport Pavement Condition Index Surveys (see Appendix B for an overview of PCI), provides a rating of the surface condition of a pavement with implications of structural performance. Regular collection of pavement condition data is essential for tracking pavement performance, modeling pavement performance, and determining when to schedule M&R. Changes in pavement conditions, as documented in routine pavement inspections, may require a need for a more detailed PCI survey since the structural condition of a pavement cannot be determined solely from a visual inspection.

2.2.1.5 Traffic data. Data about the current and future operational needs including operations and type of aircraft using the pavement is beneficial when analyzing probable causes of deterioration and when evaluating alternate M&R procedures.

2.2.2 System capabilities.

2.2.2.1 Predicting current and future pavement condition. A PMP needs to be capable of predicting current and future pavement condition. Condition predictions are necessary to develop optimum, multi-year M&R plans. Pavement deterioration is affected by many factors including environment, surface condition, structural condition, change in traffic operations, etc. Overall pavement condition cannot be determined solely from the results of pavement inspections.

2.2.2.2 Determining optimum M&R plans for a given budget. A PMP should be capable of producing an optimum M&R plan that identifies where and when M&R is required and approximately how much it will cost. This data will assist in setting priorities that fit predetermined M&R budgets.

2.2.2.3 Determining budget requirements to meet management objectives. A PMP should be capable of determining the budget requirements to meet specified management objectives. Typical management objectives include maintaining pavements above a specified condition and/or eliminating major M&R requirements over a specified number of years.

2.2.2.4 Facilitating the formulation and prioritization of M&R projects. In addition to developing optimum M&R plans at the network level, a PMP should facilitate the formulation and prioritization of M&R projects. Engineering judgment, however, remains a key component in transforming the optimum M&R plans into practical executable projects.

2.3 PMP Management.

There are several terms that need to be defined to explain pavement management:

- Pavement Network – a logical unit for organizing pavements into a structure for the purpose of pavement management. A network will consist of one or more pavement branches, which in turn may consist of one or many pavement sections. The network is the point of origin for the hierarchy of pavement management structures. For example, a network can be all the pavements on an airport or all the pavements in the state airport system.

- Pavement Branch – a readily identifiable part of the pavement network with a distinct function. For example, an airfield pavement such as each individual runway, taxiway or apron is considered a separate branch. Each branch consists of at least one section.

- Pavement Section – a section is the smallest management unit when considering the application and selection of M&R treatments for a branch. Each branch consists of at least one section, but may consist of more if pavement characteristics vary throughout the branch. Factors to consider when dividing branches into sections includes, but is not limited to: pavement structure, type, age and condition; traffic composition and frequency (current and future); construction history; pavement function; and drainage facilities and shoulders. A pavement section is defined as a subordinate of a pavement branch, which in turn will be a subordinate of a parent pavement network.

Managing a pavement system effectively requires decision-making at two levels: network and project. PMP software (paragraph 3.0) can be used to assist in making pavement management decisions.

2.3.1 Network-level management. In network-level management, questions are answered about short-term and long-term budget needs, the overall condition of the network (current and future), and pavements to be considered at the project level. A network level evaluation can be utilized to optimize funding and prioritize M&R techniques so decisions are made for the management of an entire pavement network. For example, local consideration, might comprise all the pavements on an airport and, for state consideration, all the pavements in the state airport system.

2.3.1.1 Using PMP software at the network level. In addition to providing an automated tool for storing information about specific pavements, PMP software includes the ability to produce standard and customized user-defined reports. These reports can help the user make decisions about inspection scheduling, pavements needing rehabilitation, budget forecasting, routine maintenance projects, current pavement conditions, and future condition predictions.

2.3.1.2 Condition prediction. Condition prediction is used as the basis for developing inspection schedules and identifying pavements requiring maintenance or rehabilitation. Once pavements requiring future work are identified, a budget for the current year and for several years into the future can be developed. By using an agency's prioritization scheme, maintenance policy, and M&R costs and then comparing the budget to the actual funds available for the current year, the software produces a list of potential projects. This list becomes the link to project-level management.

2.3.2 Project-level management. In project-level management, decisions are made about the most cost-effective M&R alternative for the pavements identified in the network analysis. However, factors may change the optimum M&R strategy between the time of the last PMP and the actual development of a project. At this level, each specified pavement should have a new detailed condition survey. A project normally consists of multiple pavement sections and may include different M&R actions for different sections. Roughness and friction measurements may be useful for project development. Nondestructive and/or destructive tests may be necessary to determine the pavement's load-carrying capacity.

2.3.2.1 Using PMP software at the project level. PMP software can use a number of engineering measurements to quantify a pavement's condition. Nondestructive test data, friction measurements, roughness measurements, and drainage information may be entered into the PMP database. This information is used to identify feasible alternatives that can correct existing deficiencies. The various alternatives identified, including no action, are then compared on a life-cycle cost basis. The results, combined with budget and management constraints, produce the current year's maintenance and repair program.

2.3.2.2 Roughness. Roughness measurements can be helpful when there is evidence of roughness issues, usually in the form of frequent pilot complaints. Roughness measurement is of greater value when the pavement is in very good condition with little or no distress. It has less value if reconstruction is imminent. AC 150/5380-9, Guidelines and Procedures for Measuring Airfield Pavement Roughness, provides guidelines and procedures for measuring and evaluating runway roughness.

2.3.2.3 Friction. Friction measurements should be made on a periodic basis to measure the skid-resistance of runway pavement due to the accumulation of contaminants, chiefly rubber, on the pavement surface; and the mechanical wear and polishing action from aircraft tires rolling or braking on the pavement. AC 150/5320-12, Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces, provides recommendations for friction measurements.

2.4 Reports.

There are numerous reports that can be developed using the data from a PMP. PMP software can assist in the decision-making process by allowing the user to run standard and customized reports. PMP software allows the user to customize the reports to include only the pavements and/or conditions of interest and to generate various budget/condition scenarios. Reports typically include the following:

2.4.1 Inventory Report. This report lists all pavements in a network and contains information such as surface type, location, area, and pavement function, i.e., runway, taxiway, apron.

2.4.2 Inspection Scheduling Report. This report allows the user to schedule inspections based on minimum acceptable condition levels and rates of deterioration. The PMP should have annual detailed inspections and include provisions for less comprehensive daily, weekly, and monthly inspections. Federally obligated airports must perform a detailed inspection of airfield pavements at least once a year for the PMP. If a pavement condition index (PCI) survey is performed, as set forth in ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys, the frequency of the detailed inspections by PCI surveys may be extended to three years. The PMP inspections are in addition to routine maintenance inspections for operations.

2.4.3 Pavement Condition Report. This report provides the user with a tabulation of pavement condition for the current and future years. The report provides the condition of individual pavement sections and the overall network condition. The projected condition is used to assist in planning future maintenance and repair needs and to inform management of present and future conditions.

2.4.4 Budget Planning Report. This report allows the user to project the budgets required to maintain the pavement network above a user-specified condition level. For each pavement selected, the report predicts the year in which the minimum condition or PCI will be reached and calculates the cost of repair. The budget planning report should include both routine maintenance activities, pavement preservation activities, and major rehabilitation activities for a given planning timeframe.

2.4.5 Network Maintenance Report. This report uses the agency's maintenance strategy, which is stored in the database, and applies it to the distresses identified in the latest PCI survey.

2.4.6 Economic Analysis Report. This report can assist the user in selecting the most cost-effective alternative for a pavement repair. For each feasible alternative, the user must input initial costs, periodic maintenance costs (i.e., annual crack sealing), future maintenance costs (i.e., surface treatments), interest rates, and discount rates. The program performs a life-cycle cost analysis and provides the user with a means of comparing the effectiveness of the various repair alternatives. The program allows the user to vary interest rates, repair costs, and timing so their effect on alternatives can be analyzed.

2.4.7 Other Reports. Based upon local needs and conditions, other reports may be beneficial.

3.0 PMP Software.

When developing a PMP, airports can use any of several existing software options. PMP software allows for storage of pavement condition history, nondestructive testing data, and construction and maintenance history, including cost data. It provides many capabilities, including evaluation of current conditions, prediction of future conditions, identification of M&R

needs, inspection scheduling, economic analysis, and budget planning. PMP software can be tailored to each airport based on past performance of the alternatives.

3.1 PAVER™.

PAVER™ is a PMP application developed by the U.S. Army Construction Engineering Research Laboratory sponsored by the FAA. PAVER™ development and updating is supported by the FAA, Federal Highway Administration, U.S. Army, U.S. Air Force, and U.S. Navy to meet current user needs. PAVER™ provides pavement management capabilities to (1) develop and organize the pavement inventory; (2) assess the current condition of pavements; (3) develop models to predict future conditions; (4) report on past and future pavement performance; (5) develop scenarios for M&R based on budget or condition requirements; and (6) plan projects. Additional information on the PMP software is available at the following website: http://paver.colostate.edu/.

3.2 FAA PAVEAIR.

FAA PAVEAIR is a web-based airport PMP using the concept originally developed in PAVER™ that provides users with historic and current information about airport pavement construction, maintenance and management. The program offers users a planning tool capable of modeling airport pavement surface degradation due to external effects such as traffic and the environment. FAA PAVEAIR is accessible at the following website: https://faapaveair.faa.gov.

3.3 Other PMP Software.

Various firms have developed similar software using the concept originally developed in PAVER™ that provides pavement evaluation and management services. Any software that meets the minimum requirements for a PMP as described in Appendix A is acceptable.

Appendix A. Pavement Management Program (PMP).

A-1.0 An effective PMP specifies the procedures to follow to assure that proper preventative and remedial pavement maintenance is performed. The program should identify funding or anticipated funding and other resources available to provide remedial and preventive maintenance activities. An airport sponsor may use any format deemed appropriate, but the program needs to, as a minimum, include the following:

A-1.1. Pavement inventory. The following must be depicted:

- Identification of all runways, taxiways, and aprons with pavement broken down into sections each having similar properties.
- Dimensions of pavement sections.
- Type of pavement surface.
- Year of construction and/or most recent major rehabilitation.
- Whether AIP or PFC funds were used to construct, reconstruct, or repair the pavement.

A-1.2. PMP Pavement Inspection Schedule.

Airports must perform a detailed inspection of airfield pavements at least once a year for the PMP. If a pavement condition index (PCI) survey is performed, as set forth in ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys, the frequency of the detailed inspection by PCI surveys may be extended to three years. Less comprehensive routine daily, weekly, and monthly maintenance inspections required for operations should be addressed.

A-1.3. Record keeping.

The airport must record and keep on file complete information about all detailed inspections and maintenance performed until the pavement system is replaced. The types of distress, their locations, and remedial action, scheduled or performed, must be documented. The minimum information recorded includes:

- Inspection date
- Location
- Distress types
- Maintenance scheduled or performed

A-1.4. Information retrieval.

An airport sponsor may use any form of record keeping it deems appropriate so long as the information and records from the pavement survey can generate required reports, as necessary.

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Appendix B. Pavement Condition Index (PCI) Method.

B-1.0 Most PMP software use the PCI method. ASTM has adopted the PCI as a pavement condition rating standard for airfield pavements. ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys, covers the determination of airport pavement condition through visual surveys of pavement using the PCI method to quantify pavement condition. ASTM D6433, Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys, covers the determination of road and parking lot pavement condition.

B-2.0 The PCI is a numerical indicator that reflects the structural integrity and surface operational condition of a pavement. It is based on an objective measurement of the type, severity, and quantity of distress. By projecting the rate of deterioration, a life-cycle cost analysis can be performed for various M&R alternatives. Not only can the best alternative be selected, but the optimal time of application can also be determined. The PCI values range from 0 to 100, as shown in Figure B-1 where 0 indicates a failed pavement and 100 is a new pavement.

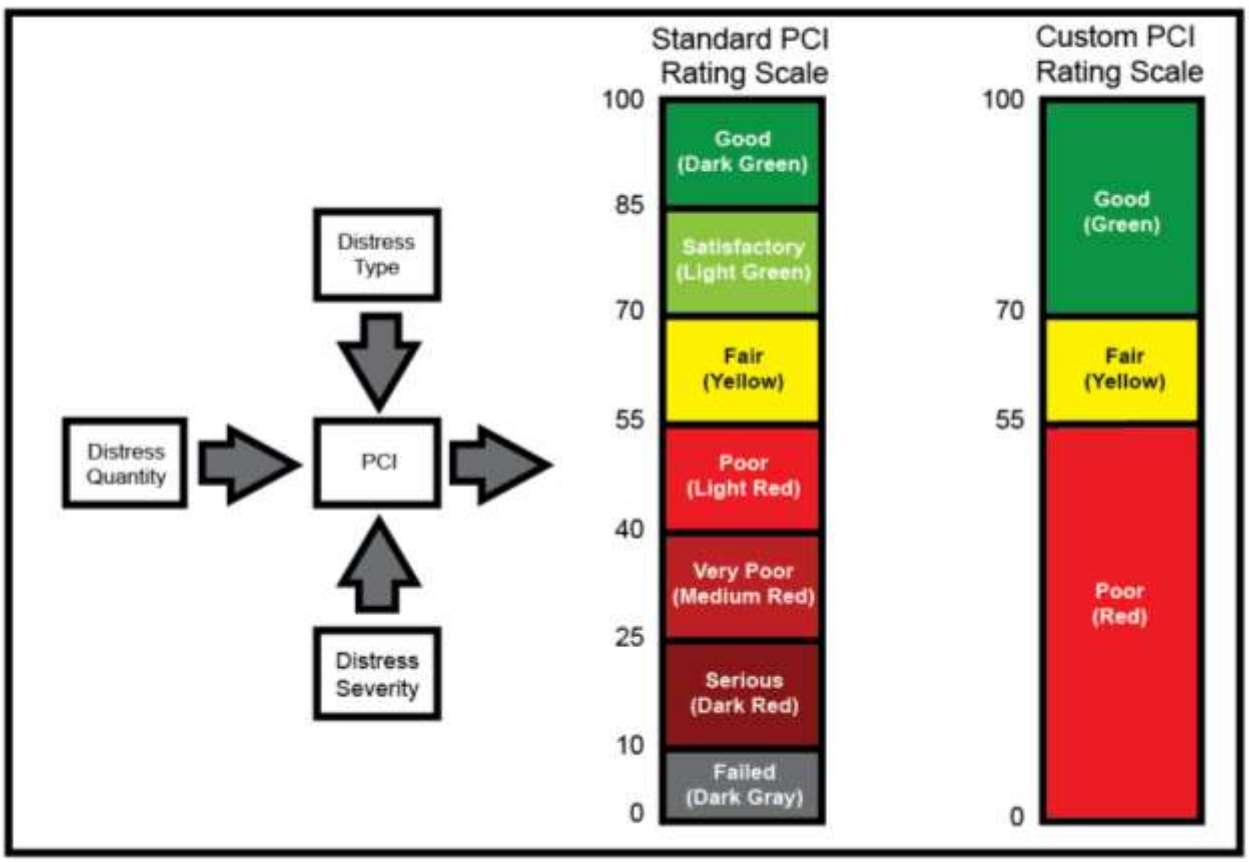

Figure B-1. Example PCI Rating Scales for Airfield Pavements.

B-3.0 The distress types for hot mix asphalt (HMA) and PCC pavements are identified in ASTM D5340; which describes each distress type, severity levels, and measurement of each distress. This information is also included in the PAVER™ Distress Identification Manuals referenced in Appendix C in this AC, as well as the PAVER™ and PAVEAIR programs.

Appendix C. PAVER™ Distress Identification Manuals.

C-1.0 This appendix includes a link to the PAVER™ Distress Identification Manuals developed by the U.S. Army Corps of Engineers Army Engineering Research and Development Center – Construction Engineering Research Laboratory (USACE ERDC-CERL). The manuals contain distress definitions, severity levels, and measuring methods for asphalt and concrete surfaced airfields, respectively. The information in these manuals can be used to determine the PCI of airfield pavements.

- The Asphalt Surfaced Airfields PAVER™ Distress Identification Manual contains distress definitions and measurement methods for asphalt surfaced airfields.

- The Concrete Surfaced Airfields PAVER™ Distress Identification Manual contains distress definitions and measuring methods for concrete surfaced airfields.

C-2.0 The manuals are available at the FAA Airports websites:

http://www.faa.gov/documentLibrary/media/Advisory_Circular/Asphalt-Surfaced-Airfields-Distress-Manual.pdf

http://www.faa.gov/documentLibrary/media/Advisory_Circular/Concrete-Surfaced-Airfields-Distress-Manual.pdf.

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Appendix D. Related Reading Material.

D-1.0 Electronic copies of the latest versions of the following FAA publications are available on the FAA website at http://www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/.

- AC 150/5320-5, Airport Drainage Design.
- AC 150/5320-6, Airport Pavement Design and Evaluation.
- AC 150/5320-12, Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces.
- AC 150/5335-5, Standardized Method of Reporting Airport Pavement Strength – PCN.
- AC 150/5370-11, Use of Nondestructive Testing Devices in the Evaluation of Airport Pavements.
- AC 150/5380-6, Guidelines and Procedures for Maintenance of Airport Pavements.
- AC 150/5380-9, Guidelines and Procedures for Measuring Airfield Pavement Roughness.
- FAA Order 5100.38, Airport Improvement Program Handbook.

D-2.0 Copies of ASTM Standards can be obtained from ASTM International at http://www.astm.org/.

- ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys.
- ASTM D6433, Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys.

D-3.0 Pavement Management for Airports, Roads, and Parking Lots, M.Y. Shahin, Second Edition, Springer, 2005.

D-4.0 Transportation Research Circular No. E-C127, Implementation of an Airport Pavement Management System (2/2008). A copy of the publication is available at the following website: http://onlinepubs.trb.org/onlinepubs/circulars/ec127.pdf.

D-5.0 Airport Cooperative Research Program (ACRP) Synthesis 22, Common Airport Pavement Maintenance Practices. A copy of the publication is available at the following website: http://www.trb.org/Publications/Blurbs/Common_Airport_Pavement_Maintenance_Practices_165167.aspx.

D-6.0 Unified Facilities Criteria (UFC) 3-270-08, Pavement Maintenance Management. A copy of the publication is available at the following website: http://www.wbdg.org/ccb/DOD/UFC/ufc_3_270_08.pdf.

Advisory Circular

U.S. Department
of Transportation

Federal Aviation Administration

Subject: Guidelines and Procedures for Maintenance of Airport Pavements	**Date:** 10/10/2014 **Initiated by:** AAS-100	**AC No:** 150/5380-6C **Change:**

1. Purpose. This advisory circular (AC) provides guidelines and procedures for maintaining airport pavements.

2. Cancellation. This AC cancels AC 150/5380-6B, Guidelines and Procedures for Maintenance of Airport Pavements, dated September 28, 2007.

3. Application. The guidelines and procedures contained in this AC are recommended by the Federal Aviation Administration (FAA) for the maintenance and minor repairs of airport pavements. This AC offers general guidance for maintenance and is neither binding nor regulatory.

Use of this AC is not mandatory. For major maintenance projects, the airport should utilize plans and specifications developed under the direction of a pavement design engineer.

For all maintenance and repair projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charge (PFC) Program, the airport must use the guidelines and specifications for materials and methods in AC 150/5370-10, Standards for Specifying Construction of Airports. Pavement maintenance discussed in this AC is specific to airfield pavements. Maintenance of airport access roads and other non-aeronautical pavements may typically use state highway standards.

4. Principal changes. The AC contains the following principal changes:

a. Revised and reformatted entire AC.

b. Added paragraph on operational safety on airports during construction in Chapter 1.

c. Simplified Chapter 2. Moved information on friction, drainage, etc., into Chapter 2.

d. Added paragraph on wildlife hazard attractants and mitigation with respect to drainage systems to Chapter 2.

e. Split Table 6-1 into two tables; updated and simplified tables for Quick Guide for Maintenance and Repair of Common Rigid Pavement Surface Problems and Quick Guide for Maintenance and Repair of Common Flexible Pavement Surface problems.

f. Deleted Tables 6-2 through 6-10 from previous release.

g. Deleted "Pavement Maintenance Management Program" from appendices. Information has been moved to AC 150/5380-7, Airport Pavement Management Program (PMP).

h. Deleted "Generic Specifications" and "Generic Typical Details" and replaced with typical repair procedures.

i. Updated Bibliography.

5. Related reading material. The publications in Appendix B, Bibliography, provide further guidance and technical information.

6. Metric units. Throughout this AC, U. S. customary units will be used followed with "soft" (rounded) conversion to metric units. The U. S. customary units govern.

7. Comments or suggestions for improvements to this AC should be sent to:

Federal Aviation Administration
Airport Engineering Division (AAS-100)
800 Independence Avenue, S.W.
Washington, DC 20591

8. Copies of this AC. This AC is available on the FAA Airport website: http://www.faa.gov/regulations_policies/advisory_circulars/.

Michael J. O'Donnell
Director of Airport Safety and Standards

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Chapter 1. Introduction to Airport Pavement Maintenance

1.1. General.

This advisory circular (AC) provides information on the types of pavement distress that occur to airport pavements and typical corrective action during preventive and remedial maintenance activities. Maintenance includes preventive and any regular or recurring work necessary to preserve existing airport pavements in good condition. Replacing individual parts and mending portions of a pavement are considered minor repair. Typical preventive and regular or recurring pavement maintenance includes: routine cleaning, filling, and/or sealing of cracks; patching pavement; seal coating; grading pavement edges; maintaining pavement drainage systems; and restoring pavement markings. Timely maintenance and repair of pavements is essential in maintaining adequate load-carrying capacity, good ride quality necessary for the safe operation of aircraft, good friction characteristics under all weather conditions, and minimizing the potential for foreign object debris (FOD).

Some older pavements were not designed for today's aircraft fleet and are exposed to much greater loads than those initially considered. FAA airport pavement design is based upon a minimum 20-year structural life, with the understanding that regular, routine maintenance is performed. Without regular maintenance, the pavement may not achieve the intended structural life.

Airport pavements require continual routine maintenance, rehabilitation and upgrading. Immediately after completion, airport pavements begin a gradual deterioration attributable to weather and loading. Normal distresses in the pavement structure due to weathering, fatigue effects, and differential movement in the underlying subbase occur over a period of years. This gradual deterioration is accelerated by, among other things, faulty construction techniques, substandard materials, or poor workmanship. Traffic loads in excess of those forecast during pavement design may also contribute to shortened pavement life.

The most effective means of preserving airport runways, taxiways, aprons, and other pavement areas is to implement a comprehensive maintenance program. An effective maintenance program takes a coordinated, budgeted, and systematic approach to both preventive and remedial maintenance. A systematic approach ensures continual vigilance and many airports using this approach have experienced tangible benefits. The comprehensive maintenance program should be updated annually and feature a schedule of inspections and a list of required equipment and products. The airport should systematically make repairs and take preventive measures when necessary.

Airport Improvement Program (AIP) grants require many airports to develop and maintain an effective airport pavement maintenance-management program. The FAA also encourages airports that are not specifically required to develop maintenance programs to do so as a means of preserving their facilities. Refer to AC 150/5380-7, Airport Pavement Management Program (PMP), for information on PMP.

Early detection and repair of pavement defects is the most important preventive maintenance procedure. Failure to perform routine maintenance during the early stages of deterioration will eventually result in serious pavement distresses that require extensive repairs that will be costly in terms of dollars and closure time. The cause of pavement distresses must first be determined so an airport can select a repair method that not only corrects the present damage, but will also prevent or retard its progression.

Airports should prioritize long term solutions rather than focusing on immediate, short-term remedies. The selection of a rehabilitation method should consider both economic and engineering impacts of all practicable alternatives. The cost of rehabilitation alternatives should be compared over some finite period of time (life cycle), considering the future economic consequences of a repair method as well as the initial rehabilitation maintenance costs.

1.2. Operational safety on airports during construction.

Airports are complex environments, and procedures and conditions associated with construction and maintenance activities often affect aircraft operations and can jeopardize operational safety. Safety considerations are paramount and may make operational impacts unavoidable. However, careful planning, scheduling, and coordination of construction and maintenance activities can minimize disruption of normal aircraft operations and avoid situations that compromise the airport's operational safety. An airport operator has overall responsibility for all activities on an airport, including construction and maintenance. The airport operator must understand how construction and maintenance activities and aircraft operations affect one another to be able to develop an effective plan to complete the project.

An effective project construction safety and phasing plan (CSPP) should be developed for maintenance activities. The development of the CSPP includes identifying the areas of the airport affected by the project; the impact to normal airport operations, if any, and any temporary changes that are required with respect to air traffic operations, aircraft rescue and fire fighting (ARFF) or other operations; and how risk will be managed. AC 150/5370-2, Operational Safety on Airports During Construction, provides additional information and guidance about safety on airports during construction.

Chapter 2. Airport Pavements

2.1. General.

This chapter is a very general and brief overview of airport pavements. Airport pavements are designed, constructed, and maintained to support the critical loads imposed by aircraft. Airport pavements produce a firm, stable, smooth, skid-resistant, all-year, all-weather surface free of debris or other particles that may be blown or picked up by propeller wash or jet blast. The quality and thickness of the pavement must ensure the pavement will not fail under the imposed loads and the pavement must be durable enough to withstand the abrasive action of traffic, adverse weather conditions, and other deteriorating influences. To ensure the necessary strength of the pavement and to prevent unmanageable distresses from developing, the airport should consider various design, construction, and material-related parameters. For guidance and design standards for pavements, refer to AC 150/5320-6, Airport Pavement Design and Evaluation. For materials and methods for construction of airports, refer to AC 150/5370-10, Standards for Specifying Construction of Airports. The ACs are available at http://www.faa.gov/regulations_policies/advisory_circulars/.

2.2. Types of pavements.

Pavements generally fall into two types: flexible and rigid. Figure 2-1 shows a typical pavement structure and acceptable materials for each layer.

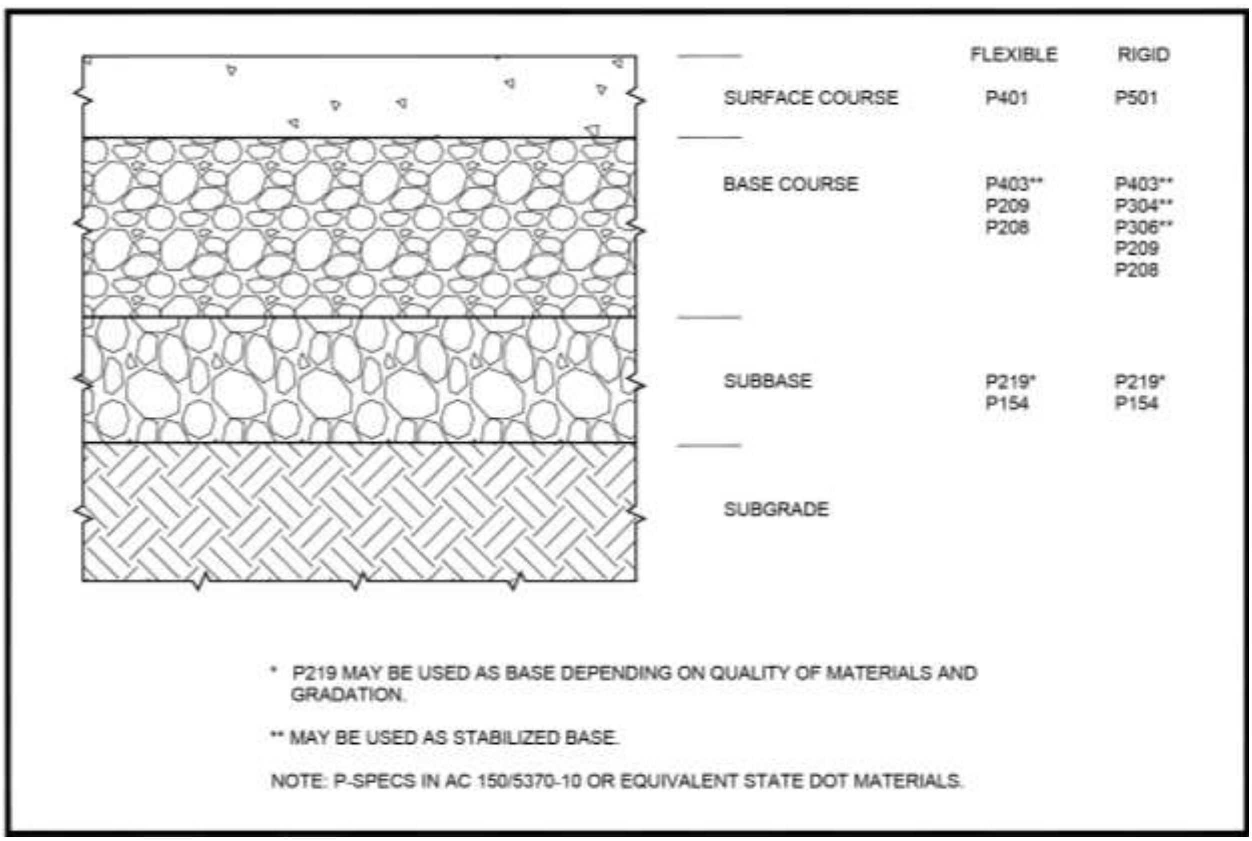

Figure 2-1. Typical pavement structure

2.2.1. Flexible pavement composition and structure. Flexible pavements support loads through bearing. They comprise several layers of carefully selected materials designed to gradually distribute loads from the pavement surface to the layers underneath. The design ensures the load transmitted to each successive layer does not exceed the layer's load-bearing capacity. The various layers composing a flexible pavement section and the functions the various layers perform are described below.

a. Bituminous surface (wearing course). The bituminous surface, or wearing course, is made up of a mixture of various selected aggregates bound together with asphalt cement or other bituminous binders. The material used in the surface course is commonly referred to as Hot-Mix Asphalt (HMA). The HMA prevents the penetration of surface water into the base course; provides a smooth, well-bonded surface free from loose particles, which might endanger aircraft or people; resists the stresses caused by aircraft loads; and supplies a skid-resistant surface without causing undue wear on tires.

b. Base course. The base course serves as the principal structural component of the flexible pavement. It distributes the imposed wheel load to the pavement foundation, the subbase, and/or the subgrade. The base course must have sufficient quality and thickness to prevent failure in the subgrade and/or subbase, withstand the stresses produced in the base itself, resist vertical pressures that tend to produce consolidation and distortion of the surface course, and resist volume changes caused by fluctuations in its moisture content. The quality of the base course is a function of its composition, physical properties, and compaction of the material. The materials composing the base course are select hard, durable aggregates, which generally fall into two main classes: stabilized and granular. The stabilized bases normally consist of crushed or uncrushed aggregate bound with a stabilizer, such as portland cement or asphalt cement. The granular bases normally consist of crushed or uncrushed aggregate constructed on a prepared subgrade.

c. Subbase. The subbase layer is used in areas where frost action is severe or the subgrade soil is weak. The subbase course functions like the base course, but the material requirements for the subbase are not as strict as those for the base course because the subbase is subjected to lower load stresses. The subbase consists of stabilized or properly compacted granular material.

d. Subgrade. The subgrade is the soil layer that forms the foundation of the pavement section. Subgrade soils are subjected to lower stresses than the surface, base, and subbase courses. Since load stresses decrease with depth, the controlling subgrade stress usually lies at the top of the subgrade. The combined thickness of subbase, base, and surface course must be great enough to reduce the stresses occurring in the subgrade to values that will not cause excessive distortion or displacement of the subgrade soil layer.

2.2.2. Rigid pavement composition and structure. Rigid pavements support loads through flexural action. Rigid pavements normally use portland cement concrete (PCC) as the prime structural element. Depending on conditions, engineers may design the PCC pavement slab with plain, lightly reinforced, continuously reinforced, or pre-stressed concrete. The PCC pavement slab is usually placed on a compacted granular or treated subbase supported by a compacted subgrade. The subbase provides uniform stable support and may provide subsurface drainage. The PCC pavement slab has considerable flexural strength and spreads the applied loads over a large area. Rigid pavement strength is most economically built into the PCC pavement slab itself with optimum use of low-cost materials under the slab. The various layers composing a rigid pavement section and the functions the various layers perform are described below.

a. PCC pavement slab (surface course). The PCC pavement slab provides structural support to the aircraft, provides a skid-resistant surface, and prevents the infiltration of surface water into the subbase.

b. Base. The base provides uniform stable support for the pavement slab. The base also serves to control frost action, provide subsurface drainage, control swelling of subgrade soils, provide a stable construction platform for rigid pavement construction, and prevent pumping of fine-grained soils. Rigid pavements generally require a minimum base thickness of 4 inches (10 cm).

c. Stabilized base. All new rigid pavements designed to accommodate aircraft weighing 100,000 pounds (45,000 kg) or more must have a stabilized base. The structural benefit imparted to a pavement section by a stabilized base is reflected in the modulus of subgrade reaction assigned to the foundation.

d. Subbase. The subbase layer is used in areas where frost action is severe or the subgrade soil is weak. The subbase course functions like the base course, but the material requirements for the subbase are not as strict as those for the base course because the subbase is subjected to lower load stresses. The subbase consists of stabilized or properly compacted granular material.

e. Subgrade. The subgrade is the soil layer that forms the foundation of the pavement section. Subgrade soils are subjected to lower stresses than the surface and subbase courses. These stresses decrease with depth, and the controlling subgrade stress is usually at the top of the subgrade unless unusual conditions exist. Unusual conditions, such as a layered subgrade or sharply varying water content or densities, may change the locations of the controlling stress. The soils investigation should check for these conditions. The pavement structure above the subgrade must be capable of reducing stresses imposed on the subgrade to values that are low enough to prevent excessive distortion or displacement of the subgrade soil layer.

2.3. Drainage of airport pavements.

Maintenance of the airport drainage system is essential in airport pavement preventive maintenance. No other factor plays a more important role in the ability of a pavement to withstand the effects of weather and traffic. The drainage system collects and removes surface water runoff, removes excess ground water, lowers the water table, and protects slopes from erosion. An inadequate drainage system can cause saturation of the subgrade and subbase, slope erosion, and loss of the load-bearing capacity of the paved surfaces.

Water has a detrimental effect on pavement performance, primarily by either weakening subsurface materials or eroding material by free water movement. For flexible pavements, the weakening of the base, subbase, or subgrade when saturated with water is one of the main causes of pavement failures. In rigid pavement, free water, trapped between the concrete surface and an impermeable layer directly beneath the concrete, will move due to pressure caused by loadings. This movement of water (referred to as pumping) erodes the subsurface material, creating voids under the concrete surface. In frost areas, subsurface water will contribute to frost damage by heaving during freezing and loss of subgrade support during thawing. Poor subsurface drainage can also contribute to secondary damage such as durability cracking (D cracking) or swelling of subsurface materials.

The type, speed, and volume of traffic will influence the criteria used in the design of pavement drainage systems. For rigid pavements, pumping is greatly increased as the volume and speed of the traffic increases. For flexible pavements, the buildup of pore pressures as a result of high-volume, high-speed traffic is a primary cause of the weakening of the pavement structure. For these reasons, the criteria for a subsurface drainage system under airfield runways and taxiways will be more stringent than for airfield parking aprons or other pavements that have low-volume and low-speed traffic.

The two types of water to be considered are surface water and subsurface water. Surface water is the most important source of water and the source of most concern. Subsurface water is important in frost areas and areas of very high water table or areas of artesian water because the free water collects under the surface by freeze/thaw action. In many areas, perched water may develop under pavements due to a reduced rate of evaporation of the water from the surface. Where drainage is required for surface and subsurface water, it is generally good practice for each system to function independently.

a. Surface drainage. Surface drainage controls, collects, and disposes of water from rainstorms and melting snow and ice that accumulate on the surface of the pavement and nearby ground. Surface drainage of pavements is achieved by constructing the pavement surface and adjacent ground in a way that allows for adequate runoff. The water may be collected at the edges of the paved surface. Although some water will enter the pavement structure through cracks, open joints, and other surface openings, this penetration may be kept to a minimum by proper surface maintenance procedures. Surface water should not be allowed to enter a subdrainage system because it often contains soil particles that may cause the subdrains to silt up.

b. Subsurface drainage. Subsurface drainage is provided for the pavement by a permeable layer of aggregate or permeable stabilized layers with longitudinal pipes for collecting the water and outlet pipes for rapid removal of the water from the subsurface drainage system. Subsurface drains may also consist of perforated collection pipes or conduits in a permeable sand or gravel trench encased in geotextiles with outlet pipes. These systems remove excess water from pavement foundations to prevent weakening of the base and subgrade and to reduce damage from frost action. Subsurface drainage placed at the pavement edge also minimizes surface runoff from entering the perimeter of the pavement structure.

AC 150/5320-5, Airport Drainage Design, contains additional guidance and technical information on airport drainage.

2.3.1. Maintenance of subsurface drainage systems. Commitment to maintenance is as important as providing subsurface drainage systems. In fact, an improperly maintained drainage system can cause more damage to the pavement structure than if no drainage were provided at all. Poor maintenance leads to clogged or silted outlets and edge-drain pipes, missing rodent screens, excessive growth of vegetation blocking outlet pipes and openings on daylighted bases, and growth of vegetation in side ditches. These problems can potentially cause the back up of water within the pavement system, thereby defeating the purpose of providing the drainage system. Inspections and maintenance of subsurface drainage systems should be made an integral part of the policy of any agency installing these systems.

2.3.2. Drainage inspection. The pavement maintenance program should take into account the importance of adequate drainage of surface and ground water because water is directly or partly responsible for many pavement failures and deterioration. Sufficient drainage for collection and disposal of surface runoff and excess ground water is vital to the stability and serviceability of pavement foundations. Trained personnel should conduct periodic and complete inspections of drainage systems and record and correct defective conditions of surface and subsurface drainage systems. Runway and taxiway edge drains and catch basins should be inspected at intervals (e.g., spring, summer, fall, and winter) and monitored following unusually heavy rainfall. The personnel making the inspection should look for distress signals that may indicate impending problems including: ponding of water; soil buildup at pavement edges preventing runoff; eroded ditches and spill basins; broken or displaced inlet grates or manhole covers; clogged or silted inlet grates and manhole covers; blocked subsurface drainage outlets; broken or deformed pipes; backfill settlement over pipes; erosion around inlets; generally poor shoulder shaping and random erosion; and discoloration of pavement at joints or cracks.

2.3.3. Wildlife hazard attractants and mitigation. Throughout the planning, design, construction, and maintenance of airport surface storm drainage and subsurface drainage systems the airport must emphasize and address the elimination and/or mitigation of drainage features in the project(s) that could attract hazardous wildlife on and/or around an airport. Refer to the following documents and sites for guidance on wildlife hazards at airports:

a. AC 150/5200-33, Hazardous Wildlife Attractants On or Near Airports, contains guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports. The AC is available at: http://www.faa.gov/airports/resources/advisory_circulars/.

b. Wildlife Hazard Management at Airports, A Manual for Airport Personnel and additional information on wildlife issues can be found on the FAA Wildlife Hazard Mitigation website at: http://www.faa.gov/airports/airport_safety/wildlife/.

2.4. Pavement Management Program (PMP).

A PMP provides one method of establishing an effective maintenance and repair system. A PMP is a systematic and consistent procedure for scheduling maintenance and rehabilitation based on maximizing benefits and minimizing costs. A PMP not only evaluates the present condition of a pavement, but also can be used to forecast its future condition. By projecting the rate of deterioration, a PMP can facilitate a life-cycle cost analysis for pavement maintenance/repair procedures and help determine the best alternative.

The primary component of any PMP is the ability to track a pavement's deterioration and determine the cause of the deterioration. This requires an evaluation procedure that is objective, systematic, and repeatable. One such procedure is the Pavement Condition Index (PCI). The

PCI is a rating of the surface condition of a pavement and indicates functional performance. A PCI evaluation may also provide an indication of the pavement's structural performance. Periodic PCI determinations on the same pavement will show the change in performance level over time. Airports can use the pavement condition survey to develop pavement performance data. Distress intensity recorded over time helps determine how the pavement is performing. The rate at which the distress intensity increases is a good indicator of the pavement performance. The PCI is determined in accordance with procedures contained in ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys. Refer to AC 150/5380-7 for additional information on PMP.

2.5. Friction.

Airports should maintain runway pavements that provide surfaces with good friction characteristics under all weather conditions. Over time, the skid-resistance of runway pavement deteriorates due to a number of factors, the primary ones being mechanical wear and polishing action from aircraft tires rolling or braking on the pavement and the accumulation of contaminants, chiefly rubber, on the pavement surface. The effect of these two factors is directly dependent upon the volume and type of aircraft traffic. Other influences on the rate of deterioration includes, but is not limited to, local weather conditions, the type of pavement (HMA or PCC), the materials used in original construction, any subsequent surface treatment, drainage, and airport maintenance practices.

AC 150/5320-12, Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces, provides guidance on frequency and procedures for conducting friction surveys. Visual observations made during a pavement inspection are an inadequate predictor of skid resistance.

Contaminants, such as rubber deposits, dust particles, jet fuel, oil spillage, water, snow, ice, and slush, all cause friction loss on runway pavement surfaces. Removal and runway treatment for snow, ice, and slush are covered in AC 150/5200-30, Airport Winter Safety and Operations. The most persistent contaminant problem is deposit of rubber from tires of landing jet aircraft. Rubber deposits occur at the touchdown areas on runways and can be quite extensive. Heavy rubber deposits can completely cover the pavement surface texture causing loss of aircraft braking capability and directional control, particularly when runways are wet.

2.6. Nondestructive Testing (NDT).

In addition to collecting information from visual inspections of the pavement areas and historical construction records, airports should consider collecting data from nondestructive testing. Such data may be used to evaluate the pavement load-carrying capacity. Refer to AC 150/5370-11, Use of Nondestructive Testing Devices in the Evaluation of Airport Pavements, for information on NDT.

Chapter 3. Pavement Distress

3.1. General.

This chapter provides a discussion and description of the types of pavement distress and relates them to likely causal factors. Various external signs or indicators make the deterioration of a pavement apparent, and often reveal the probable causes of the failure. AC 150/5380-7, ASTM D5340, and ASTM D6433, Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys, provide additional information on distresses.

3.2. Types of pavement distress.

The discussions of problems related to pavement distress are generally based on whether the pavement has a flexible or rigid surface type.

3.2.1. Flexible pavement distresses.

a. Cracking. Cracks in flexible pavements are caused by deflection of the surface over an unstable foundation, shrinkage of the surface, thermal expansion and contraction of the surface, poorly constructed lane joints, or reflection cracking. The following types of cracks commonly occur in flexible pavements.

(1) Longitudinal and transverse cracks. Longitudinal and transverse cracks may result from shrinkage or contraction of the HMA surface. Shrinkage of the surface material is caused by oxidation and age hardening of the asphalt material. Contraction is caused by thermal fluctuations. Poorly constructed paving lane joints may accelerate the development of longitudinal joint cracks. This type of cracking is not load associated.

(2) Block cracking. Block cracks are interconnected cracks that divide the pavement into approximately rectangular pieces. The blocks may range in size from approximately 1 foot by 1 foot (0.3 m by 0.3 m) to 10 feet by 10 feet (3 m by 3 m). Block cracking is caused mainly by contraction of the asphalt and daily temperature cycling that results in daily stress/strain cycling. It is not load associated. The occurrence of block cracking usually indicates that the asphalt has hardened significantly. Block cracking normally occurs over a large portion of pavement area, but sometimes will occur only in non-traffic areas. Block cracking differs from alligator cracking which is discussed in (4) below.

(3) Reflection cracking. Vertical or horizontal movement in the pavement beneath an overlay cause this type of distress. This movement may be due to expansion and contraction caused by temperature and moisture changes or traffic loads. The cracks in HMA overlays reflect the crack pattern or joint pattern in the underlying pavement. They occur most frequently in HMA overlays on PCC pavements. However, they may also occur on overlays of HMA pavements when cracks or joints in the old pavement have not been properly repaired.

(4) Alligator or fatigue cracking. Alligator or fatigue cracking is a series of interconnecting cracks caused by fatigue failure of the HMA surface under repeated traffic loading. The cracking begins at the bottom of the HMA surface (or stabilized base) where tensile stress and strain are highest under a wheel load. The cracks propagate to the surface initially as a series of parallel cracks. After repeated traffic loading or excessive deflection of the HMA surface over a weakened or under-designed foundation or interlayer, the cracks connect, forming many sided sharp angled pieces that develop a pattern resembling chicken wire or alligator skin. The pieces are less than 2 feet (0.6 m) on the longest side.

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

b. Disintegration. Disintegration in a flexible pavement is typically caused by climate, insufficient compaction of the surface, insufficient asphalt binder in the mix, loss of adhesion between the asphalt coating and aggregate particles, or severe overheating of the mix. The following types of disintegration commonly occur.

(1) Raveling. Raveling is the wearing away of the pavement surface caused by the dislodging of aggregate particles. This distress may indicate that the asphalt binder has aged and hardened significantly. As the raveling continues, larger pieces break free, and the pavement takes on a rough and jagged appearance which can produce a significant source for FOD.

(2) Weathering. Weathering is the wearing away of the asphalt binder and fine aggregate matrix from the pavement surface. The asphalt surface begins to show signs of aging which may be accelerated by climatic conditions. Loss of fine aggregate matrix is noticeable and may be accompanied by fading of the asphalt pavement color.

(3) Potholes. A pothole is defined as a disruption in the pavement surface where a portion of the pavement material has broken away, leaving a hole. Most potholes are caused by fatigue of the pavement surface. As fatigue cracks develop, they interlock forming alligator cracking. When the sections of cracked pavement work loose, they may eventually be picked out of the surface by continued wheel loads, and form a pothole. In northern climates, where freeze-thaw cycles are severe, pothole development is exacerbated due to the continuous freeze-thaw action and may not be related solely to traffic patterns. Although possible, potholes are not a common distress to airfields.

(4) Asphalt stripping. Asphalt stripping is caused by moisture infiltration into the HMA pavement structure leading to “stripping” of the bituminous binder from the aggregate particles. Asphalt stripping of HMA pavements may also be caused by cyclic water-vapor pressures within the mixture scrubbing the binder from the aggregates.

(5) Jet blast erosion. Jet blast erosion is defined as a darkened area of pavement surface where the bituminous binder has been burned or carbonized. Localized burned areas may vary in depth up to approximately 1/2-inch (13 mm).

(6) Patching and utility cut patch. A patch is defined as an area where the original pavement has been removed and replaced by a filler material. Deterioration of a patch typically progresses at a higher rate than the original pavement. Deterioration of patch areas affects the ride quality and creates FOD potential.

c. Distortion. Distortion in flexible pavements is caused by foundation settlement, insufficient compaction of the pavement courses, a lack of stability in the bituminous mix, poor bond between the surface and the underlying layer of the pavement structure, and swelling soils or frost action in the subgrade. The following types of distortion commonly occur in flexible pavement.

(1) Rutting. A rut is characterized by a surface depression in the wheel path. In many instances, ruts become noticeable only after a rainfall when the wheel paths fill with water. This type of distress is caused by a permanent deformation in any one of the pavement layers or subgrade, resulting from the consolidation or displacement of the materials due to traffic loads.

(2) Corrugation. Corrugation results from a form of plastic surface movement typified by ripples across the surface. Corrugation can be caused by a lack of stability in the mix or a poor bond between material layers.

(3) Shoving. Shoving is the localized bulging of a pavement surface. It can be caused by lack of stability in the mix, shear movement at an interlayer, or lateral stresses produced by adjacent PCC pavement during expansion.

(4) Depressions. Depressions are localized low areas of limited size. Light depressions are typically only noticeable after a rain, when ponding creates “birdbath” areas. Depressions may result from heavier traffic than the pavement was designed for; localized settlement of the underlying pavement layers; or poor construction methods.

(5) Swelling. An upward bulge in the pavement’s surface characterizes swelling. It may occur sharply over a small area or as a longer gradual wave. Both types of swelling may be accompanied by surface cracking. A swell is usually caused by frost action surrounding dissimilar material types in the subgrade or by swelling soil.

d. Loss of skid resistance. Factors that decrease the skid resistance of a pavement surface and can lead to hydroplaning include too much asphalt in the bituminous mix; too heavy a tack coat; poor aggregate which is subject to wear; paint; and buildup of contaminants. In flexible pavements, a loss of skid resistance may result from the following distresses.

(1) Polished aggregate. Aggregate polishing is caused by repeated traffic applications. Polished aggregate is present when the portion of aggregate extending above the asphalt is either very small, of poor quality, or there are no rough or angular particles to provide good skid resistance.

(2) Contaminants. Accumulation of rubber particles, oils, or other external materials on the pavement surface will reduce the skid resistance of a pavement. In addition, buildup of rubber deposits in pavement grooves will reduce the effectiveness of the grooves and increase the likelihood of hydroplaning.

(3) Bleeding. Bleeding is characterized by a film of bituminous material on the pavement surface that resembles a shiny, glass-like, reflecting surface that usually becomes quite sticky. It is caused by excessive amounts of asphalt binder in the mix and/or low air-void content. Bleeding occurs when asphalt binder fills the voids in the mix during hot weather and then expands out onto the surface of the pavement. Bleeding may also result when an excessive tack coat is applied prior to placement of the HMA surface. Since the bleeding process is not reversible during cold weather, asphalt binder will accumulate on the surface. Extensive bleeding may cause a severe reduction in skid resistance.

(4) Fuel/oil spillage. Continuous fuel/oil spillage on a HMA surface will soften the asphalt. Areas subject to only minor fuel/oil spillage will usually heal without repair, and only minor damage will result.

3.2.2. Rigid pavement distresses.

a. Cracking. Cracks in rigid pavements often result from stresses caused by expansion and contraction or warping of the pavement. Overloading, loss of subgrade support, and insufficient and/or improperly cut joints acting singly or in combination are also possible causes. The following types of cracking typically occur in rigid pavements.

(1) Longitudinal, transverse, and diagonal cracks. A combination of repeated loads and shrinkage stresses usually causes this type of distress. It is characterized by cracks that divide the slab into two or three pieces that may indicate poor construction techniques, underlying pavement layers that are structurally inadequate for the applied load, or pavement overloads.

(2) Corner breaks. Load repetition, combined with loss of support and curling stresses, usually causes cracks at the slab corner. The lack of support may be caused by pumping or loss of load transfer at the joint. Corner breaks are characterized by a crack that intersects the joints at a distance less than or equal to one-half of the slab length on both sides, measured from the corner of the slab. A corner break differs from a corner spall in that the break extends vertically through the entire slab thickness; a corner spall intersects the joint at an angle.

(3) Durability "D" cracking. D cracking usually appears as a pattern of cracks running in the vicinity of and parallel to a joint or linear crack. It is caused by the concrete's inability to withstand environmental factors such as freeze-thaw cycles because of variable expansive aggregates. This type of cracking may eventually lead to disintegration of the concrete within 1 to 2 feet (0.3 m to 0.6 m) of the joint or crack.

(4) Shrinkage cracking. Shrinkage cracks are hairline cracks that are usually only a few feet long and do not extend across the entire slab. They are formed during the setting and curing of the concrete and usually do not extend through the depth of the slab. Typically, shrinkage cracks do not extend greater than 1/4-inch (6 mm) from the slab surface and may be primarily in the finished surface paste only.

(5) Shattered slab/intersecting cracks. A shattered slab is defined as a slab where intersecting cracks break up the slab into four or more pieces. This is primarily caused by overloading due to traffic and/or inadequate foundation support.

b. Joint seal damage. Joint seal damage is any condition that enables incompressible foreign material such as soil or rocks to accumulate in the joints or that allows infiltration of water. Accumulation of foreign materials prevents the slabs from expanding and may result in buckling, shattering, or spalling. Water infiltration through joint seal damage can cause pumping or deterioration of the base. Typical types of joint seal damage include stripping of joint sealant, extrusion of joint sealant, hardening of the filler (oxidation), loss of bond to the slab edges, and absence of sealant in the joint. Joint seal damage is caused by improper joint width, use of the wrong type of sealant, incorrect application, not properly cleaning the joint before sealing, and/or climate (aging).

c. Disintegration. Disintegration is the breaking up of a pavement into small, loose pieces including the dislodging of aggregate particles. Improper curing and finishing of the concrete, unsuitable aggregates, and improper mixing of the concrete can cause this distress. Disintegration typically falls into the following categories.

(1) Scaling, map cracking, and crazing. Scaling is the disintegration and loss of the wearing surface. A surface weakened by improper curing or finishing and freeze-thaw cycles can lead to scaling. Map cracking or crazing refers to a network of shallow hairline cracks that extend only through the upper surface of the concrete. Crazing usually results from improper curing and/or finishing of the concrete and may lead to scaling of the surface.

(2) Alkali-Silica Reactivity (ASR). ASR is another source of distress associated with map cracking. ASR is caused by an expansive reaction between alkalis and certain reactive silica minerals, which forms a gel. The gel absorbs water, causing expansion, which may damage the concrete and adjacent structures. Alkalis are most often introduced by the portland cement within the pavement. ASR may be indicated by cracking of the concrete pavement (often in a map pattern); white, brown, gray or other colored gel or staining that may be present at the crack surface; and/or an increase in concrete volume (expansion) that may result in distortion of adjacent or integral structures or physical elements.

(3) Joint spalling. Joint spalling is the breakdown of the slab edges within 2 feet (0.6 m) of the side of the joint. A joint spall usually does not extend vertically through the slab but intersects the joint at an angle. Joint spalling often results from excessive stresses at the joint or crack caused by infiltration of incompressible materials or weak concrete at the joint (caused by overworking) combined with traffic loads. Joint spalling also results when dowels, which prevent slab movement, become misaligned either through improper placement or improper slippage preparation.

(4) Corner spalling. Corner spalling is the raveling or breakdown of the slab within approximately 2 feet (0.6 m) of the corner. It differs from a corner break in that the spall usually angles downward to intersect the joint, while a break extends vertically through the slab. The same mechanisms that cause joint spalling often cause corner spalling, but this type of distress may appear sooner because of increased exposure.

(5) Blowups. Blowups, although not common, usually occur at a transverse crack or joint that is not wide enough to permit expansion of the concrete slabs. Insufficient width may result from infiltration of incompressible materials into the joint space or by gradual closure of the joint caused by expansion of the concrete due to ASR. When expansive pressure cannot be relieved, a localized upward movement of the slab edges (buckling) or shattering will occur in the vicinity of the joint. Blowups normally occur only in thin pavement sections, although blowups can also appear at drainage structures (manholes, inlets, etc.). The frequency and severity of blowups may increase with an asphalt overlay due to the additional heat absorbed by the dark asphalt surface. They generally occur during hot weather because of the additional thermal expansion of the concrete.

(6) Popouts. A popout is defined as a small piece of pavement that breaks loose from the concrete surface. This is caused by freeze-thaw action in combination with expansive aggregates and can be caused by ASR. Popouts usually range from approximately 1 to 4 inches (2.5 to 10 cm) in diameter and from 1/2 to 2 inches (1.3 to 5 cm) deep. A popout may also be caused by a singular piece of large aggregate that breaks loose from the concrete surface or caused by clay balls in the concrete mix.

(7) Patching. A patch is defined as an area where the original pavement has been removed and replaced by a filler material. Deterioration of a patch typically progresses at a higher rate than the original pavement. Patching is usually divided into two types:

(a) Small. A small patch is defined as an area less than 5 ft^2 (0.5 m^2).

(b) Large and utility cuts. A large patch is defined as an area greater than 5 ft^2 (0.5 m^2). A utility cut is defined as a patch that has replaced the original pavement due to placement of underground utilities.

d. Distortion. Distortion refers to a change in the pavement surface's original position, and it results from foundation settlement, expansive soils, frost-susceptible soils, or loss of fines through improperly designed subdrains or drainage systems. The following types of distortion generally occur.

(1) Pumping. The deflection of the slab when loaded may cause pumping, which is characterized by the ejection of water and underlying material through the joints or cracks in a pavement. As the water is ejected, it carries particles of gravel, sand, clay, or silt with it, resulting in a progressive loss of pavement support that can lead to cracking. Evidence of pumping includes surface staining and base or subgrade material on the pavement close to joints or cracks. Pumping near joints indicates poor joint-load transfer, a poor joint seal, and/or the presence of ground water.

(2) Settlement or faulting. Settlement or faulting is a difference in elevation at a joint or crack caused by upheaval or non-uniform consolidation of the underlying pavement layer(s) material. This condition may result from loss of fines, frost heave, or swelling soils.

e. Loss of skid resistance. Skid resistance refers to the ability of a pavement to provide a surface with the desired friction characteristics under all weather conditions. It is a function of the surface texture. Loss of skid resistance is caused by the wearing down of the textured surface through normal wear and tear or the buildup of contaminants.

(1) Polished aggregates. Some aggregates become polished quickly under traffic. Naturally polished aggregates create skid hazards if used in the pavement without crushing. Crushing the naturally polished aggregates creates rough angular faces that provide good skid resistance.

(2) Contaminants. Rubber deposits building up over a period of time will reduce the surface friction characteristics of a pavement. Oil spills and other contaminants will also reduce the surface friction characteristics. In addition, buildup of rubber deposits in pavement grooves will reduce the effectiveness of the grooves and increase the likelihood of hydroplaning.

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Chapter 4. Guidelines for Inspection of Pavements.

4.1. Introduction to pavement inspection.

Airports should prioritize the upkeep and repair of all pavement surfaces in the aircraft operating areas of the airport to help ensure safe aircraft operations. While deterioration of the pavements from usage and exposure to the environment cannot be completely prevented, a timely and effective maintenance program can minimize this deterioration. Adequate and timely maintenance is the greatest single means of controlling pavement deterioration. The failure of airport pavements and drainage features can be directly attributed to inadequate maintenance characterized by the absence of a vigorously followed inspection program. Maintenance, no matter how effectively carried out, cannot overcome or compensate for a major design or construction inadequacy, but it can prevent the total and possibly disastrous failure that can result from such deficiencies. Maintenance inspections reveal at an early stage where a problem exists and provide warning and sufficient time to perform corrective action. Postponement of minor maintenance may evolve into major pavement repairs. Visible evidence of excessive stress and/or environmental distress in pavement systems may include cracks, holes, depressions, and other types of pavement distresses. The formation of distresses in airport pavements may severely affect the structural integrity, ride quality, and safety of airport pavements. To alleviate the effects of distresses and to improve the airport pavement serviceability, airports should adopt an effective and timely inspection and maintenance program and adequate repair procedures.

Although there are numerous distress types associated with airfield pavements, a particular concern on airfield pavements is the possibility that pavement distress will generate loose material that may strike aircraft propellers or be ingested into jet engines. This loose material and the resulting damage are commonly labeled as FOD. FOD can cause considerable damage to an aircraft and increase the cost of maintaining the aircraft in a safe operating condition. More important, FOD can cause undetected damage to an aircraft, making it unsafe to operate. All pavement inspections should address the issue of FOD to minimize its potential hazard. AC 150/5210-24, Airport Foreign Object Debris (FOD) Management, provides guidance on reducing FOD hazards.

AC 150/5200-18, Airport Safety Self-Inspection, provides information on airport self-inspection operational items such as pavement areas, safety areas, markings, signs, lighting, aircraft rescue and fire fighting, fueling operations, navigational aids, ground vehicles, obstructions, public protection, hazard management, construction, and snow and ice control.

4.2. Inspection procedures.

Maintenance is an ongoing process and a critical responsibility of airport personnel. Effective maintenance programs require a series of scheduled, periodic inspections, conducted by experienced engineers, technicians, or maintenance personnel. These inspections must be controlled to ensure that each element or feature is thoroughly inspected, potential problem areas are identified, and proper corrective measures are recommended and implemented. The maintenance program must provide for adequate follow-up to ensure corrective work is expeditiously accomplished and recorded. The organization and scope of maintenance activities will vary in complexity and degree from airport to airport, however, the general types of maintenance required will be similar.

4.2.1. Inspection schedules. The airport is responsible for establishing a schedule for regular and routine pavement inspections to ensure all areas are thoroughly inspected. Conditions that may adversely affect the pavement, such as severe weather, may necessitate additional inspections. Airport personnel should also solicit reports from airport users and conduct daily drive-by-type inspections.

4.2.2. Recordkeeping. The airport should prepare and maintain records of all inspections and maintenance performed. These records should document the existing distresses, locations, probable causes, remedial actions required, and any follow up inspections and maintenance required. Records of materials and equipment used for maintenance and repair work should also be kept on file for future reference. Periodic review of these references may help reduce maintenance costs and improve pavement performance. AC 150/5380-7, Airport Pavement Management Program (PMP), provides additional guidance.

Chapter 5. Materials and Equipment

5.1. General.

Maintenance includes any regular or recurring work necessary to preserve existing airport pavements in good condition. Work typically involves the care or cleaning of existing airport pavement and incidental or minor pavement repair. Maintenance activities typically require a work crew of two to six people who are trained in the various repair techniques and who are familiar with the materials and equipment necessary to perform the routine pavement maintenance. Work requiring more staff is typically beyond the scope of normal maintenance activities. The following sections identify commonly used materials and equipment for normal maintenance activities. Additional information on materials and methods is also available in AC 150/5370-10. Equivalent state pavement specifications may also be used.

5.2. Common materials for maintenance and repair.

The materials listed below are commonly used for maintenance and repair of pavements.

5.2.1. Hot-mix asphalt (HMA). HMA is a blend of asphalt binder and well-graded, high-quality aggregates. The materials are mixed in a plant and placed and compacted while hot. HMA is used for construction of new airfield pavement and patching and overlay of airfield pavements. HMA for maintenance and repair should be equivalent or better than the existing pavement. P-401, Hot Mix Asphalt (HMA) Pavements or P-403, Hot Mix Asphalt (HMA) Pavements (Base, Leveling or Surface Course) in AC 150/5370-10; or equivalent state pavement specifications should be used.

5.2.2. Tack coat. A tack coat is a light application of emulsified asphalt applied to an existing pavement to provide a bond with an overlying course, such as a HMA overlay. A tack coat is also used on the sides of an existing pavement that has been cut vertically before patching. Asphalt emulsions are manufactured in several grades and are selected by the desired setting time. P-603, Bituminous Tack Coat in AC 150/5370-10 or equivalent state specifications may be used.

5.2.3. Crack and joint sealing material. Material for sealing cracks should meet ASTM standards for the type of pavement and service for which the sealant is intended.

a. ASTM D5893, Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

b. ASTM D6690, Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

c. ASTM D5249, Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints.

5.2.4. Crack filler material. Material for filling cracks should meet ASTM D5078, Standard Specification for Crack Filler, Hot-Applied, for Asphalt Concrete and Portland Cement Concrete Pavements.

5.2.5. Concrete. Concrete is a blend of portland cement, fine and coarse aggregate, and water, with or without additives. Concrete is used to repair a distressed portland cement concrete pavement so it may be used at its original designed capacity. P-501, Portland Cement Concrete Pavement in AC 150/5370-10 or equivalent state pavement specifications with non-reactive materials may be used.

5.2.6. Other materials and products. There are many other products available, such as epoxy resins and special concrete mixtures, that may be used for repair of pavements. The selection and use of these products must be in accordance with the manufacturers' requirements for the intended application. Local experience and conditions dictate acceptable products. State Departments of Transportation (DOTs) may also maintain list of materials that have performed well in a geographic area.

AC 150/5370-10 is another good source of information on materials and methods used for construction on airports.

5.3. Equipment for pavement maintenance.

There are many different types and models of equipment airports can use for pavement maintenance. Some commonly used pavement maintenance equipment include the following.

5.3.1. Power Saws. A pavement power saw is usually a one-person-operated, dolly-mounted unit with an abrasive circular blade. This type of saw can cut a straight line through flexible or rigid pavements and leave vertical sides. A random crack saw has a small diameter saw blade capable of tracking the crack.

5.3.2. Jackhammers. Jackhammers with chisel heads are commonly used for removal of existing pavement surfaces. Jackhammers must be used with caution to avoid damage to remaining pavement. Light, 30 pound (14 kg) or less, chipping hammers should be used to prepare partial depth repair patches.

5.3.3. Pavement grinders. A pavement grinder may be a one-person-operated, dolly-mounted unit with an abrasive cylindrical head 4 inches (10 cm) or more wide, or it may be variable-width diamond grinding equipment. Diamond grinding is a common rehabilitation technique used for tasks as varied as paint removal and pavement texturing.

5.3.4. Hand tools. Hand tools such as chisels, sledgehammers, shovels, pry bars, and picks can be used to remove deteriorated pavement. Rakes, lutes, and other such hand tools are used to move and level material placed in a patch area.

5.3.5. Front-end loaders and skid-steer loaders. Front-end loaders are useful when loading trucks with removed pavement. Skid-steer loaders are small versatile loaders that can be equipped with numerous attachments such as brooms or milling heads. Their small size and maneuverability make them ideal for maintenance activities.

5.3.6. Asphalt kettle. Asphalt kettles are usually small-tractor-mounted units that have the capacity to heat and store 40 to 500 gallons (150 to 2000 liters) of bituminous material. A pump forces the liquid material through spray nozzles located on a hand-held hose. These units are used for priming and tacking on small jobs and for crack or surface sealing of HMA surfaces.

5.3.7. Vibratory plate compactors. Vibratory plate compactors are hand-operated units used to compact granular base or HMA plant-mix materials.

5.3.8. Vibratory and non-vibratory steel-wheel rollers. Steel-wheel rollers are used to compact material, including HMA in patchwork areas. Smaller rollers can be hand operated, while large rollers are self-powered.

5.3.9. Joint plow. A joint plow is used to remove old sealer from joints. This is usually a specially made tool attached to a small loader or tractor.

5.3.10. Joint router. A joint router is used to clear existing cracks or joints to be resealed. A router is usually a self-powered machine operating a rotary cutting tool. A rotary routing tool with a V-shaped end can be used for cleaning out random cracks. The use of a random crack saw is preferred for PCC pavements.

5.3.11. Random crack saw. A random crack saw is designed to follow irregular crack patterns in concrete and asphalt surfaces. The crack saw utilizes small diameter, dry-cut diamond blades in standard widths to create smooth sided cuts to prepare surfaces for proper crack filling. A center mounted blade configuration allows a crack saw to pivot about its own axis to more exactly follow random crack patterns easily.

5.3.12. Air compressor and sand blasting. Sand blasting may be used for final removal of old joint sealant, and is recommended for the final cleaning method for PCC surfaces prior to application of new sealant. Joints and cracks should be blown out with clean, dry compressed air immediately before applying new sealant. Air compressors must be equipped with oil and moisture traps to prevent contaminating the cleaned surface.

5.3.13. Pavement sweeper. A pavement sweeper can be used for cleaning the pavement surface and removing excess aggregate before and after repairs.

5.3.14. Heating kettle. A heating kettle is a mobile, indirect-fired double boiler used to melt hot-applied joint sealing material. It is equipped with a means to agitate and circulate the sealer to ensure uniform heating and melting of the entire charge in the kettle. Sealants may be applied to joints with an applicator attached directly to a pump unit on the kettle.

5.3.15. Pouring pot. A pouring pot, hand carried or mounted on a hand-pushed pot dolly, is used to pour hot sealing materials into a prepared crack or joint.

5.3.16. High-pressure water. High-pressure water, with the proper selection of spray nozzle and pressure, can be used to clean out joints prior to resealing and to clean vertical faces of pavement to be patched. Pressure should be monitored and controlled to the minimum necessary to minimize any damage to the remaining pavement.

5.3.17. Hot air lance. A hot air lance can be used to dry and heat cracks in existing bituminous material.

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Chapter 6. Pavement Repair Methods.

6.1. General.

This chapter describes various repair methods airports can use to correct airfield pavement distress. While these repair methods apply to specific types of distress and pavements, methods used should take into account the possibility of foreign object debris (FOD) damage to aircraft. FOD is defined as any object, live or not, located in an inappropriate location in the airport environment that has the capacity to injure airport or air carrier personnel and damage aircraft. FOD damage is any damage attributed to a foreign object that can be expressed in physical or economic terms, which may or may not downgrade the product's safety or performance characteristics. Repair activities may leave potential FOD at or near the repair sites. All maintenance activities must include quality control to assure that repairs are conducted properly and clean-up activities undertaken to remove FOD potential. AC 150/5210-24 provides additional guidance to help manage debris hazards associated with maintenance activities

The first step in rehabilitating or preparing a pavement for repair is to identify the causes of distress. Then, the proper procedures for repairing - which will not only correct the damage, but also prevent or retard its further occurrence - may be applied. Pavement repairs should be made as quickly as possible after the need for them arises to help ensure continued and safe aircraft operations. Airports should perform repairs at early stages of distress, even when the distresses are considered minor. A delay in repairing pavements may allow minor distresses to progress into major failures. While deterioration of pavements due to traffic and adverse weather conditions cannot be completely prevented, maintenance and repair programs can significantly reduce the rate of deterioration and minimize the damage.

Weather conditions may limit repair measures undertaken to prevent further pavement damage. For example, rehabilitation by crack filling is more effective in cool and dry weather conditions, whereas pothole patches, seal coats, and other surface treatments require warm, dry weather for best results. This does not mean that resurfacing work cannot be performed under cold and damp conditions or that crack filling cannot be done in warm weather. Rather, these repairs just require much greater care when made during such periods. The procedures in Appendix A list the weather and temperature limitations for each repair procedure. When emergency pavement repairs are required and weather conditions exceed the procedure recommendations, the initial repair will be temporary and replaced as soon as weather conditions permit.

6.2. Repair methods for flexible pavements.

6.2.1. General. The selection of a repair method for flexible pavements will depend on the type of damage; climate; experience; and availability of materials among others. Table 6-1 summarizes some common problems and potential repair methods.

6.2.2. Crack repair. Cracks take many forms, such as longitudinal, transverse, block, alligator, slippage, and reflection cracks. For some, such as longitudinal and transverse cracks, simple crack filling may be the proper corrective action. Refer to Appendix A1 and Figure A-1 for crack repair in flexible pavement.

6.2.3. Partial and full depth repair. Some cracks may require partial or full depth repair of the damaged pavement. Partial depth repairs may be an alternative for pavements greater than 5 inches (13 cm) thick. Full depth repairs are typically required for pavement less than 5 inches (13 cm) thick. Refer to Appendix A2 and Figure A-2 for partial depth crack repair in flexible pavement. Refer to Appendix A3 and Figure A-3 for full depth crack repair in flexible pavement.

6.3. Repair methods for rigid pavements.

6.3.1. General. The selection of a repair method for rigid pavements will depend on the type of damage, climate, experience, and availability of materials among others. Table 6-2 summarizes some common problems and potential repair methods. Refer to Appendix A4 and Figure A-4 for a plan view of typical rigid pavement full depth repairs including a corner break; partial slab replacement; and full depth slab replacement.

6.3.1.1. Crack repair and joint sealing. Sealing cracks prevents surface moisture from entering the pavement structure. This type of repair may require establishing a sealant reservoir. A concrete saw is preferable to router equipment because a router can cause micro-cracks in the adjacent concrete pavement. Shrinkage cracks are non-structural and non-propagating cracks that are cosmetic and typically do not require repairs.

Refer to AC 150/5370-10, Items P-604 Compression Joint Seals for Concrete Pavements and P-605, Joint Sealants for Concrete Pavements for information and guidance on joint and crack sealants. A silicone sealant per ASTM D5893 can be used for edge joints between flexible and rigid pavements. Silicone should not be used to seal flexible pavement to flexible pavement joints.

6.3.1.2. Full depth repair. Full depth rigid pavement repair requires the complete removal of the damaged concrete pavement. The base and sub base material may also require repair if they are damaged during removal of the pavement or by water infiltration and subsequent pumping action.

a. Corner break. A corner break is a crack that intersects the joints of a slab at a distance less than or equal to one-half the slab length on both sides of the slab, measured from the corner of the slab. The crack extends vertically through the entire slab thickness. Load repetition combined with loss of support and curling stresses cause corner breaks. Refer to Appendix A5 and Figure A-5 for full depth repair of a corner break.

b. Partial slab replacement. Refer to Appendix A6 and Figure A-6 for partial slab replacement procedures.

c. Full slab replacement. Refer to Appendix A7 and Figure A-7 for full slab replacement procedures.

6.3.1.3. Partial depth repair

a. Joint spall repair. Joint spalling is the breakdown of the slab edges within 2 feet (0.6 m) of the side of the joint. A joint spall usually does not extend vertically through the slab, intersecting the joint at an angle. Refer to Appendix A8 and Figure A-8 for joint spall repair procedures.

6.4. Temporary patching of rigid pavements.

Broken rigid pavement areas can be patched with flexible pavement as an interim measure. Full-depth HMA repairs will interrupt the structural integrity of the rigid pavement and may lead to additional failures. Such full-depth repairs are considered temporary, and corrective long-term repairs must be scheduled.

The minimum depth of repair for portland cement concrete should be 2 inches (5 cm). Repairs made thinner than 2 inches (5 cm) usually deteriorate quickly on an airfield pavement. (Most distresses needing repair will extend at least 2 inches (5 cm) into the pavement.) Rigid pavement repairs that are thinner than 2 inches (5 cm) may benefit from the use of epoxy materials.

Table 6-1. Quick guide for maintenance and repair of common flexible pavement surface problems

Problem	Repair	Probable Cause
Weathering/ Oxidation	- Apply surface treatment - Overlay	- Environment - Lack of timely surface treatments
Cracks	- Remove old sealer material if present - Clean and prepare cracks - Seal/reseal cracks - Joint heating may be an option for longitudinal cracks when under the direction of an engineer. (Operate heaters to avoid excessive heat on the pavement.)	- Age - Environmental conditions - Bitumen too hard or overheated in mix - Sealant defects (e.g., incorrect application temperature, improper sealant selection, improper crack preparation)
Alligator or fatigue cracking	- Remove and replace damaged pavement, including the base and/or subbase course if required.	- Base and/or Subgrade failure - Overload - Under-designed surface course (too thin)
Patches	- Remove/replace. - Repair and Resurface	- Inadequate/Improper repair detail/material - Age
Surface irregularities (e.g., rutting, wash-boarding, birdbaths)	- Remove and replace damaged areas - Surface grinding/milling	- Traffic - Age
Loss of Skid Resistance	- Remove rubber/surface contamination - Apply surface treatment	- Rubber deposits/surface contamination - Polished aggregate - Improper surface treatment
Bleeding	- Blot with sand and remove sand prior to resuming aircraft operations. Excessive bleeding may require removal and replacement of pavement.	- Overly rich mix/low air void content. Bleeding may be a precursor to other surface deformities forming, e.g., rutting, wash-boarding, etc.
Drainage	- Grade pavement shoulders, clear drainage path - Clean out drainage structures, e.g., edge drains, outfalls, etc.	- Poor maintenance of drainage facilities - Poor maintenance of grade

Table 6-2. Quick guide for maintenance and repair of common rigid pavement surface problems

Problem	Repair	Probable Cause
Joint sealant damage	- Remove old sealant, clean joints, reseal	- Age - Environmental conditions - Sealant defects (e.g., incorrect application temperature, improper sealant selection, improper joint preparation)
Cracks	- Clean and seal cracks - Repair/replace slab - Evaluate adequacy of pavement structure; may require strengthening	- Loss of slab support - Load repetition; curling stresses; and shrinkage stresses
Corner Breaks	- Seal and maintain until full depth patch	- Loss of slab support - Load repetition and curling stresses
Joint spalling	- Remove lose material; refill with approved product; reseal - Partial depth repair	- Latent defects, i.e., excessive finishing - Incompressible matter in joint spaces - Snow plow damage
Slab blowup	- Replace slab in blowup area; clean and reseal joints.	- Incompressible material in joints preventing slab from expanding
Loss of Skid Resistance	- Remove rubber/surface contamination. - Grinding.	- Rubber deposits/surface contamination - Age, i.e., surface wear
Drainage	- Grade pavement shoulders, clear drainage path - Clean out drainage structures, e.g., edge drains, outfalls, etc.	- Poor maintenance of drainage facilities - Poor maintenance of grade
Popouts	- Remove FOD	- Material
Patches	- Remove/replace	- Inadequate/Improper repair detail/material - Age

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Appendix A. Repair Procedures

The following typical details and repair procedures are intended for use for minor maintenance repair of airport pavements. For major maintenance projects, the airport should utilize plans and specifications developed under the direction of a pavement design engineer.

For all maintenance and repair projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charge (PFC) Program, the airport must use the guidelines and specifications for materials and methods in AC 150/5370-10, Standards for Specifying Construction of Airports.

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A1. PROCEDURE FOR CRACK REPAIR OF FLEXIBLE PAVEMENT

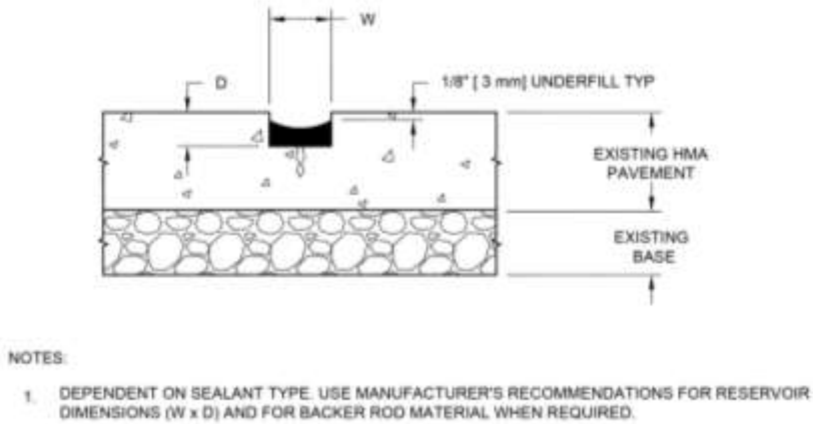

Figure A-1. Crack repair of flexible pavement

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin crack repair during inclement weather.
- The pavement temperature should be 50°F (10°C) and rising or meet the manufacturer's recommendations at the time of application of the crack sealing material.
- Do not apply sealant if moisture is observed in the crack.

PREPARATION

To choose sealant:

- Consider your geographic area, climate, and past performance of the sealant
- Hot-applied sealants must meet the requirements of ASTM D6690
- Cold-applied sealants must meet the requirements of ASTM D977

REPAIR PROCEDURE

Use this procedure to repair cracks less than 1 inch (2.5 cm) in width in flexible pavements.

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, signs, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area of crack repair.
3. Use an air compressor with an operable oil and water trap to clean all cracks with compressed hot air.
4. If necessary, saw or rout the cracks to the required width and depth. Use the sealant manufacturer's specifications to determine the sealant reservoir dimensions (W × D).
5. Inspect the cracks for proper width, depth, alignment, and preparation. Make sure the crack surface faces are dry.
6. To obtain the width and depth ratio required by the sealant manufacturer's specifications may require installation of backer rod. Make sure the backer rod:
   - Meets the requirements of ASTM D5249
   - Is compatible with the sealant
   - Is 25% larger in diameter than the width of the sealant reservoir
7. Apply the sealant uniformly from the bottom to the top of the crack avoiding voids or entrapping air.
8. Make sure the surface of the sealant remains ¼ inch to ⅜ inch (6 mm to 9 mm) below the existing pavement surface.
9. Do not allow traffic until the sealants have cured.
10. Completely clean the work area before opening to aircraft traffic.

MATERIAL REQUIREMENTS

ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

State Department of Transportation specifications for pavements

A2. PARTIAL DEPTH CRACK REPAIR IN FLEXIBLE PAVEMENT

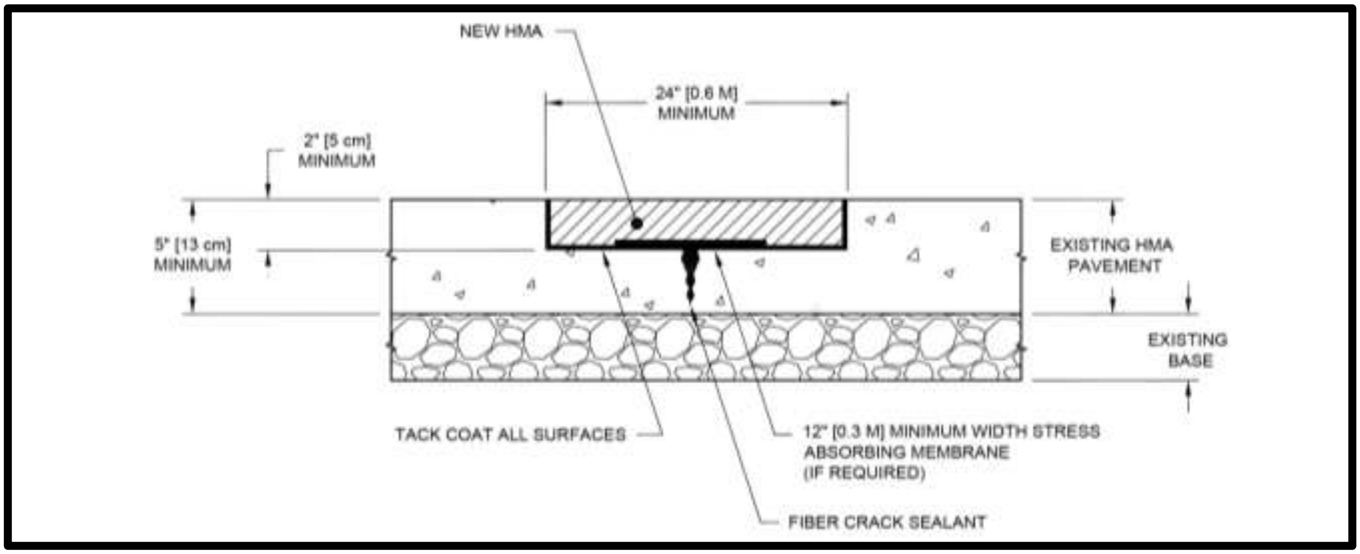

Figure A-2. Partial depth crack repair in flexible pavement

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin crack repair during inclement weather.
- HMA should not be placed upon a wet surface or when the surface temperature of the underlying course is less than 45°F (7°C).
- The pavement temperature should be 50°F (10°C) and rising or meet the manufacturer's recommendations at the time of application of the crack sealing material.
- Do not apply sealant if moisture is observed in the crack.

REPAIR PROCEDURE

Use this procedure to repair HMA Pavements that are 5 inches (13 cm) or greater in thickness with cracks greater than 1 inch (2.5 cm).

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, signs, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area of crack repair.
3. Saw cut or mill out an area 24 inches (0.6 m) wide by 2 to 3 inches (5 to 8 cm) deep centered on the crack. Extend the saw cut or mill out the area a minimum of 12 inches (30 cm) beyond the limits of the distressed pavement area.
4. Use an air compressor with an operable oil and water trap to clean all cracks with compressed hot air.
5. Fill the crack flush with fiber crack filler per the sealant manufacturer's specifications. Apply the sealant uniformly from the bottom to the top of the crack avoiding voids or entrapping air.
6. Apply a 12 inch (30 cm) repair membrane centered over the crack. (Installation of the membrane is optional.)
7. Apply a tack coat to the bottom and sides of the repair area. Make sure the tack meets the requirements of P-603 and ASTM D3628.
8. Fill the patch area with HMA equivalent or better than the existing pavement. Use P-401, P-403 or equivalent State DOT dense mix and compact to the minimum density specified.
9. Use a straight-edge to verify the patch is flush with adjacent pavement.
10. Do not allow traffic until the HMA has cured.
11. Completely clean the work area before opening to aircraft traffic.

MATERIAL REQUIREMENTS

ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
P-401	Hot Mix Asphalt (HMA) Pavements, AC 150/5370-10, Standards for Specifying Construction of Airports
P-403	Hot Mix Asphalt (HMA) Pavements (Base, Leveling, or Surface Course), AC 150/5370-10, Standards for Specifying Construction of Airports

State Department of Transportation specifications for pavements

A3. FULL DEPTH CRACK REPAIR IN FLEXIBLE PAVEMENT

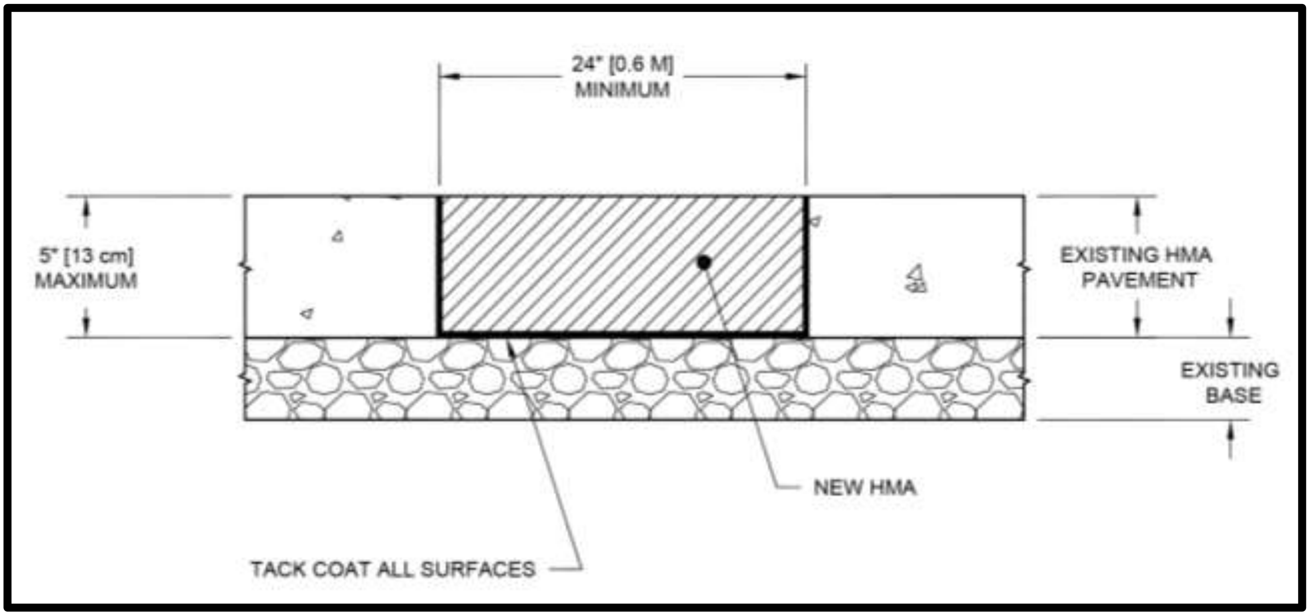

Figure A-3. Full depth crack repair in flexible pavement

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin crack repair during inclement weather.
- HMA should not be placed upon a wet surface or when the surface temperature of the underlying course is less than 45°F (7°C).

REPAIR PROCEDURE

Use this procedure to conduct full depth repairs of flexible pavements and to repair cracks greater than 1 inch (2.5 cm) in flexible pavements 5 inches (13 cm) or less in thickness.

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area of crack repair.
3. Saw cut or mill out an area 24 inches (0.6 m) wide to the full depth of the HMA centered on the crack. Extend the saw cut or mill out an area a minimum of 12 inches (30 cm) beyond the limits of the distressed pavement area.
4. Repair and re-compact the base as necessary.
5. Apply a tack coat to the bottom and sides of the repair area. Make sure the tack meets the requirements of P-603 and ASTM D3628.
6. Fill the patch area with HMA equivalent to or better than the existing pavement. Use P-401, P-403 or equivalent State DOT dense mix and compact to the minimum density specified.
7. Use a straight-edge to verify that the patch is flush with adjacent pavement.
8. Do not allow traffic until HMA has cured.
9. Completely clean the work area before opening to aircraft traffic.

MATERIAL REQUIREMENTS

ASTM D977	Standard Specification for Emulsified Asphalt
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
P-401	Hot Mix Asphalt (HMA) Pavements, AC 150/5370-10, Standards for Specifying Construction of Airports
P-403	Hot Mix Asphalt (HMA) Pavements (Base, Leveling, or Surface Course), AC 150/5370-10, Standards for Specifying Construction of Airports
P-603	Bituminous Tack Coat, AC 150/5370-10, Standards for Specifying Construction of Airports

State Department of Transportation specifications for pavements

A4. RIGID PAVEMENT REPAIR – PLAN VIEW

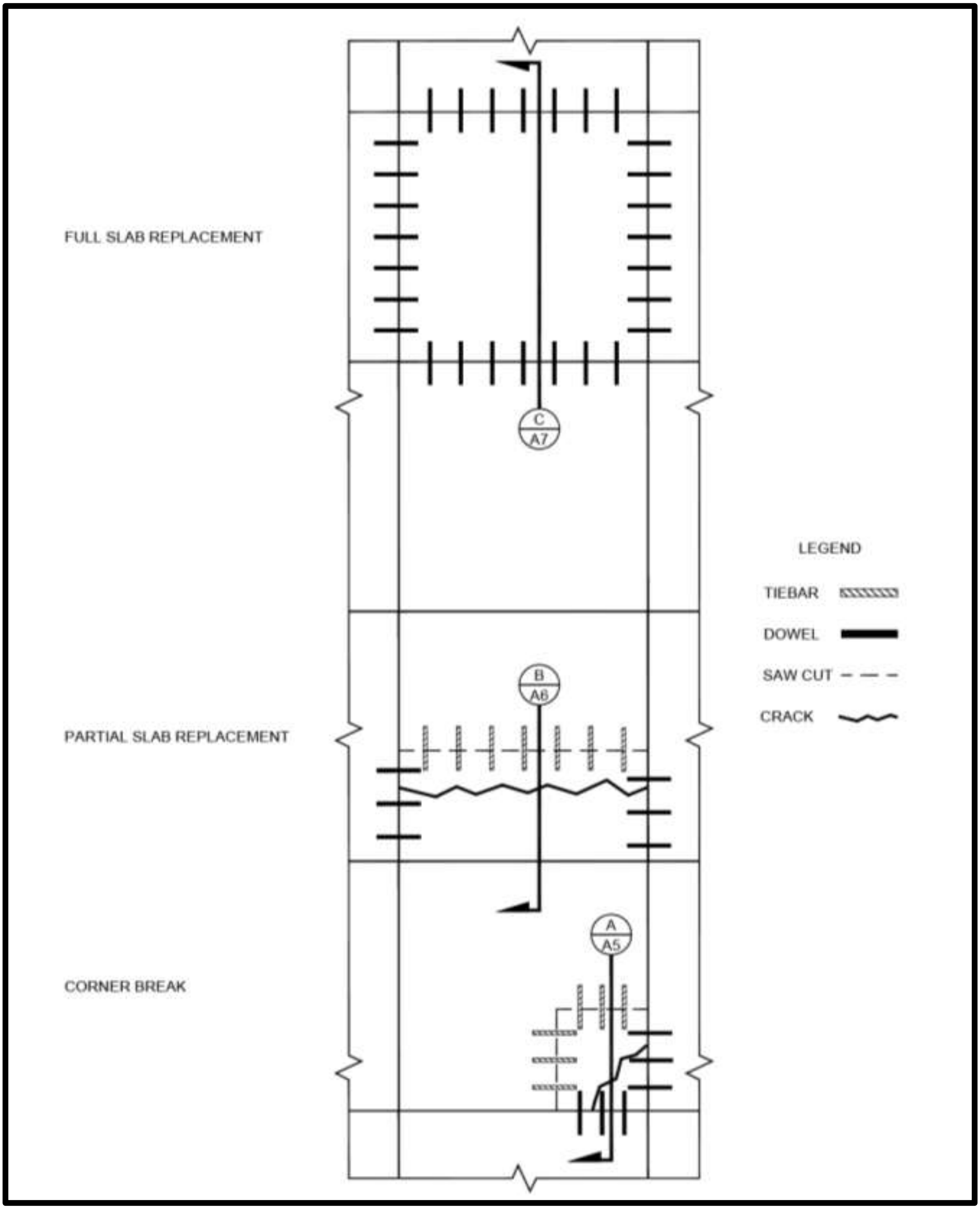

Figure A-4. Rigid pavement repair – plan view

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A5. FULL DEPTH REPAIR IN RIGID PAVEMENT – CORNER BREAK

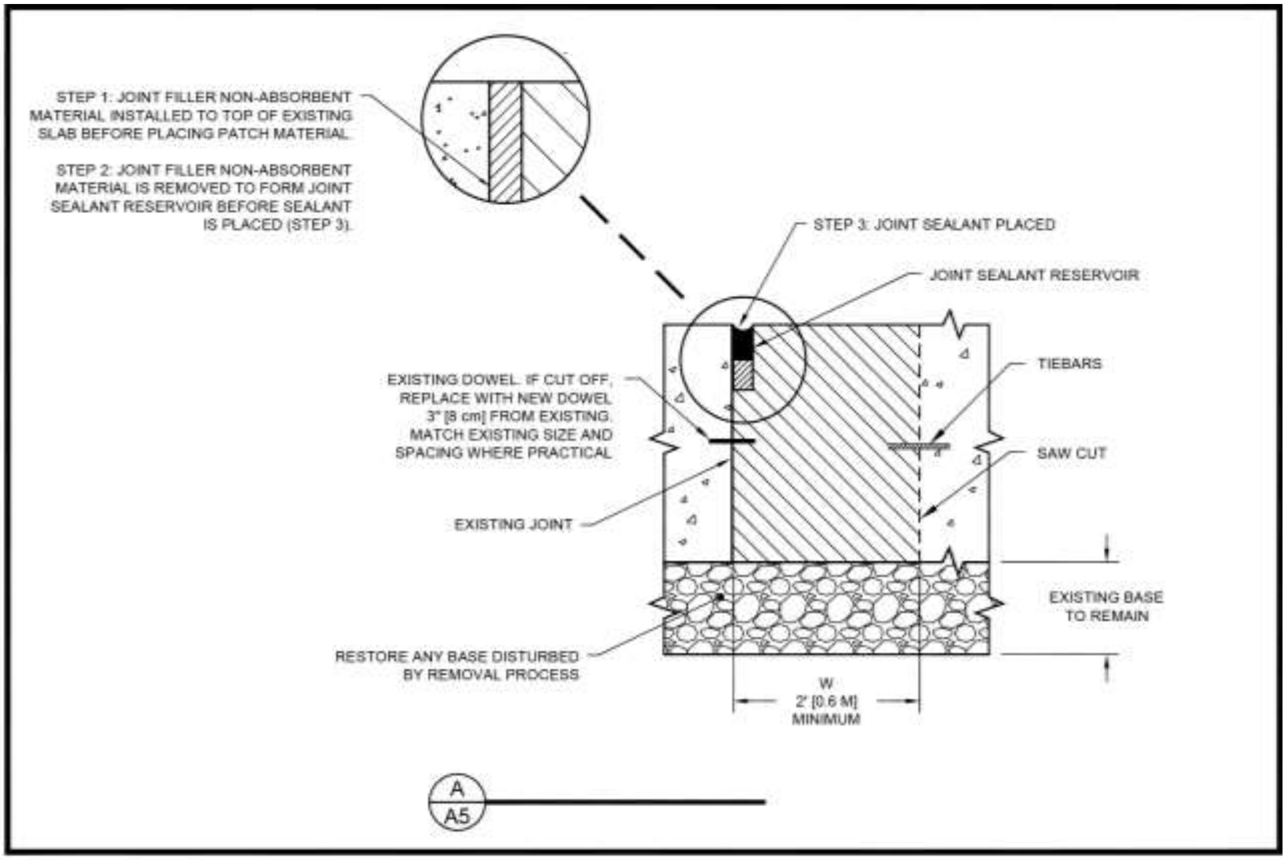

Figure A-5. Full depth repair in rigid pavement – corner break

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Repair Procedure and Weather and Temperature Requirements are on the back of this page.

MATERIAL REQUIREMENTS

ASTM A1078	Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement
ASTM A615	Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
P-501	Portland Cement Concrete (PCC) Pavement, AC 150/5370-10, Standards for Specifying Construction of Airports

State Department of Transportation specifications for pavements

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin repairs during inclement weather.
- Do not place concrete unless the ambient temperature is at least 40°F (4°C) and rising and the concrete temperature is greater than or equal to 50°F (10°C).
- Do not place concrete on frozen base, ice, or snow.
- When the ambient temperature exceeds 85°F (29°C), sprinkle the adjacent concrete and base with water immediately before placing concrete.
- Place concrete at the coolest temperature practicable, and never allow the placed concrete temperature to exceed 90°F (32°C).

REPAIR PROCEDURE

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area to be repaired. For corner breaks the repair area should be square.
3. Make a full-depth saw cut along the constructed joints at least 2 feet (0.6 m) beyond the limits of the break and make saw cuts perpendicular to the constructed joints from these points until they intersect. See Figure A-4.
4. If dowels or tie bars are present along any edges, either of the following options is acceptable:
   - If dowels or tie bars will be exposed and saved, saw edges full depth just beyond the end of the dowels or tie bars. Carefully saw joints on the joint line to within 1 inch (2.5 cm) of the depth of the dowel or tie bar. Use light 30 pound (14 kg) or less jackhammers or other approved equipment to carefully break up and remove the narrow strips of concrete along the doweled edges.
   - If dowel or tie bars are cut and replaced, make a full depth saw cut along the constructed joint cutting the dowels and tie bars.
5. Take care to prevent damage to remaining dowels, tie bars, or concrete.
6. Use light weight equipment, i.e., jackhammers less than 30 pounds (14 kg), hand tools, etc., to remove the remaining damaged PCC pavement. Work from inside the saw cut toward the edge of the slab of the area being removed to prevent damage to the pavement remaining.
7. Remove by hand all loose material and vacuum to minimize any disturbance to the subgrade or base materials.
8. Restore subgrade or base material if required.
9. Install deformed tie-bars in each face of the parent panel by drilling horizontal holes into the face and using an epoxy bonding agent.
10. If existing dowel bars have been cut and removed, install new dowel bars of the type and size of the existing dowel bars in the joint that parallels the direction of traffic. On aprons and areas where traffic may be oblique to joints, install dowels in both joint faces.
11. Install dowels by drilling and epoxying into the PCC pavement at least 3 inches (8 cm) from the location of the existing dowels which were cut off. Space dowel bars at least 3 inches (8 cm) from the edge of the repair area and at least one bar spacing apart at corners of intersecting joints.
12. Oil the exposed ends of dowel bars prior to backfilling the repair area with concrete.
13. Install nonabsorbent board or other approved material within the limits of the joint seal reservoir (Step 1). The nonabsorbent board will be a standard ½ inch (13 mm) asphalt impregnated fiber-board or other approved material. For joints wider than ½ inch (13 mm), adjust the width of the nonabsorbent board to fit the joint width.
14. Fill the repair area with concrete and consolidate with a vibrator. Concrete should meet the requirements of P-501 or State DOT specifications for pavements.
15. Finish the surface to match existing pavement.
16. Spray with curing compound per ASTM C309.
17. Remove the nonabsorbent board (Step 2) and place joint sealant per ASTM D6690 and manufacturer's requirements (Step 3).
18. Do not allow traffic until the patch has cured.
19. Completely clean the work area before opening the pavement to aircraft traffic.

A6. FULL DEPTH REPAIR IN RIGID PAVEMENT – PARTIAL SLAB REPLACEMENT

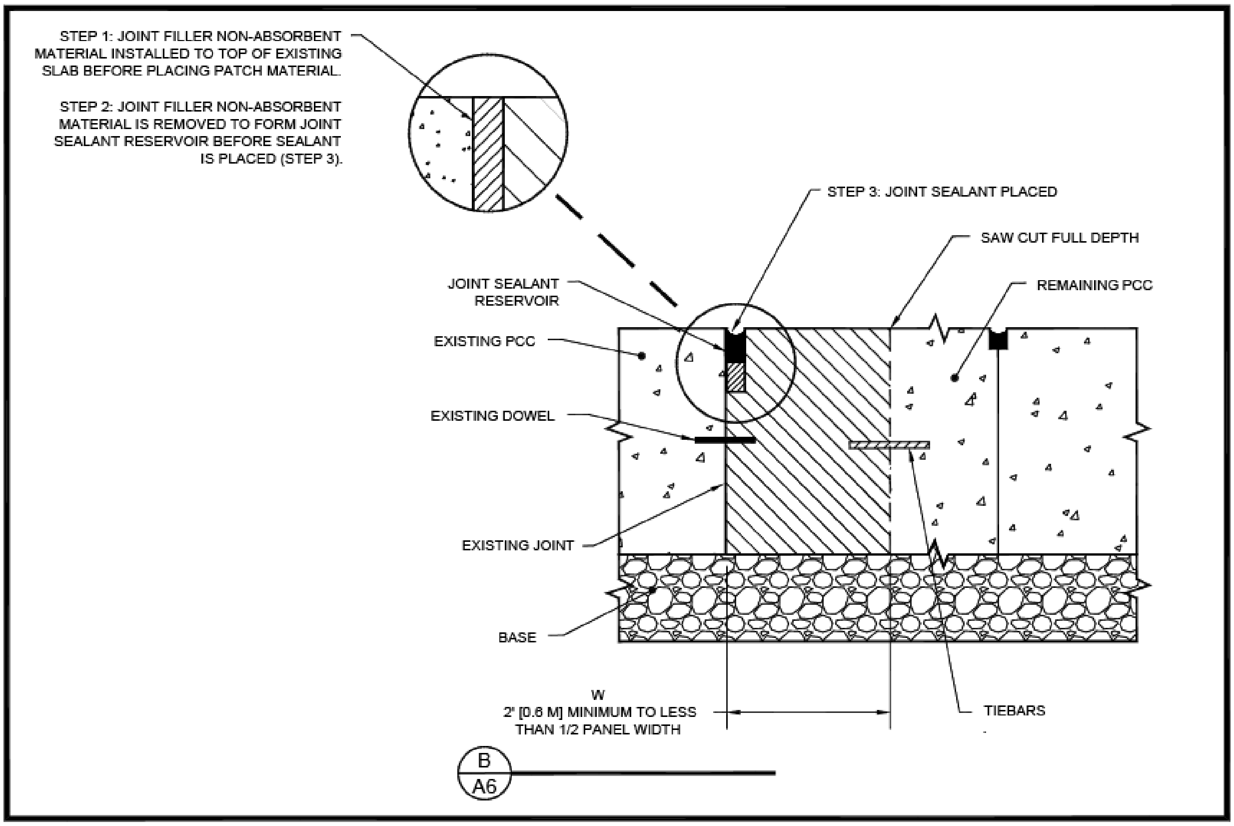

Figure A-6. Full depth repair in rigid pavement – partial slab replacement

Repair Procedure and Weather and Temperature Requirements are on the back of this page.

MATERIAL REQUIREMENTS

ASTM A1078	Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement
ASTM A615	Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
P-501	Portland Cement Concrete (PCC) Pavement, AC 150/5370-10, Standards for Specifying Construction of Airports

State Department of Transportation specifications for pavements

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin repairs during inclement weather.
- Do not place concrete unless the ambient temperature is at least 40°F (4°C) and rising and the concrete temperature is greater than or equal to 50°F (10°C).
- Do not place concrete on frozen base, ice, or snow.
- When the ambient temperature exceeds 85°F (29°C), sprinkle the adjacent concrete and base with water immediately before placing concrete.
- Place concrete at the coolest temperature practicable, and never allow the placed concrete temperature to exceed 90°F (32°C).

REPAIR PROCEDURE

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area to be repaired.
3. Make a full-depth saw cut along the constructed joints at least 2 feet (0.6 m) beyond the limits of the damaged pavement and make a saw cut perpendicular to the constructed joints from these points across the width of the pavement panel. See Figure A-4.
4. If dowels or tie bars are present along any edges, either of the following options is acceptable:
    - If dowels or tie bars will be exposed and saved, saw edges full depth just beyond the end of the dowels or tie bars. Carefully saw joints on the joint line to within 1 inch (2.5 cm) of the depth of the dowel or tie bar. Carefully break up and remove the narrow strips of concrete along doweled edges using light 30 pound (14 kg) or less jackhammers, or other approved equipment.
    - If dowels or tie bars are to be cut and replaced, make a full depth saw cut along the constructed joint cutting the dowels and tie bars.
5. Take care to prevent damage to the dowels, tie bars, or to concrete that remains in place.
6. Make additional saw cuts within the limits of the repair area, dividing the repair area into quarters.
7. Use light weight equipment, i.e., jackhammers less than 30 pounds (14 kg), hand tools, etc., to remove the damaged PCC pavement. Work from inside the saw cut toward the interior of the area being removed to prevent damage to the pavement remaining.
8. Remove by hand all loose material and vacuum to minimize any disturbance to the subgrade or base materials.
9. Restore subgrade or base material if required.
10. Install deformed tie-bars in the face of the parent panel by drilling horizontal holes in to the face and using an epoxy bonding agent.
11. If existing dowel bars have been cut and removed, install dowel bars of the type and size of the existing dowel bars in the joints that are parallel to the direction of traffic. On aprons and areas where traffic may be oblique to joints, install dowels in both joint faces.
12. Install dowels by drilling and epoxying into the PCC pavement at least 3 inches (8 cm) from the location of the existing cut dowels. Space dowel bars at least 3 inches (8 cm) from the edge of the repair area and at least one bar spacing apart at corners of intersecting joints.
13. Oil the exposed ends of dowel bars prior to backfilling repair area with concrete.
14. Install nonabsorbent board or other approved material within the limits of the joint seal reservoir (Step 1). The nonabsorbent board will be a standard ½ inch (13 mm) asphalt impregnated fiber-board. For joints wider than ½ inch (13 mm), adjust the width of the nonabsorbent board to fit the joint width.
15. Fill the repair area with concrete and consolidate with a vibrator. Use concrete meeting the requirements of P-501 or State DOT specifications for pavements.
16. Finish the surface to match the existing surface.
17. Spray with curing compound per ASTM C309.
18. Remove the nonabsorbent board or other approved material (Step 2) and place joint sealant per ASTM D6690 (Step 3).
19. Thoroughly clean the work area before opening the pavement to aircraft traffic.
20. Do not allow traffic until the concrete has cured.

A7. FULL DEPTH REPAIR IN RIGID PAVEMENT – FULL SLAB REPLACEMENT

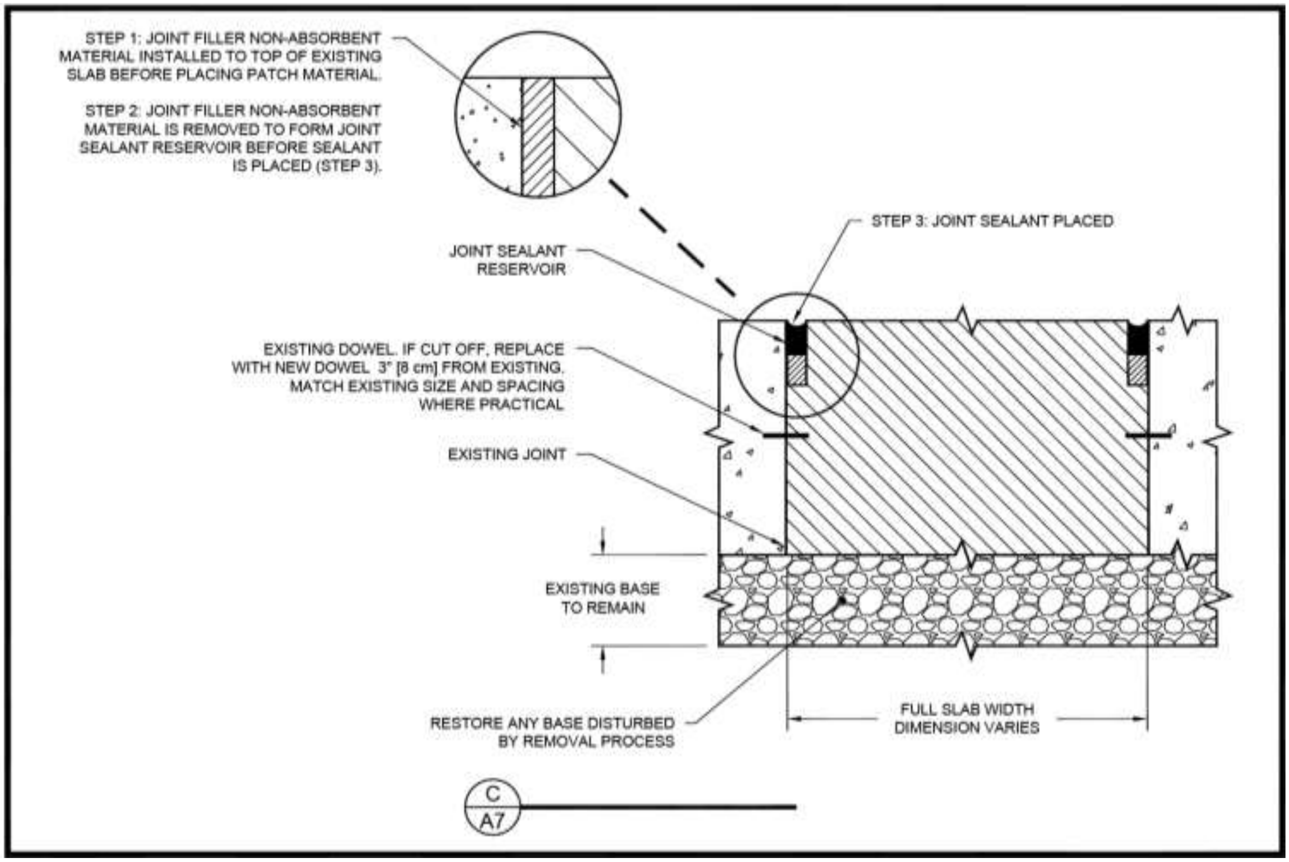

Figure A-7. Full depth repair in rigid pavement – full slab replacement

Repair Procedure and **Weather and Temperature Requirements** are on the back of this page.

MATERIAL REQUIREMENTS

ASTM A1078	Standard Specification for Epoxy-Coated Steel Dowels for Concrete Pavement
ASTM A615	Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
P-501	Portland Cement Concrete (PCC) Pavement, AC 150/5370-10, Standards for Specifying Construction of Airports

State Department of Transportation specifications for pavements

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin repairs during inclement weather.
- Do not place concrete unless the ambient temperature is at least 40°F (4°C) and rising and the concrete temperature is greater than or equal to 50°F (10°C).
- Do not place concrete on frozen base, ice, or snow.
- When the ambient temperature exceeds 85°F (29°C), sprinkle the adjacent concrete and base with water immediately before placing concrete.
- Place concrete at the coolest temperature practicable, and never allow the placed concrete temperature to exceed 90°F (32°C).

REPAIR PROCEDURE

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area to be repaired.
3. Make a full-depth saw cut along the constructed joints at least 2 feet (0.6 m) beyond the limits of the damaged pavement and make a saw cut perpendicular to the constructed joints from these points across the width of the pavement panel.
4. If dowels or tie bars are present along any edges, either of the following options is acceptable:
   - If dowels or tie bars will be exposed and saved, edges will be sawed full depth just beyond the end of the dowels or tie bars. Carefully saw joints on the joint line to within 1 inch (2.5 cm) of the depth of the dowel or tie bar. Carefully break up the narrow strips of concrete along doweled edges using light 30 pound (14 kg) or less jackhammers, or other approved equipment.
   - If dowels or tie bars are to be cut and replaced, make a full depth saw cut along the constructed joint cutting the dowels and tie bars.
5. Take care to prevent damage to the dowels, tie bars, or to concrete that remains in place.
6. Make additional saw cuts within the limits of the repair area dividing the repair area into quarters.
7. Use light weight equipment, i.e., jackhammers less than 30 pounds (14 kg), hand tools, etc., to remove the damaged PCC pavement. Work from inside the saw cut toward the interior of the area being removed to prevent damage to the pavement remaining.
8. Remove by hand all loose material and vacuum to minimize any disturbance to the subgrade or base materials.
9. Restore subgrade or base material if required.
10. If existing dowel bars have been cut and removed, install dowel bars of the type and size of the existing dowel bars in the joints that are parallel to the direction of traffic. On aprons and areas where traffic may be oblique to joints, install dowels in both joint faces.
11. Install dowels by drilling and epoxying into the PCC pavement at least 3 inches (8 cm) from the location of the existing dowels which were cut off. Space dowel bars at least 3 inches (8 cm) from the edge of the repair area and at least one bar spacing apart at corners of intersecting joints.
12. Oil the exposed ends of dowel bars prior to backfilling repair area with concrete.
13. Install nonabsorbent board or other approved material within the limits of the joint seal reservoir (Step 1). The nonabsorbent board will be a standard ½ inch (13 mm) asphalt impregnated fiber-board. For joints wider than ½ inch (13 mm), adjust the width of the nonabsorbent board to fit the joint width.
14. Fill the repair area with concrete and consolidate with a vibrator. Use concrete meeting the requirements of P-501 or State DOT specifications for pavements.
15. Finish the surface to match the existing surface.
16. Spray with curing compound per ASTM C309.
17. Remove the nonabsorbent board or other approved material (Step 2) and place joint sealant per ASTM D6690 (Step 3).
18. Thoroughly clean the work area before opening the pavement to aircraft traffic.
19. Do not allow traffic until the concrete has cured.

A8. JOINT SPALL REPAIR IN RIGID PAVEMENT

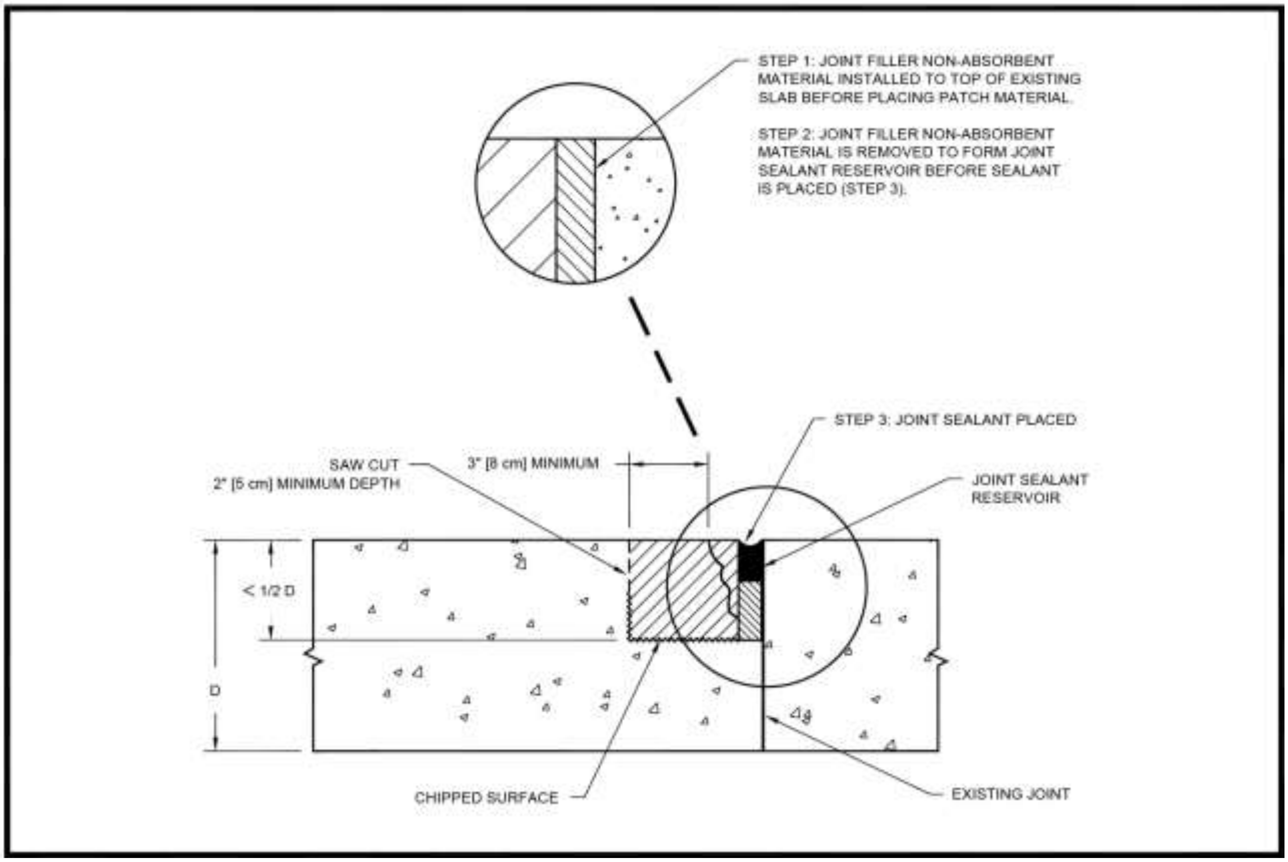

Figure A-8. Joint spall repair in rigid pavement

Repair Procedure and Weather and Temperature Requirements are on the back of this page.

MATERIAL REQUIREMENTS

ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C881	Standard Specifications for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
P-501	Portland Cement Concrete (PCC) Pavement, AC 150/5370-10, Standards for Specifying Construction of Airports

State Department of Transportation specifications for pavements

WEATHER AND TEMPERATURE REQUIREMENTS

- Do not begin repairs during inclement weather.
- Do not place concrete unless the ambient temperature is at least 40°F (4°C) and rising and the concrete temperature is greater than or equal to 50°F (10°C).
- Do not place concrete on frozen base, ice, or snow.
- When the ambient temperature exceeds 85°F (29°C), sprinkle the adjacent concrete and base with water immediately before placing concrete.
- Place concrete at the coolest temperature practicable, and never allow the placed concrete temperature to exceed 90°F (32°C).

REPAIR PROCEDURE

1. Review the construction safety and phasing plan (CSPP). Ensure all pavement closures have all required items in place, such as lighted Xs, barricades, etc.; and all NOTAMS have been issued for affected areas of the airfield.
2. Mark the limits of the area of spall repair.
3. Make vertical saw cuts a minimum of 2 inches (5 cm) in depth and approximately 3 inches (8 cm) beyond the limit of the spall area. Saw cuts should be straight lines defining the perimeter of the spall repair area. The spall repair area should be a rectangular area.
4. When there are adjacent spall repair areas within a slab, the minimum distance between spall repair areas is 1-1/2 feet (45 cm). When spall repair areas are less than 1-1/2 feet (45 cm) apart, combine the spall repair areas into one repair. When the spall repair areas are greater than 1-1/2 feet (45 cm) apart, maintain separate spall repair areas.
5. Chip out and remove all unsound concrete and at least ½ inch (13 mm) of visually sound concrete between the saw cut and the joint, or crack.
6. Use light weight equipment, i.e., jackhammers less than 30 pounds (14 kg), hand tools, etc., to remove the damaged PCC pavement. Work from inside the saw cut toward the joint to prevent damage to the remaining pavement.
7. Remove all loose material by hand and vacuum to minimize any damage to the remaining pavement.
8. Clean the spall repair area with high-pressure water.
9. Place nonabsorbent board or other approved material (Step 1) in the existing joint and form a new joint sealant reservoir adjacent to the repair area. Maintain the joint through the full depth of the spall repair and prevent a bond between the patch and the adjacent slab.
10. Prepare the surface of the joint repair area in accordance with the manufacturer's recommendations for the material used for the repair. This may require treating the surface of the spall repair with a neat cement grout or a liquid bonding agent.
11. Place the patch.
12. Finish the patch to match the texture of the adjacent pavement.
13. Cure the patch in accordance with the material manufacturer's recommendations.
14. Remove the nonabsorbent board or other approved material from the joint (Step 2) and place joint sealant per ASTM D6690 (Step 3).
15. Protect the patch from traffic until the material has set.
16. Thoroughly clean the work area before opening the pavement to aircraft traffic.

Appendix B. Bibliography

1. American Concrete Pavement Association (ACPA), http://www.acpa.org/:

- Guidelines for Full-Depth Repair (TB002P), 1995.
- Guidelines for Partial-Depth Repair (TB003P), 1998.
- Joint and Crack Sealing and Repair for Concrete Pavements (TB012P), 1993.
- Diamond Grinding and Concrete Pavement Restoration (TB008P), 2000.
- Concrete Pavement Restoration Guide: Procedures for Preserving Concrete Pavements (TB020P), 1998.
- Concrete Repair Manual for Airfields (JP002P), 2003.
- Concrete Crack and Partial-Depth Spall Repair Manual (JP003P), 2004.

2. The Asphalt Institute (AI), http://www.asphaltinstitute.org/:

- Asphalt in Pavement Preservation and Maintenance, MS-16, 4th Edition.
- The Basic Asphalt Emulsion Manual, MS-19, 4th Edition.
- Asphalt Overlays for Highway and Street Rehabilitation, MS-17, 3rd Edition.

3. Advisory Circulars, http://www.faa.gov/airports/resources/advisory_circulars/:

- AC 150/5200-18, Airport Safety Self-Inspection.
- AC 150/5200-30, Airport Winter Safety and Operations.
- AC 150/5200-33, Hazardous Wildlife Attractants On or Near Airports.
- AC 150/5210-24, Airport Foreign Object Debris (FOD) Management.
- AC 150/5320-5, Airport Drainage Design.
- AC 150/5320-6, Airport Pavement Design and Evaluation.
- AC 150/5320-12, Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces.
- AC 150/5220-22, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns.
- AC 150/5370-2, Operational Safety on Airports During Construction.

- AC 150/5370-10, Standards for Specifying Construction of Airports.
- AC 150/5370-11, Use of Nondestructive Testing Devices in the Evaluation of Airport Pavements.
- AC 150/5380-7, Airport Pavement Management Program.

4. Unified Facilities Criteria (UFC), http://www.wbdg.org/ccb/browse_cat.php?o=29&c=4:

- UFC 3-270-01, Asphalt Maintenance and Repair, 15 March 2001.
- UFC 3-270-02, Asphalt Crack Repair, 15 March 2001.
- UFC 3-270-03, Concrete Crack and Partial-Depth Spall Repair, 15 March 2001.
- UFC 3-270-04, Concrete Repair, 15 March 2001.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Standardized Method of Reporting Airport Pavement Strength - PCN

Date: 8/14/2014
Initiated By: AAS-100

AC No: 150/5335-5C

1 **Purpose.**

This advisory circular (AC) provides guidance for—

- Using the standardized International Civil Aviation Organization (ICAO) method to report airport runway, taxiway, and apron pavement strength. ICAO requires member states to report aerodrome-related aeronautical data, including pavement strength. The standardized method, known as the Aircraft Classification Number – Pavement Classification Number (ACN-PCN) method, has been developed and adopted as an international standard and has facilitated the exchange of pavement strength rating information.
- The AC provides guidance for use of the standardized method of reporting pavement strength, which applies only to pavements with bearing strengths of 12,500 pounds (5 700 kg) or greater. The method of reporting pavement strength for pavements of less than 12,500 pounds (5 700 kg) bearing strength remains unchanged.
- Reporting changes to airport data that is generally published on Federal Aviation Administration (FAA) Form 5010, Airport Master Record. The data elements associated with Gross Weight (Data Elements 35 through 38) and Pavement Classification Number (Data Element 39) are affected.

2 **Cancellation.**

This AC cancels AC 150/5335-5B, *Standardized Method of Reporting Airport Pavement Strength – PCN,* dated August 26, 2011.

3 **Application.**

The FAA recommends the guidelines and specifications in this AC for reporting airport pavement strength using the standardized method. Use of this AC is mandatory for all projects funded with Federal grant monies through the Airport Improvement Program (AIP) or with revenue from the Passenger Facility Charge (PFC) Program. See Grant

Assurance No. 34, “Policies, Standards, and Specifications,” and PFC Assurance No. 9, “Standards and Specifications.”

4 **Effective Date.**

- The FAA recommends the guidelines and specifications in this AC for reporting airport pavement strength using the standardized method for all paved runways, taxiways, and aprons at all airports.
- One year after the implementation of this AC, the FAA requires all public-use paved runways at all Part 14 CFR 139 certificated airports be assigned gross weight and PCN data.
- Upon completion of projects funded with Federal grant monies through the Airport Improvement Program (AIP) or with revenue from the Passenger Facility Charge (PFC) program, the airport will update Form 5010 data elements associated with Gross Weight and Pavement Classification Number.

5 **Principal Changes.**

The AC includes the following principal changes:

- Updates the Effective Date paragraph above for public-use paved runways at nonprimary commercial service airports serving air carrier aircraft. Clarifies that upon completing paving projects that receive AIP or PFC funds, the airport will update the 5010 form.
- Updates the Application paragraph above to clarify that this AC applies to all runways that have or will receive AIP or PFC funding.
- Clarifies in Chapter 3 that COMFAA calculates ACN using ICAO procedures but calculates PCN using the procedures in this AC.
- Clarifies Using Aircraft Method to Determine PCN in paragraph 4.3.
- Clarifies the subgrade support category requirement in paragraph 4.4, Technical Evaluation Method to Determine PCN.
- Adds a note to Table A-1, Standard P/TC Ratio Summary.
- Updates Appendix C and particularly Section C.6, Technical Evaluation Examples for Flexible Pavements, and Section C.7, Technical Evaluation Examples for Rigid Pavements, with easier to follow examples and to comply with the current version of COMFAA (updated in 2012), 2012), the software program used for airport pavement thickness and strength evaluations, and the new COMFAA support spreadsheet (dated 11/21/2012).
- Updates Appendix D to conform to the current version of COMFAA.
- Makes editorial corrections and clarifications throughout, including adopting a new paragraph numbering system.

6 **Related Reading Material.**

The publications listed in Appendix G provide further information on the development and use of the ACN-PCN method.

Michael J. O'Donnell
Director, Office of Airport Safety and Standards

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CHAPTER 1. INTRODUCTION

1.1 Background.

The United States is a contracting state of the International Civil Aviation Organization (ICAO) and, under 47 USC §40105(b), will act consistently with the obligations of the United States Government under an international agreement. Annex 14 to the Convention of International Civil Aviation, Aerodromes, contains a standard that requires member states to publish information on the strengths of all public airport pavements in its own Aeronautical Information Publication. The FAA reports pavement strength information to the National Airspace System Resources (NASR) database and publishes pavement strength information in the Airport Master Record (Form 5010) and the Airport/Facility Directory (AFD).

1.2 Development of a Standardized Method.

In 1977, ICAO established a Study Group to develop a single international method of reporting pavement strengths. The study group developed, and ICAO adopted, the Aircraft Classification Number - Pavement Classification Number (ACN-PCN) method. Using this method, it is possible to express the effect of an individual aircraft on different pavements with a single unique number that varies according to aircraft weight and configuration (e.g. tire pressure, gear geometry, etc.), pavement type, and subgrade strength. This number is the Aircraft Classification Number (ACN). Conversely, the load-carrying capacity of a pavement can be expressed by a single unique number, without specifying a particular aircraft or detailed information about the pavement structure. This number is the Pavement Classification Number (PCN).

1.2.1 Definition of ACN.

ACN is a number that expresses the relative effect of an aircraft at a given configuration on a pavement structure for a specified standard subgrade strength.

1.2.2 Definition of PCN.

PCN is a number that expresses the load-carrying capacity of a pavement for unrestricted operations.

1.2.3 System Methodology.

The ACN-PCN system is structured so a pavement with a particular PCN value can support an aircraft that has an ACN value equal to or less than the pavement’s PCN value. This is possible because ACN and PCN values are computed using the same technical basis.

1.3 Application.

The use of the standardized method of reporting pavement strength applies only to pavements with bearing strengths of 12,500 pounds (5 700 kg) or greater. The method of reporting pavement strength for pavements of less than 12,500 pounds (5 700 kg) bearing strength remains unchanged.

1.4 Limitations of the ACN-PCN System.

The ACN-PCN system is only intended as a method that airport operators can use to evaluate acceptable operations of aircraft. It is not intended as a pavement design or pavement evaluation procedure, nor does it restrict the methodology used to design or evaluate a pavement structure.

CHAPTER 2. DETERMINATION OF AIRCRAFT CLASSIFICATION NUMBER

2.1 Determination of the ACN.

The aircraft manufacturer provides the official computation of an ACN value. Computation of the ACN requires detailed information on the operational characteristics of the aircraft, such as maximum aft center of gravity, maximum ramp weight, wheel spacing, tire pressure, and other factors.

2.2 Subgrade Category.

The ACN-PCN method adopts four standard levels of subgrade strength for rigid pavements and four levels of subgrade strength for flexible pavements. These standard support conditions are used to represent a range of subgrade conditions as shown in Tables 2-1 and 2-2.

Table 2-1. Standard Subgrade Support Conditions for Rigid Pavement ACN Calculation

Subgrade Strength Category	Subgrade Support k-Value pci (MN/m3)	Represents pci (MN/m3)	Code Designation
High	552.6 (150)	k ≥ 442 (≥120)	A
Medium	294.7 (80)	221<k<442 (60<k<120)	B
Low	147.4 (40)	92<k≤221 (25<k≤60)	C
Ultra Low	73.7 (20)	k≤92 (≤25)	D

Table 2-2. Standard Subgrade Support Conditions for Flexible Pavement ACN Calculation

Subgrade Strength Category	Subgrade Support CBR-Value	Represents	Code Designation
High	15	CBR ≥ 13	A
Medium	10	8<CBR<13	B
Low	6	4<CBR≤8	C
Ultra Low	3	CBR≤4	D

2.3 Operational Frequency.

Operational frequency is defined in terms of coverages that represent a full-load application on a point in the pavement. Coverages must not be confused with other common terminology used to reference movement of aircraft. As an aircraft moves along a pavement section it seldom travels in a perfectly straight path or along the exact same path as before. This movement is known as aircraft wander and is assumed to be modeled by a statistically normal distribution. As the aircraft moves along a taxiway or runway, it may take several trips or passes along the pavement for a specific point on the pavement to receive a full-load application. It is easy to observe the number of passes an aircraft may make on a given pavement, but the number of coverages must be mathematically derived based upon the established pass-to-coverage ratio for each aircraft.

2.4 Rigid Pavement ACN.

For rigid pavements, the aircraft landing gear flotation requirements are determined by the Westergaard solution for a loaded elastic plate on a Winkler foundation (interior load case), assuming a concrete working stress of 399 psi (2.75 MPa).

2.5 Flexible Pavement ACN.

For flexible pavements, aircraft landing gear flotation requirements are determined by the California Bearing Ratio (CBR) method for each subgrade support category. The CBR method employs a Boussinesq solution for stresses and displacements in a homogeneous, isotropic elastic half-space.

2.6 ACN Calculation.

Using the parameters defined for each type of pavement section, a mathematically derived single wheel load is calculated to define the landing gear/pavement interaction. The derived single wheel load implies equal stress to the pavement structure and eliminates the need to specify pavement thickness for comparative purposes. This is achieved by equating the thickness derived for a given aircraft landing gear to the thickness derived for a single wheel load at a standard tire pressure of 181 psi (1.25 MPa). The ACN is defined as two times the derived single wheel load (expressed in thousands of kilograms).

2.7 Variables Involved in Determination of ACN Values.

Because aircraft can be operated at various weight and center of gravity combinations, ICAO adopted standard operating conditions for determining ACN values. The ACN is to be determined at the weight and center of gravity combination that creates the maximum ACN value. Tire pressures are assumed to be those recommended by the manufacturer for the noted conditions. Aircraft manufacturers publish maximum weight and center of gravity information in their Aircraft Characteristics for Airport Planning (ACAP) manuals. To standardize the ACN calculation and to remove operational frequency from the relative rating scale, the ACN-PCN method specifies that ACN values be determined at a frequency of 10,000 coverages.

CHAPTER 3. DETERMINATION OF ACN-PCN VALUES USING COMFAA

3.1 Availability of COMFAA Software Application.

To facilitate the use of the ACN-PCN system, the FAA developed a software application that calculates ACN values using the procedures and conditions specified by ICAO and can be used to determine PCN values following the procedures in this AC. The software is called COMFAA and may be downloaded along with its source code and supporting documentation from the FAA website.[1] The program is useful for determining an ACN value under various conditions; however, official ACN values are provided by the aircraft manufacturer.

3.2 Origin of the COMFAA Program.

Appendix 2 of the ICAO Aerodrome Design Manual, Part 3, Pavements, Second Edition, provides procedures for determining the Aircraft Classification Number (ACN). The appendix provides program code for two FORTRAN software applications capable of calculating the ACN for various aircraft on rigid and flexible pavement systems. The computer program listings in Appendix 2 of the ICAO manual were optically scanned and the FORTRAN code translated into Visual Basic 6.0 for incorporation into COMFAA.

3.3 COMFAA Program.

The COMFAA software is a general purpose program that operates in two computational modes: ACN Computation Mode and Pavement Thickness Mode.

3.3.1 ACN Computation Mode.

- Calculates the ACN number for aircraft on flexible pavements.
- Calculates the ACN number for aircraft on rigid pavements.
- Calculates flexible pavement thickness based on the ICAO procedure (CBR method) for default values of CBR (15, 10, 6, and 3).
- Calculates rigid pavement slab thickness based on the ICAO procedures (Portland Cement Association method, interior load case) for default values of k (552.6, 294.7, 147.4, and 73.7 lb/in^3 [150, 80, 40, and 20 MN/m^3]).

Note: Thickness calculation in the ACN mode is for specific conditions identified by ICAO for determination of ACN and not intended to be used to design a new pavement. For flexible pavements, a standard tire pressure of 181 psi (1.25 MPa) and 10,000 coverages is specified. For rigid pavements, an allowable stress level of 399 psi is identified by ICAO. The thickness calculated in ACN mode has meaning for determining allowable pavement loading only for the specific conditions identified by ICAO. (Appendix C has more details.)

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[1] See http://www.faa.gov/airports/engineering/design_software/. This software is in the public domain.

3.3.2 Pavement Thickness Mode.

- Calculates total flexible pavement thickness based on the FAA CBR method specified in AC 150/5320-6[2], Airport Pavement Design and Evaluation, for CBR values and coverage levels specified by the user.
- Calculates rigid pavement slab thickness based on the FAA Westergaard method (edge load analysis) specified in AC 150/5320-6 for k values and coverage levels specified by the user.

Note: The pavement thickness requirements associated with the ACN-PCN procedures are based upon historical procedures identified in previous versions of AC 150/5320-6. The FAA has replaced these procedures for pavement design with new procedures.

3.4 Internal Aircraft Library.

COMFAA contains an internal library of aircraft covering most large commercial and U.S. military aircraft currently in operation. The internal library is based on aircraft information provided directly by aircraft manufacturers or obtained from ACAP Manuals. The default characteristics of aircraft in the internal library represent the ICAO standard conditions for calculation of ACN. These characteristics include center of gravity at the maximum aft position for each aircraft in the ACN mode. Changes to characteristics of internal library aircraft are not permanent unless the internal library aircraft is added to an external library.

3.5 External Aircraft Library.

3.5.1 COMFAA allows for an external aircraft library where characteristics of the aircraft can be changed and additional aircraft added as desired. Functions permit users to modify the characteristics of an aircraft and save the modified aircraft in the external library. There are no safeguards in the COMFAA program to assure that aircraft parameters in the external library are feasible or appropriate. The user is responsible for assuring all data is correct.

3.5.2 When saving an aircraft from the internal library to the external library, the COMFAA program will calculate the tire contact area based upon the gross load, maximum aft center of gravity, and tire pressure. This value is recorded in the external library and is used for calculating the pass-to-coverage (P/C) ratio in the pavement thickness mode. Since the tire contact area is constant, the P/C ratio is also constant in the pavement thickness mode. This fixed P/C ratio should be used for converting passes to coverages for pavement thickness determination and equivalent aircraft operations.

[2] New FAA layered elastic and finite element pavement design procedures were adopted in AC 150/5320-6E. The pavement thickness mode uses the FAA CBR method and the FAA Westergaard method, identified in previous versions of AC 150/5320-6. These historical procedures are consistent with the ACN/PCN method, an internationally used standard published by ICAO. Data from the historical procedures relative to the existing ICAO standard are included in this AC.

3.6 Using the COMFAA Program.

Using the COMFAA program to calculate ACN values to determine PCN is visually interactive and intuitive.

3.6.1 ACN.

The user—

- Selects the desired aircraft,
- Confirms the physical properties of the aircraft. Only gross weight, percent gross weight on main gear, and tire pressure are changeable. All other properties are fixed by the ICAO standard.
- Clicks on the "MORE" button, and
- Clicks on the ACN Flexible or ACN Rigid button to determine the ACN for the four standard subgrade conditions.
- Clicks on the "Details" button to view parameters used to compute ACN.

3.6.2 PCN.

3.6.2.1 The user—

- Adds the runway traffic mix aircraft to an external file,
- Confirms the physical properties of each individual aircraft in the traffic mix,
- Inputs either annual departures or coverages of the aircraft,
- Inputs the evaluation thickness and the subgrade support strength,
- Inputs the concrete strength if analyzing a rigid pavement,
- Clicks on the "LESS" button to activate the PCN Batch computational mode, and
- Clicks on the PCN Flexible Batch or PCN Rigid Batch button to determine the PCN of the pavement.
- Clicks on the "Details" button to view the Results Tables.

3.6.2.2 The program includes a help file to assist users. Figures 3-1, 3-2, and 3-3 summarize the operation of the COMFAA program.

Figure 3-1. Computational Modes of the COMFAA Program

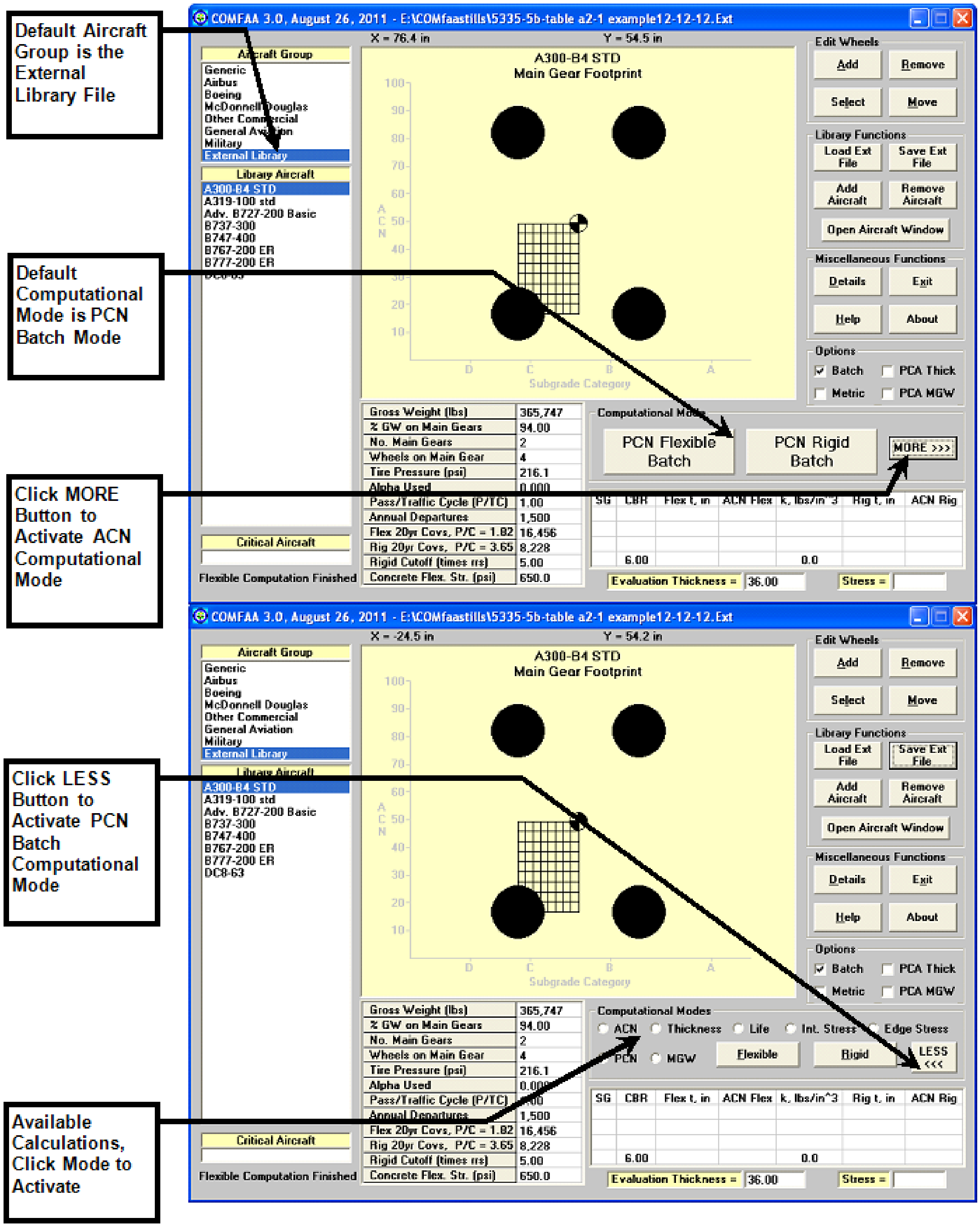


Figure 3-2. Operation of the COMFAA Program in ACN Mode

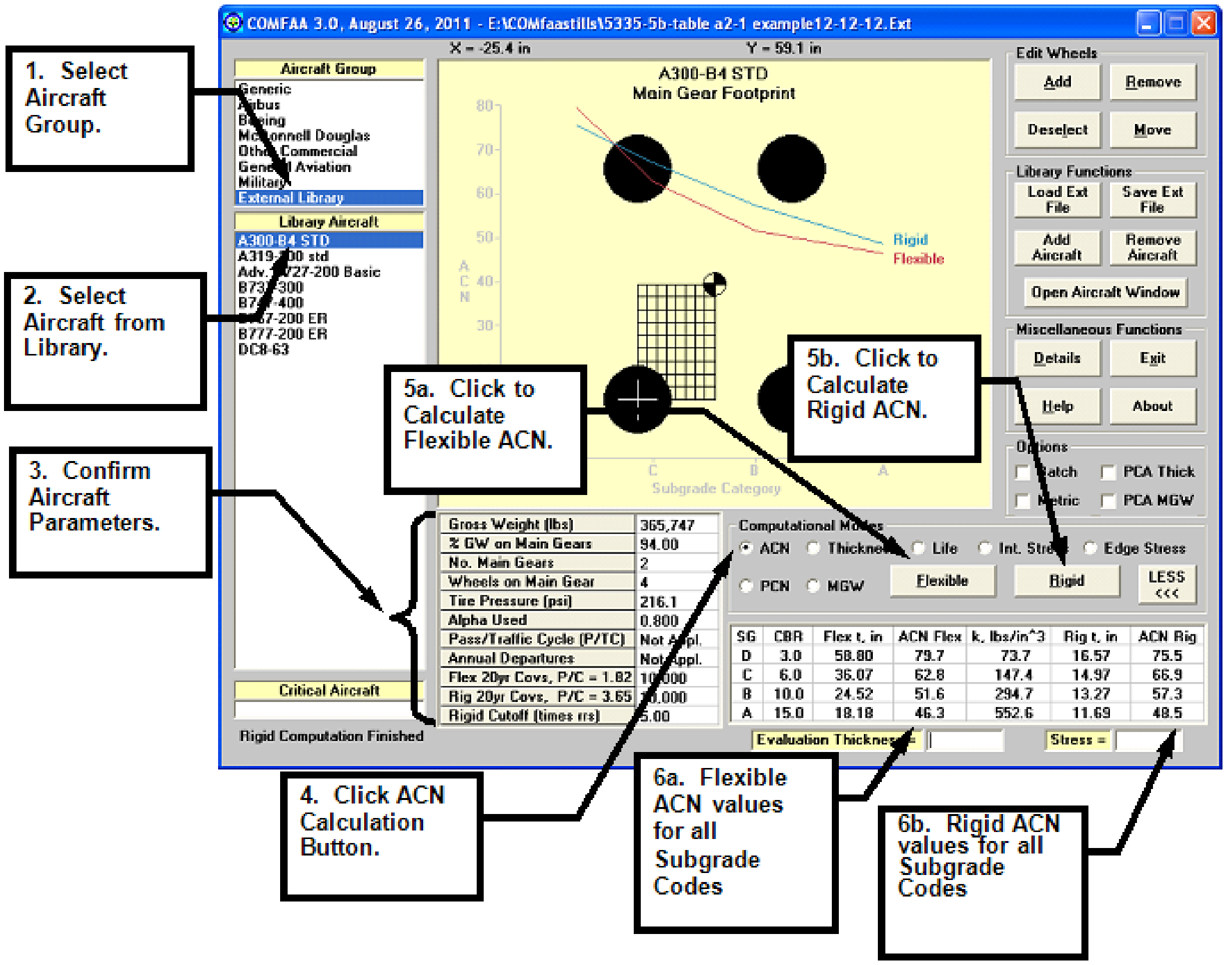
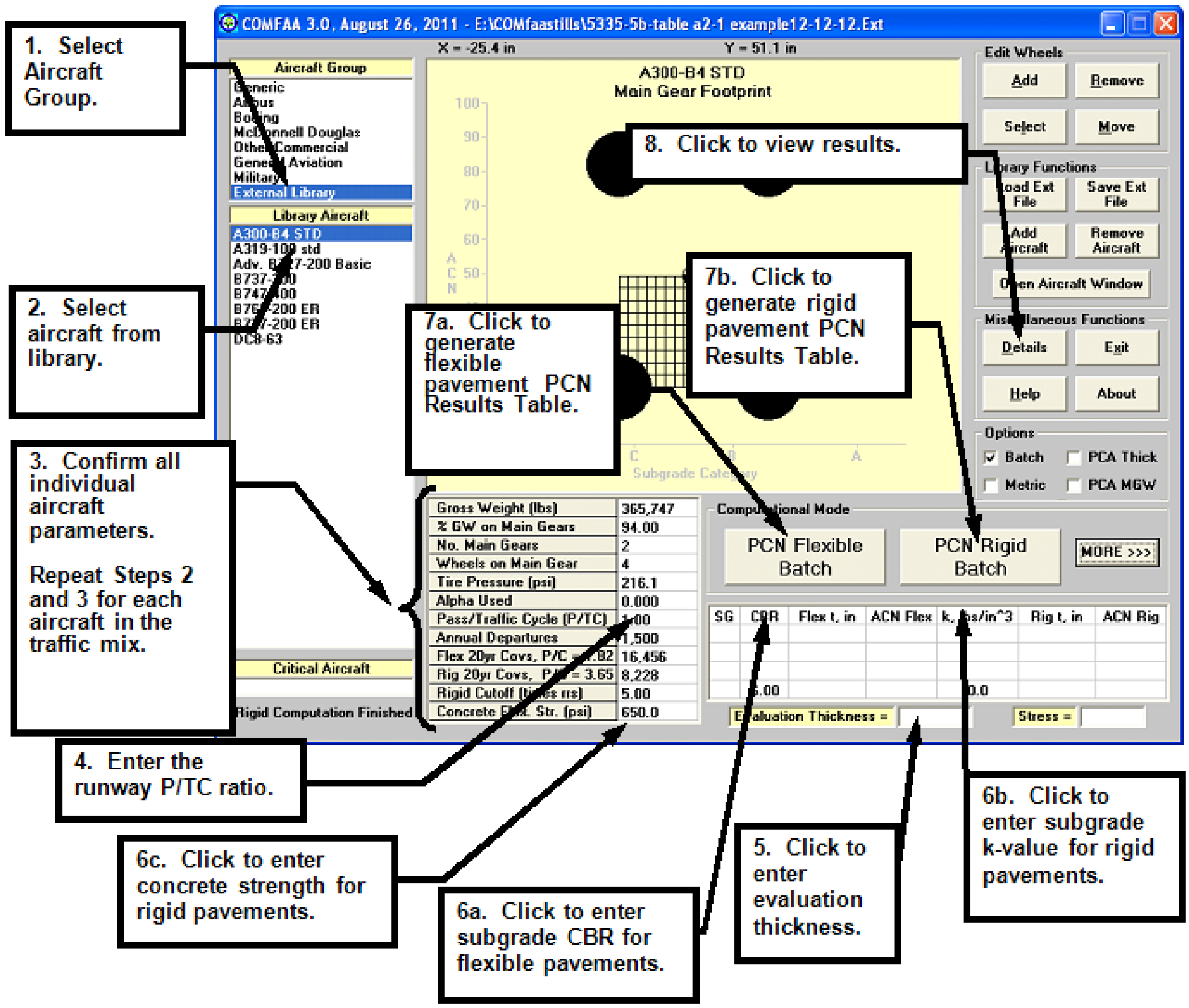


Figure 3-3. Operation of the COMFAA Program in PCN Batch Mode



CHAPTER 4. DETERMINATION OF PCN NUMERICAL VALUE

4.1 PCN Concept.

The determination of a pavement rating in terms of PCN is a process of (1) determining the ACN for each aircraft considered to be significant to the traffic mixture operating of the subject pavement and (2) reporting the ACN value as the PCN for the pavement structure. Under these conditions, any aircraft with an ACN equal to or less than the reported PCN value can safely operate on the pavement subject to any limitations on tire pressure.

Note: PCN values determined in accordance with this AC depend upon the aircraft traffic used to determine the PCN value. Airports should re-evaluate their posted PCN value if significant changes to the original aircraft traffic occur.

4.2 Determination of Numerical PCN Value.

Determination of the numerical PCN value for a particular pavement can be based upon one of two procedures: the “Using” aircraft method or the “Technical” evaluation method. ICAO procedures permit member states to determine how PCN values will be determined based upon internally developed pavement evaluation procedures. Either procedure may be used to determine a PCN, but the methodology used must be reported as part of the posted rating.

4.3 Using Aircraft Method to Determine PCN.

The Using aircraft method is a simple procedure where ACN values for all aircraft currently permitted to use the pavement facility are determined and the largest ACN value is reported as the PCN. This method is easy to apply and does not require detailed knowledge of the pavement structure. Figures 4-1 and 4-2 show an example of the Using Aircraft Method. The subgrade support category IS NOT a critical input when reporting PCN based on the Using Aircraft Method. The recommended subgrade support category when information IS NOT available should be Category B.

4.3.1 <u>Assumptions of the Using Aircraft Method.</u>

An underlying assumption with the Using aircraft method is that the pavement structure has the structural capacity to accommodate all aircraft in the traffic mixture, and that each aircraft is capable of operating on the pavement structure without **weight** restriction. From a technical point of view, the Using Aircraft method assumes that the number of total operations is equal to 10,000 coverages of the using aircraft with the highest ACN. The methodology used to determine ACN/PCN does not consider the critical design aircraft used to determine airport dimensional requirements.

4.3.2 <u>Inaccuracies of the Using Aircraft Method.</u>

The accuracy of this method is greatly improved when aircraft traffic information is available. Significant over-estimation of the pavement capacity can result if an excessively damaging aircraft, which uses the pavement on a very infrequent basis, is used to determine the PCN. Likewise, significant under-estimation of the pavement capacity can lead to uneconomic use of the pavement by preventing acceptable traffic from operating. Although there are no minimum limits on frequency of operation before an aircraft is considered part of the normal traffic, the reporting agency must use a rational approach to avoid overstating or understating the pavement capacity. A consistent method based on a design period minimum frequency is recommended and presented in Appendix C. The frequency recommended is equal to 1,000 coverages of the aircraft with the highest ACN for the Using method.

Note: Use of the Using aircraft method is discouraged on a long-term basis due to the concerns listed above.

Figure 4-1. Operation of COMFAA ACN Only Program, Version in Batch Mode

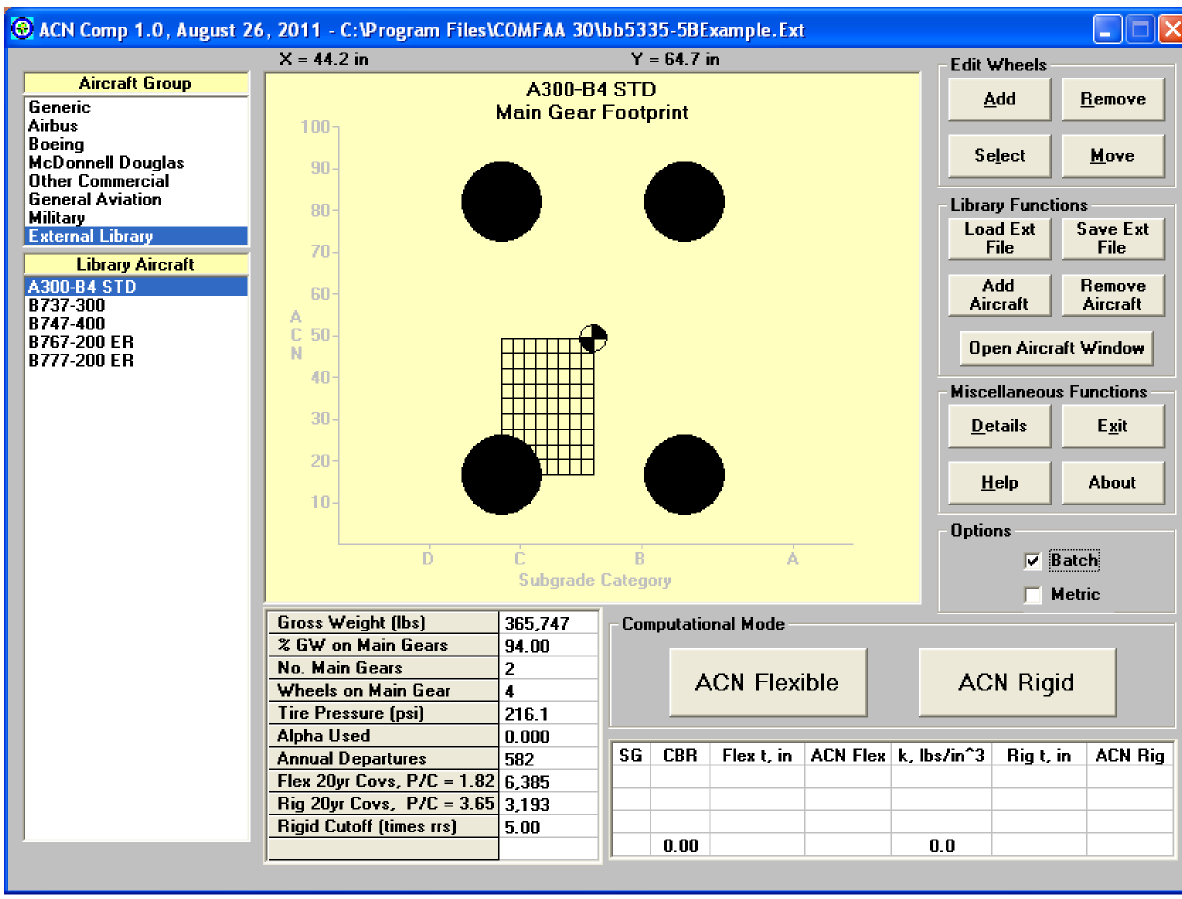
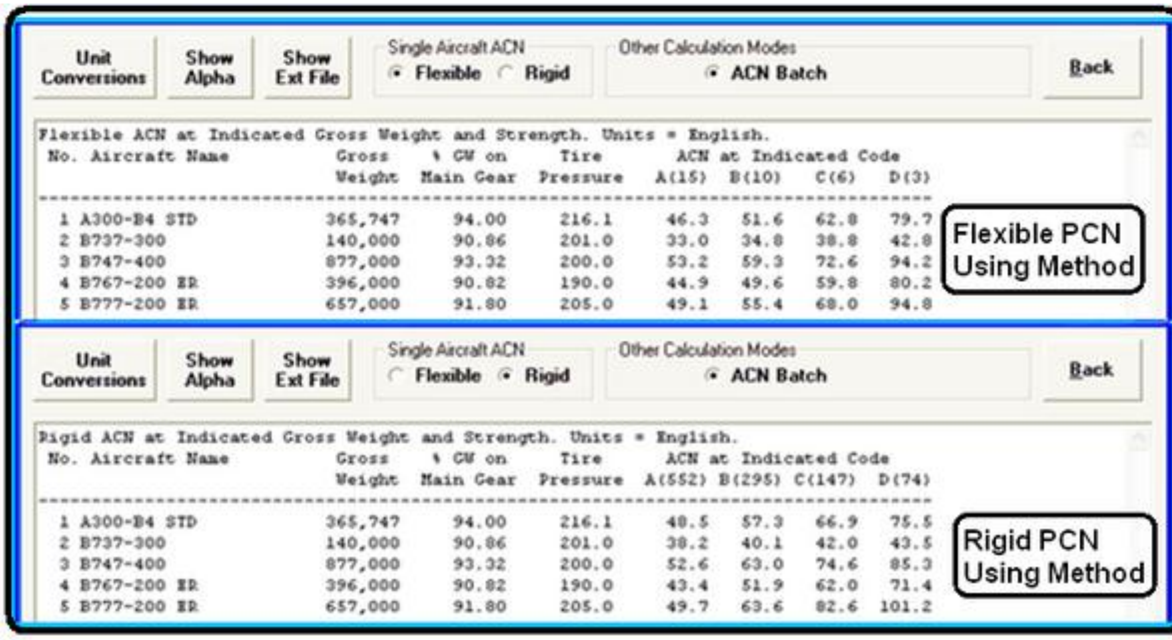


Figure 4-2. COMFAA Program, ACN Only Version in Batch Mode



4.4 Technical Evaluation Method to Determine PCN.

4.4.1 The strength of a pavement section is difficult to summarize in a precise manner and will vary depending on the unique combination of aircraft loading conditions, frequency of operation, and pavement support conditions. The technical evaluation method attempts to address these and other site-specific variables to determine reasonable pavement strength. *In general terms, for a given pavement structure and given aircraft, the allowable number of operations (traffic) will decrease as the intensity of pavement loading increases (increase in aircraft weight). It is entirely possible that two pavement structures with different cross-sections will report similar strength. However, the permissible aircraft operations will be considerably different. This discrepancy must be acknowledged by the airport operator and may require operational limitations administered outside of the ACN-PCN system.* All of the factors involved in determining a pavement rating are important, and it is for this reason that pavement ratings should not be viewed in absolute terms, but rather as estimations of a representative value. A successful pavement evaluation is one that assigns a pavement strength rating that considers the effects of all variables on the pavement.

4.4.2 The accuracy of a technical evaluation is better than that produced with the Using aircraft procedure but requires a considerable increase in time and resources. Pavement evaluation may require a combination of on-site inspections, load-bearing tests, and engineering judgment. It is common to think of pavement strength rating in terms of ultimate strength or immediate failure criteria. However, pavements are rarely removed from service due to instantaneous structural failure. A decrease in the serviceability of a pavement is commonly attributed to increases in surface roughness or localized distress, such as rutting or cracking. Determination of the adequacy of a pavement structure must not only consider the magnitude of pavement loads but the impact of the accumulated effect of traffic volume over the intended life of the pavement. The subgrade support category is a necessary input when reporting PCN based on the Technical Method.

Note: There is no recommended subgrade support category when information is not available.

4.4.2.1 **Determination of the PCN Value.**

The PCN numerical value is determined from an allowable load rating. While it is important not to confuse the PCN value with a pavement design parameter, the PCN is developed in a similar fashion. An allowable load rating is determined by applying the same principles as those used for pavement design. The process for determining the allowable load rating takes factors such as frequency of operations and permissible stress levels into account. Allowable load ratings are often discussed in terms of aircraft gear type and maximum gross aircraft weight, as these variables are used in the pavement design procedure. Missing from the allowable load rating, but just as important, is frequency of operation. In determining an allowable load rating, the evaluation must address whether the allowable load rating represents the pavement strength over a reasonable frequency of operation. Once the allowable load rating is established, the determination of the PCN value is a simple process of determining the ACN of the aircraft representing the allowable load and reporting the value as the PCN.

4.4.2.2 **Concept of Equivalent Traffic.**

The ACN-PCN method is based on design procedures that evaluate one aircraft against the pavement structure. Calculations necessary to determine the PCN can only be performed for one aircraft at a time. The ACN-PCN method does not directly address how to represent a traffic mixture as a single aircraft. To address this limitation, the FAA uses the equivalent annual departure concept to consolidate entire traffic mixtures into equivalent annual departures of one representative aircraft. The procedure for evaluating equivalent annual departures for a given aircraft from a traffic mixture is based on the cumulative damage factor concept discussed in Appendix A.

4.4.2.3 **Counting Aircraft Operations.**

When evaluating or designing a pavement section, it is important to account for the number of times the pavement will be stressed. As discussed in paragraph 2.2, an aircraft may have to pass over a given section of pavement numerous times before the portion of pavement considered for evaluation receives one full stress application. While statistical procedures exist to determine the passes required for one full stress application, the evaluation of a pavement section for PCN determination must also consider how aircraft use the pavement in question. The FAA uses a conservative approach for pavement design procedures by assuming that each aircraft using the airport must land and take off once per cycle. Since the arrival or landing weight of the aircraft is usually less than the departure weight, the design procedure only counts one pass at the departure weight for analysis. The one pass at departure weight is considered as one annual departure and the arrival event is ignored. Appendix A provides a detailed discussion of traffic analysis.

4.5 Limitations of the PCN.

The PCN value should not be used for pavement design or as a substitute for evaluation. Pavement design and evaluation are complex engineering problems that require detailed analyses. They cannot be reduced to a single number. The PCN rating system uses a continuous scale to compare pavement capacity where higher values represent pavements with larger load capacity.

4.6 Reporting the PCN.

The PCN system uses a coded format to maximize the amount of information contained in a minimum number of characters and to facilitate computerization. The PCN for a pavement is reported as a five-part number where the following codes are ordered and separated by forward slashes: Numerical PCN value / Pavement type / Subgrade category / Allowable tire pressure / Method used to determine the PCN. An example of a PCN code is 80/R/B/W/T, which is further explained in paragraph 4.6.6.

4.6.1 Numerical PCN Value.

The PCN numerical value indicates the load-carrying capacity of a pavement in terms of a standard single wheel load at a tire pressure of 181 psi (1.25 MPa). The PCN value should be reported in whole numbers, rounding off any fractional parts to the nearest whole number. For pavements of diverse strengths, the controlling PCN numerical value for the weakest segment of the pavement should normally be reported as the strength of the pavement. Engineering judgment may be required in that if the weakest segment is not in the most heavily used part of the runway, then another representative segment may be more appropriate to determine PCN.

4.6.2 Pavement Type.

For the purpose of reporting PCN values, pavement types are considered to function as either flexible or rigid structures. Table 4-1 lists the pavement codes for the purposes of reporting PCN.

Table 4-1. Pavement Codes for Reporting PCN

Pavement Type	Pavement Code
Flexible	F
Rigid	R

4.6.2.1 Flexible Pavement.

Flexible pavements support loads through bearing rather than flexural action. They comprise several layers of selected materials designed to gradually distribute loads from the surface to the layers beneath. The design ensures that load transmitted to each successive layer does not exceed the layer's load-bearing capacity.

4.6.2.2 **Rigid Pavement.**

Rigid pavements employ a single structural layer, which is very stiff or rigid in nature, to support the pavement loads. The rigidity of the structural layer and resulting beam action enable rigid pavement to distribute loads over a large area of the subgrade. The load-carrying capacity of a rigid structure is highly dependent upon the strength of the structural layer, which relies on uniform support from the layers beneath.

4.6.2.3 **Composite Pavement.**

Various combinations of pavement types and stabilized layers can result in complex pavements that could be classified as between rigid or flexible. A pavement section may comprise multiple structural elements representative of both rigid and flexible pavements. Composite pavements are most often the result of pavement surface overlays applied at various stages in the life of the pavement structure. If a pavement is of composite construction, the pavement type should be reported as the type that most accurately reflects the **structural behavior** of the pavement. The method used in computing the PCN is the best guide in determining how to report the pavement type. For example, if a pavement is composed of a rigid pavement with a bituminous overlay, the usual manner of determining the load-carrying capacity is to convert the pavement to an equivalent thickness of rigid pavement. In this instance, the pavement type should be reported as a rigid structure. A general guideline is that when the bituminous overlay reaches 75 to 100 percent of the rigid pavement thickness the pavement can be considered as a flexible pavement. It is permissible to include a note stating that the pavement is of composite construction but only the rating type, "R" or "F", is used in the assessment of the pavement load capacity.

4.6.3 Subgrade Strength Category.

As discussed in paragraph 2.1, there are four standard subgrade strengths identified for calculating and reporting ACN or PCN values. Tables 2-1 and 2-2 list the values for rigid and flexible pavements.

4.6.4 Allowable Tire Pressure.

Table 4-2 lists the allowable tire pressure categories identified by the ACN-PCN system. The tire pressure codes apply equally to rigid or flexible pavement sections; however, the application of the allowable tire pressure differs substantially for rigid and flexible pavements.

Table 4-2. Tire Pressure Codes for Reporting PCN

Category	Code	Tire Pressure Range
Unlimited	W	No pressure limit
High	X	Pressure limited to 254 psi (1.75 MPa)
Medium	Y	Pressure limited to 181 psi (1.25 MPa)
Low	Z	Pressure limited to 73 psi (0.50 MPa)

4.6.4.1 **Tire Pressures on Rigid Pavements.**

Aircraft tire pressure will have little effect on pavements with Portland cement concrete (concrete) surfaces. Rigid pavements are inherently strong enough to resist tire pressures higher than currently used by commercial aircraft and can usually be rated as code W.

4.6.4.2 **Tire Pressures on Flexible Pavements.**

Tire pressures may be restricted on asphaltic concrete (asphalt), depending on the quality of the asphalt mixture and climatic conditions. Tire pressure effects on an asphalt layer relate to the stability of the mix in resisting shearing or densification. A poorly constructed asphalt pavement can be subject to rutting due to consolidation under load. The principal concern in resisting tire pressure effects is with stability or shear resistance of lower quality mixtures. A properly prepared and placed mixture that conforms to FAA specification Item P-401 can withstand substantial tire pressure in excess of 218 psi (1.5 Mpa). Item P-401, Hot Mix Asphalt (HMA) Pavements, is provided in the current version of AC 150/5370-10, Standards for Specifying Construction of Airports. Improperly prepared and placed mixtures can show distress under tire pressures of 100 psi (0.7 MPa) or less. Although these effects are independent of the asphalt layer thickness, pavements with well-placed asphalt of 4 to 5 inches (10.2 to 12.7 cm) in thickness can generally be rated with code X or W, while thinner pavement of poorer quality asphalt should not be rated above code Y.

4.6.5 Method Used to Determine PCN.

The PCN system recognizes two pavement evaluation methods. If the evaluation represents the results of a technical study, the evaluation method should be coded T. If the evaluation is based on “Using aircraft” experience, the evaluation method should be coded U. Technical evaluation implies that some form of technical study and computation were involved in the determination of the PCN. Using aircraft evaluation means the PCN was determined by selecting the highest ACN among the aircraft currently using the facility and not causing pavement distress. PCN values computed by the technical evaluation method should be reported to the NASR database and shown on the FAA Form 5010, Airport Master Record. Publication of a Using aircraft evaluation in the Airport Master Record, Form 5010, and the NASR database is permitted only by mutual agreement between the airport owner and the FAA.

4.6.6 Example PCN Reporting.

An example of a PCN code is 80/R/B/W/T—with 80 expressing the PCN numerical value, R for rigid pavement, B for medium strength subgrade, W for high allowable tire pressure, and T for a PCN value obtained by a technical evaluation.

4.6.7 Report PCN Values to FAA (See Appendix E).

Once a PCN value and the coded entries are determined, the PCN code should be reported to the appropriate regional FAA Airports Division, either in writing or as part of the annual update to the Airport Master Record, FAA Form 5010-l. The PCN code will be disseminated by the National Flight Data Center through aeronautical publications such as the Airport/Facility Directory (AFD) and the Aeronautical Information Publication (AIP). An aircraft's ACN can then be compared with published PCN's to determine if pavement strength places any restrictions on the aircraft operating on that pavement, such as the aircraft's tire pressure or load.

APPENDIX A. EQUIVALENT TRAFFIC

A.1 Equivalent Traffic.

A.1.1 A detailed method based on the cumulative damage factor (CDF) procedure allows the calculation of the combined effect of multiple aircraft in the traffic mix for an airport. This combined traffic is brought together into the equivalent traffic of a critical aircraft. This is necessary since the procedure used to calculate ACN allows only one aircraft at a time. By combining all of the aircraft in the traffic mix into an equivalent critical aircraft, calculation of a PCN that includes the effects of all traffic becomes possible. The methodology used to determine ACN/PCN does not consider the critical design aircraft used to determine airport dimensional requirements.

A.1.2 The assessment of equivalent traffic, as described in this section, is needed only in the process of determining PCN using the technical method and may be disregarded when the Using aircraft method is employed.

A.1.3 In order to arrive at a technically derived PCN, it is necessary to determine the maximum allowable gross weight of each aircraft in the traffic mixture, which will generate the known pavement structure. This in turn requires that the pavement cross-section and aircraft loading characteristics be examined in detail. Consequently, the information presented in this appendix appears at first to apply to pavement design rather than a PCN determination. However, with this knowledge in hand, an engineer will be able to arrive at a PCN that will have a solid technical foundation.

A.2 Equivalent Traffic Terminology.

In order to determine a PCN, based on the technical evaluation method, it is necessary to define common terms used in aircraft traffic and pavement loading. The terms arrival, departure, pass, coverage, load repetition, operation, and traffic cycle are often used interchangeably by different organizations when determining the effect of aircraft traffic operating on a pavement. It is important to determine which aircraft movements need be counted when considering pavement stress and how the various movement terms apply in relation to the pavement design and evaluation process. For the purposes of this document, they are differentiated as follows:

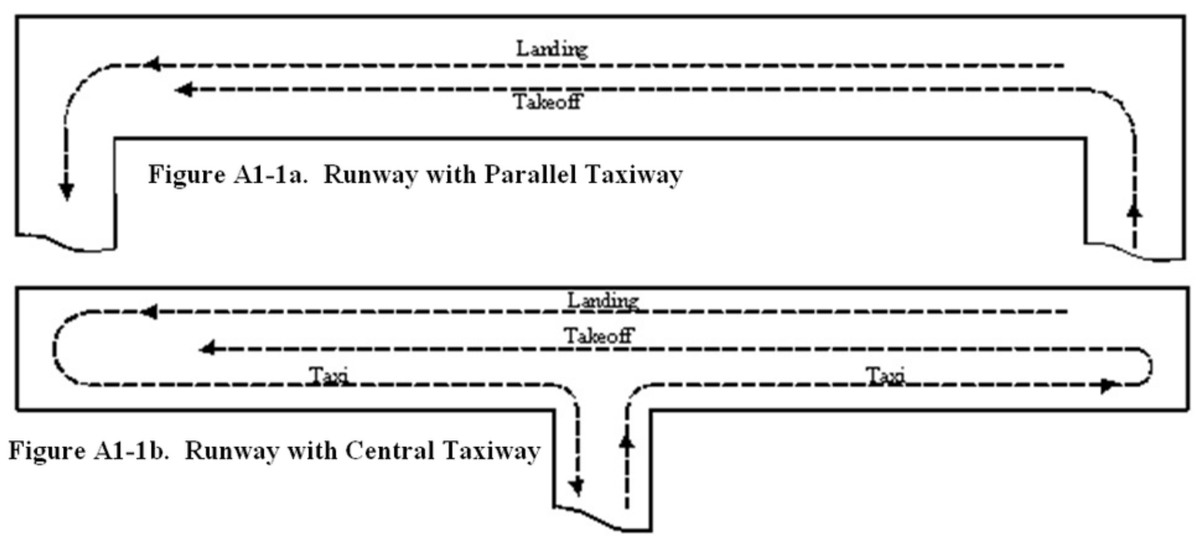
A.2.1 <u>Arrival (Landing) and Departure (Takeoff).</u>

Typically, aircraft arrive at an airport with a lower amount of fuel than is used at takeoff. As a consequence, the stress loading of the wheels on the runway pavement is less when landing than at takeoff due to the lower weight of the aircraft as a result from the fuel used during flight and the lift on the wings. This is true even at the touchdown impact in that there is still lift on the wings, which alleviates the dynamic vertical force. Because of this, the FAA pavement design procedure only considers departures and ignores the arrival traffic count. However, if the aircraft do not receive additional fuel at the airport, then the landing weight will be substantially the same as the takeoff weight (discounting the changes in passenger count and cargo), and the landing operation should be counted as a takeoff for pavement stress loading cycles. In this latter scenario, there are two equal load stresses on the pavement for each traffic count (departure), rather than just one. Regardless of the method of counting load stresses, a traffic cycle is defined as one takeoff and one landing of the same aircraft, subject to a further refinement of the definition in the following text.

A.2.2 Pass.

A pass is a one-time movement of the aircraft over the runway pavement. It could be an arrival, a departure, a taxi operation, or all three, depending on the loading magnitude and the location of the taxiways. Figure A-1 shows typical traffic patterns for runways having either parallel taxiways or central taxiways. A parallel taxiway requires that none or very little of the runway be used as part of the taxi movement. A central taxiway requires that a large portion of the runway be used during the taxi movement.

Figure A-1. Traffic Load Distribution Patterns



A.2.2.1 **Parallel Taxiway Scenario.**

In the case of the parallel taxiway, shown as Figure A1-1a in Figure A-1, two possible loading situations can occur. Both of these situations assume that the passenger count and cargo payload are approximately the same for the entire landing and takeoff cycle:

1. If the aircraft obtains fuel at the airport, then a traffic cycle consists of only one pass since the landing stress loading is considered at a reduced level, which is a fractional equivalence. For this condition only the takeoff pass is counted, and the ratio of passes to traffic cycles (P/TC) is 1.
2. If the aircraft does not obtain fuel at the airport, then both landing and takeoff passes should be counted, and a traffic cycle consists of two passes of equal load stress. In this case, the P/TC ratio is 2.

A.2.2.2 **Central Taxiway Scenario.**

For a central taxiway configuration, shown as Figure A1-1b in Figure A-1, there are also two possible loading situations that can occur. As was done for the parallel taxiway condition, both of these situations assume that the payload is approximately the same for the entire landing and takeoff cycle:

1. If the aircraft obtains fuel at the airport, then both the takeoff and taxi to takeoff passes should be counted since they result in a traffic cycle consisting of two passes at the maximum load stress. The landing pass can be ignored in this case. It is recognized that only part of the runway is used during some of these operations, but it is conservative to assume that the entire runway is covered each time a pass occurs. For this situation, the P/TC ratio is 2.
2. If the aircraft does not obtain fuel at the airport, then both the landing and takeoff passes should be counted, along with the taxi pass, and a traffic cycle consists of three passes at loads of equal magnitude. In this case, the P/TC ratio is 3.

A.2.2.3 A simplified, but less conservative, approach would be use a P/TC ratio of 1 for all situations. Since a landing and a takeoff only apply full load to perhaps the end third of the runway (opposite ends for no shift in wind direction), this less conservative approach could be used to count one pass for both landing and takeoff. However, the FAA recommends conducting airport evaluations on the conservative side, which is to assume any one of the passes covers the entire runway.

A.2.2.4 Table A-1 summarizes the standard P/TC ratio discussion.

Table A-1. Standard P/TC Ratio Summary (see Note)

Taxiway Serving the Runway	**P/TC** **Fuel Obtained at the Airport** **(i.e. departure gross weight more than arrival gross weight.)**	**P/TC** **No Fuel Obtained at the Airport** **(i.e. departure gross weight same as arrival gross weight.)**
Parallel	1	2
Central	2	3

Note: The standard P/TC ratios are whole numbers 1, 2, and 3. The range of values that can be entered in the software is 0.001 thru 10.0. This feature allows flexibility in those instances where a fraction of the total traffic may use different runways or other pavements. For example, a P/TC ratio of 0.5 multiplies the coverages of each aircraft by 0.5, which will increase the PCN of the pavement.

A.2.3 Coverage.

A.2.3.1 When an aircraft moves along a runway, it seldom travels in a perfectly straight line or over the exact same wheel path as before. It will wander on the runway with a statistically normal distribution. One coverage occurs when a unit area of the runway has been traversed by a wheel of the aircraft main gear. Due to wander, this unit area may not be covered by the wheel every time the aircraft is on the runway. The number of passes required to statistically cover the unit area one time on the pavement is expressed by the pass to coverage (P/C) ratio.

A.2.3.2 Although the terms coverage and P/C ratio have commonly been applied to both flexible and rigid pavements, the P/C ratio has a slightly different meaning when applied to flexible pavements as opposed to rigid pavements. This is due to the manner in which flexible and rigid pavements are considered to react to various types of gear configurations. For gear configurations with wheels in tandem, such as dual tandem (2D) and triple dual tandem (3D), the ratios are different for flexible and rigid pavements, and using the same term for both types of pavements may become confusing. It is incumbent upon the user to select the proper value for flexible and rigid pavements.

A.2.3.3 Aircraft passes can be determined (counted) by observation but coverages are used by the COMFAA program. The P/C ratio is necessary to convert passes to coverages for use in the program. This ratio is different for each aircraft because of the different number of wheels, main gear configurations, tire contact areas, and load on the gear. Fortunately, the P/C ratio for any aircraft is automatically determined by the COMFAA program and the user only need be concerned with passes.

A.2.4 Operation.

The meaning of this term is unclear when used in pavement design or evaluation. It could mean a departure at full load or a landing at minimal load. It is often used interchangeably with pass or traffic cycle. When this description of an aircraft activity is used, additional information should be supplied. It is usually preferable to use the more precise terms described in this section.

A.2.5 Annual Departure and Traffic Cycle Ratio.

A.2.5.1 The FAA standard for counting traffic cycles at an airport for pavement design purposes is to count one landing, one taxi, and one take-off as a single event called a departure. For pavement evaluation related to determination of PCN, it may be necessary to adjust the number of traffic cycles (departures) based upon the scenarios discussed in paragraph 1.1b of this appendix. Similar to the discussion above regarding P/C ratio, the traffic cycle to coverage (TC/C) ratio is needed to finalize the equivalent traffic determination. The TC/C ratio differs when applied to flexible pavements as opposed to rigid pavements. The ratio in flexible pavement, rather than passes to coverages, is required since there could be one or more passes per traffic cycle. When only one pass on the operating surface is assumed for each traffic count, then the P/C ratio is sufficient. However, when situations are encountered where more than one pass is considered to occur during the landing to takeoff cycle, then the TC/C ratio is necessary in order to properly account for the effects of all of the traffic. These situations occur most often when there are central taxiways or fuel is not obtained at the airport.

A.2.5.2 Equation A-1 translates the P/C ratio to the TC/C ratio for flexible and rigid pavements by including the previously described ratio of passes to traffic cycles (P/TC):

$$TC/C = P/C \div P/TC \quad \text{(Equation A-1)}$$

Where:

TC	=	Traffic Cycles
C	=	Coverages
P	=	Passes

A.2.5.3 Since the COMFAA program will automatically determine passes to coverages and convert annual departures to coverages, the conditions described in paragraph A.2.2 can be addressed by simply multiplying annual departures by the pass to traffic cycle (P/TC) ratio. COMFAA requires the P/TC ratio parameter and will automatically perform this multiplication.

A.3 Equivalent Traffic Calculations.

A.3.1 In order to complete the equivalent traffic calculations for converting one of the aircraft in the mix to another, a procedure based on cumulative damage factor (CDF) is used. The CDF method is similar to the one used in the design procedures embodied in the design program FAARFIELD, required by AC 150/5320-6, and provides more consistent results than the wheel load method (as in FAA’s CBR and Westergaard methods) when the traffic mix contains a wide range of gear geometries and strut loads. The primary difference between the CDF procedure used here and the one in FAARFIELD is that in FAARFIELD, the CDF is summed over all aircraft to produce the criterion for design whereas in the procedure used here the CDF methodology is used to convert the traffic for the complete mix into an equivalent number of coverages of one of the aircraft in the mix. That aircraft is designated the “critical” aircraft or “most demanding” aircraft for PCN determination or the “design” aircraft for thickness design (FAA’s CBR and Westergaard methods). The wheel load method is briefly described before describing the CDF method.

A.3.2 In the wheel load method, select one of the aircraft in the mix to be the critical aircraft and then convert the traffic of the remaining aircraft into equivalent traffic of the critical aircraft. First, with equation A-1, convert the traffic for the gear type of each of the conversion aircraft into equivalent traffic for the same gear type as the critical aircraft.

$$TC_{CRTGE} = TC_{CNV} \times 0.8^{(M-N)} \quad \text{(Equation A-2)}$$

Where:

TC_{CNV} = the number of traffic cycles of the conversion aircraft.

TC_{CRTGE} = the number of traffic cycles of the critical aircraft equivalent to the number of traffic cycles of the conversion aircraft due to gear type equivalency.

N = the number of wheels on the main gear of the conversion aircraft.

M = the number of wheels on the main gear of the critical aircraft.

A.3.3 Second, with equation A-3, convert the gear equivalency traffic cycles into equivalent traffic based on load magnitude.

$$\text{Log}\left(TC_{CRTE}\right) = \text{Log}\left(TC_{CRTGE}\right) \times \sqrt{\frac{W_{CRT}}{W_{CNV}}}$$

Or

$$TC_{CRTE} = \left(TC_{CRTGE}\right)^{\sqrt{W_{CRT}/W_{CNV}}} \quad \text{(Equation A-3)}$$

Where:

TC_{CRTE} = the number of traffic cycles of the critical aircraft equivalent to the number of traffic cycles of the conversion aircraft due to gear type and load magnitude equivalencies.

W_{CNV} = the wheel load of the conversion aircraft.

W_{CRT} = the wheel load of the critical aircraft.

A.3.4 Alternatively, both operations can be combined into a single equation:

$$TC_{CRTE} = \left(TC_{CNV} \times 0.8^{(M-N)}\right)^{\sqrt{W_{CRT}/W_{CNV}}} \quad \text{(Equation A-4)}$$

A.3.5 Finally, the equivalent traffic cycles of all of the conversion aircraft are added to the original traffic cycles of the critical aircraft to give the total equivalent traffic cycles of the critical aircraft.

A.3.6 In the CDF method, the number of equivalent traffic cycles of the critical aircraft is defined as the number of traffic cycles of the critical aircraft that will cause the same amount of damage to the pavement as the number of traffic cycles of the conversion aircraft, where damage is defined by CDF.

A.3.7 CDF is derived from Miner's Rule, which states the damage induced in a structural element is proportional to the number of load applications divided by the number of load applications required to fail the structural element. In airport pavement design, load applications are counted in coverages, so the relationship for calculating equivalent traffic is first derived in terms of coverages.

$$CDF_{CNV} = \frac{C_{CNV}}{C_{CNVF}} = \frac{\text{coverages of the conversion aircraft}}{\text{coverages to fail the pavement when loaded by the conversion aircraft}}$$

$$= \text{cumulative damage factor resulting from the coverages of the conversion aircraft}$$

$$CDF_{CRTE} = \frac{C_{CRTE}}{C_{CRTF}} = \frac{\text{equivalent coverages of the critical aircraft}}{\text{coverages to fail the pavement when loaded by the critical aircraft}}$$

$$= \text{cumulative damage factor resulting from the equivalent coverages of the critical aircraft}$$

A.3.8 CDF is the fraction of the total pavement life used up by operating the indicated aircraft on the pavement. It therefore follows that the CDF for the equivalent critical aircraft is equal to the CDF for the conversion aircraft. Or:

$$\frac{C_{CRTE}}{C_{CRTF}} = \frac{C_{CNV}}{C_{CNVF}}, \text{ and}$$

$$C_{CRTE} = \frac{C_{CRTF}}{C_{CNVF}} C_{CNV} \qquad \text{(Equation A-5)}$$

But:

$$TC_{CNV} = PC_{CNV} \times C_{CNV}, \text{ and}$$
$$TC_{CRTE} = PC_{CRT} \times C_{CRTE}$$

Where:

TC_{CNV} = the number of traffic cycles of the conversion aircraft.

TC_{CRTE} = the number of traffic cycles of the critical aircraft equivalent to the number of traffic cycles of the conversion aircraft.

PC_{CNV} = pass-to-coverage ratio for the conversion aircraft.

PC_{CRT} = pass-to-coverage ratio for the critical aircraft.

A.3.9 Therefore, the equivalent traffic cycles of the critical aircraft by the CDF method is given by:

$$TC_{CRTE} = \frac{PC_{CRT}}{PC_{CNV}} \frac{C_{CRTF}}{C_{CNVF}} TC_{CNV}$$ (Equation A-6)

A.3.10 Equation A-6 can be rewritten as:

$$C_{CRTEI} = C_{CRTF} \times CDF_{CNVI}$$

Where:

C_{CRTEI} = the number of equivalent coverages of the Ith aircraft in the list, including the critical aircraft.

CDF_{CNVI} = the CDF of the Ith aircraft in the list, including the critical aircraft.

A.3.11 Summing over all aircraft in the list gives the total number of equivalent coverages of the critical aircraft, $C_{CRTETotal}$, as:

$$C_{CRTETotal} = \sum_{I=1}^{N} C_{CRTEI} = \sum_{I=1}^{N} C_{CRTF} \times CDF_{CNVI} = C_{CRTF} \sum_{I=1}^{N} CDF_{CNVI}$$

Where N = the total number of aircraft in the list, including the critical aircraft.

A.3.12 Defining the total CDF for the traffic mix, CDF_T, as the total number of equivalent coverages of the critical aircraft divided by the number of coverages to failure of the critical aircraft, gives the equation:

$$CDF_T = \frac{C_{CRTETotal}}{C_{CRTF}} = \sum_{I=1}^{N} CDF_{CNVI}$$ (Equation A-7)

A.3.13 The total CDF for the traffic mix is therefore, by this definition, the sum of the CDFs of all of the aircraft in the traffic mix, including that of the critical aircraft.

A.3.14 Table A-2 shows how the above calculations are combined, using the COMFAA Life calculation with the Batch option checked, to determine the equivalent traffic cycles of the critical aircraft. The pavement is assumed to be a flexible structure 33.80 inches thick on a CBR 8 subgrade. For this example, assume that the B747-400 is the critical aircraft. Also assume that the P/TC ratio is 1.0 so Traffic Cycles equals Annual Departures. Referring to the Top table, the CDF contribution of each aircraft on the pavement is calculated by dividing 20-year Coverages (Column 7) by Life (Column 9), with results shown in the Bottom portion of the table. The B747-400 is the assumed critical aircraft, so the operations of all other aircraft are equated to the B747-400. The results are shown in Column 11 of the Bottom portion of the table. Column 11 results use equation A-6, i.e., (3000/0.6543)*Col. 10. The sum of the equivalent annual departures (Equation A-7) indicates that all other aircraft are equivalent to 468 departures of the B747-400.

Table A-2. Example of COMFAA Batch Life Calculations

Top

CBR = 8.00
Evaluation pavement thickness = 33.80 in

Results Table: Life Computations

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Col 5 Annual Deps	6D Thick	Col 7 20-yr Coverages	Life Thick	Col 9 Coverages to Failure (Life)
1	A300-B4 STD	365,747	94.00	216.1	1,500	29.86	16,456	33.80	310,137
2	A319-100 std	141,978	92.60	172.6	1,200	22.08	6,443	33.80	1,602,794.6E+003
3	Adv. B727-200 Basic	185,200	96.00	148.0	400	25.09	2,754	33.80	385,343
4	B737-300	140,000	90.86	201.0	6,000	25.19	31,003	33.80	2,730,009.4E+002
5	B747-400	877,000	93.32	200.0	3,000	33.15	34,410	33.80	52,590
6	B767-200 ER	396,000	90.82	190.0	2,000	29.44	21,813	33.80	815,894
7	B777-200 ER	657,000	91.80	205.0	300	28.87	4,375	33.80	675,096
8	DC8-63	330,000	96.12	194.0	800	28.10	9,269	33.80	1,080,551

Bottom

Col 10 = Col 7 / Col 9

Col. 1	Col 5	Col 7	Col 9	Col 10 CDF	Col 11 Equivalent Departures
A300-B4 STD	1,500	16,456	310,137	0.0531	243
A319-100 std	1,200	6,443	1.60E+09	0.0000	0
Adv. B727-200 Basic	400	2,754	385,343	0.0071	33
B737-300	6,000	31,003	2.73E+08	0.0001	1
B747-400	3,000	34,410	52,590	0.6543	3,000
B767-200 ER	2,000	21,813	815,894	0.0267	123
B777-200 ER	300	4,375	675,096	0.0065	30
DC8-63	800	9,269	1,080,551	0.0086	39
			Totals	0.7564	3,468

Example using B747-400 as the critical aircraft

Col 11 converts all to B747-400 departures

Col 11 = 3,000 multiplied by (Col 10) / 0.6543

CBR = 8.00
Evaluation pavement thickness = 33.80 in

All Departures converted to B747-400 3,468 --> 0.7564 Life
39778/52590 = 0.7564 Life

Results Table: Life Computations

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	6D Thick	20-yr Coverages	Life Thick	Coverages to Failure (Life)
5	B747-400	877,000	93.32	200.0	3,468	33.38	39,778	33.80	52,590

A.3.15 The Top portion of the table can be viewed in the Details window in the program after executing the Life function for Flexible pavement with all computation features available (shown when the "MORE" button is clicked). Pavement thickness and subgrade strength must be entered in the program for the Life function to work correctly. Results for all aircraft in the list will be computed and displayed if the Batch box is checked. Otherwise, results for only one aircraft are displayed. Detailed instructions are given later for operating the program.

A.3.16 Coverages to failure for each individual aircraft is computed in the program by changing the number of coverages for that aircraft until the design thickness by the CBR method (for flexible pavements) is the same as the evaluation pavement thickness, in this case 33.8 inches. As explained above, CDF is the ratio of applied coverages to coverages to failure, and is a measure of the amount of damage done to the pavement by that aircraft over a period of 20 years (under the assumptions implicit in the design procedure). If the CDF for any aircraft is equal to one, then the pavement is predicted to fail in 20 years if it is the only aircraft in operation. If the sum of the CDFs for all aircraft in the list is equal to one, then the pavement is predicted to fail in 20 years with all of the aircraft operating at their assumed operating weights and annual departures.

The sum of the CDFs in this example is 0.7564, indicating that the pavement is being operated under a set of conservative assumptions.

A.3.17 It should be noted that the sum of the CDFs as calculated in COMFAA do not strictly provide a prediction of pavement damage caused by the accumulation of damage from all of the aircraft because not all of the aircraft landing gears pass down the same longitudinal path. The summation given here would therefore provide a somewhat conservative result than expected. In comparison with the FAARFIELD computer program, the COMFAA values correspond to the “CDF Max for Aircraft” values from FAARFIELD. The “CDF Contribution” values from FAARFIELD are summed along defined longitudinal paths and do not correspond to the values from COMFAA, except when the Contribution and Max for Aircraft values coincide. This discussion indicates how, all other things being equal, the equivalent critical aircraft concept used in FAA’s CBR and Westergaard methods and in COMFAA, produces more conservative designs than the procedure used in FAARFIELD, and why the two methodologies can never be made to produce the same predictions of pavement life for different traffic mixes. For a new design using FAARFIELD in which the design thickness is determined based on CDF=1.0 for the traffic mix, the PCN determined from COMFAA will not reflect the true pavement design life. In this situation, consider setting the PCN = ACN of the highest using aircraft.

APPENDIX B. TECHNICAL EVALUATION METHOD—EVALUATION PAVEMENT PROPERTIES DETERMINATION

B.1 Technical Evaluation Method.

The Technical Evaluation method for determining a PCN requires pavement thickness and cross-sectional properties as well as traffic mix details.

B.2 Flexible Pavement Cross-Section Properties—Equivalent Thickness Determination.

B.2.1 For evaluation purposes, the actual thickness of the flexible pavement section under consideration must be converted to a standard flexible pavement section.. The standard section, which corresponds to the total thickness requirement calculated by the COMFAA program, assumes a defined layer thickness for the asphalt surface, a defined layer thickness of aggregate base material with a CBR 80 or higher, and a variable thickness subbase layer with a CBR 20 or greater. For flexible pavement systems, two standard structural reference sections have been defined.

B.2.2 When no aircraft in the traffic mix have four or more wheels on a main gear, the reference structure to be used is: 3 inches asphalt surface course (P401) and 6 inches crushed aggregate base course (P209). When one or more aircraft in the traffic mix have four or more wheels on a main gear, the reference structure to be used is: 5 inches asphalt surface course (P401) and 8 inches crushed aggregate base course (P209).

Reference Structural Layer Thickness (inches)	Less than Four Wheels on Main Gear	Four or More Wheels on Main Gear
Asphaltic Concrete (FAA Item P-401)	3	5
High Quality Granular Base (FAA Item P-209)	6	8

B.2.3 If the pavement has excess material or improved materials, the total pavement thickness may be increased according to the FAA CBR method summarized herein as Figures B-1 and B-2 and Table B-1. The pavement is considered to have excess asphalt, which can be converted to extra equivalent thickness, when the asphalt thickness is greater than the minimum thickness of asphalt surfacing of the referenced pavement section. The pavement may also be considered to have excess aggregate base thickness when the cross-section has a high quality crushed aggregate base thickness greater than the minimum thickness of high quality crushed aggregate base of the referenced pavement section or when other improved materials, such as asphalt stabilization or cement treated materials, are present. Likewise, additional improved base materials may also be converted to additional subbase material to add to the total pavement thickness.

B.2.4 If the evaluation pavement section is deficient for asphalt pavement surface course (i.e. less than 3 inches) and/or high quality crushed aggregate base course (i.e. less than 6 inches), the subbase thickness is reduced using a slightly more conservative inverse layer equivalency factor for surface course material and/or the subbase thickness is reduced using a slightly more conservative inverse layer equivalency factor for high quality crushed aggregate base material. This is shown in Table B-1.

Table B-1. FAA Flexible Pavement Layer Equivalency Factor Range

Structural Item	Description	Range Convert to P-209	Recommended Convert to P-209	Range Convert to P-154	Recommended Convert to P-154
P-501	Portland Cement Concrete (PCC)	--	--	--	--
P-401	Plant Mix Bituminous Pavements (HMA)	1.2 to 1.6	1.6	1.7 to 2.3	2.3
P-403	Plant Mix Bituminous Pavements (HMA)	1.2 to 1.6	1.6	1.7 to 2.3	2.3
P-306	Econocrete Subbase Course (ESC)	1.2 to 1.6	1.2	1.6 to 2.3	1.6
P-304	Cement Treated Base Course (CTB)	1.2 to 1.6	1.2	1.6 to 2.3	1.6
P-212	Shell Base Course	--	--	--	--
P-213	Sand-Clay Base Course	--	--	--	--
P-220	Caliche Base Course	--	--	--	--
P-209	Crushed Aggregate Base Course	1.0	1.0	1.2 to 1.6	1.4
P-208	Aggregate Base Course	1.0	1.0	1.0 to 1.5	1.2
P-211	Lime Rock Base Course	1.0	1.0	1.0 to 1.5	1.2
P-301	Soil-Cement Base Course	n/a	--	1.0 to 1.5	1.2
P-154	Subbase Course	n/a	--	1.0	1.0
P-501	Portland Cement Concrete (PCC)	Range Convert to P-401 2.2 to 2.5, 2.5 Recommended			

Note: Engineering judgment may be used to adjust recommended factors for all Structural Items within the ranges shown in the table. Include justification for higher or lower conversion factors than recommended factors when reporting PCN values.

B.3 Rigid Pavement Cross-Section Properties—Improved Subgrade Support Determination.

The rigid pavement characteristics—including subgrade soil modulus, k, the concrete thickness, and flexural strength—are needed for PCN determination. The foundation modulus (k value) is assigned to the material directly beneath the concrete pavement layer. However, the k value for the subgrade is determined and then adjusted to account for improved layers (subbases) between the subgrade and the concrete layer. There are k value corrections available for uncrushed aggregate subbases, crushed aggregate subbases, and subbases stabilized with asphalt cement or Portland cement. The k value may be increased according to the methods described in the FAA Westergaard method, summarized herein as Figures B-3 through B-6. The thickness of the concrete in a rigid pavement may be increased if an asphalt overlay has been placed on the surface. The thickness may be increased using the factor described in the FAA Westergaard method, summarized herein as Figure B-7. Each 2.5 inches of asphalt may be converted to 1.0 inch of concrete. The references for both improvement subgrade support guidance and additional thickness conversion guidance is summarized in Table B-2.

Table B-2. FAA Rigid Pavement Subbase Effect on Foundation k Value

FAA Pavement Layer	Effect When Uncrushed Aggregate (Bank Run Sand and Gravel) is Used as the Subbase	Effect When Well-Graded Crushed Aggregate is Used as the Subbase	Effect When Asphalt Cement or Portland Cement Stabilized Materials are Used as the Subbase
P-401 and/or P-403			Ref. Figure B-6
P-306			Ref. Figure B-6
P-304			Ref. Figure B-6
P-209		Ref. Figure B-5, Upper Graph	
P-208 and/or P-211	Ref. Figure B-5, Lower Graph		
P-301	Ref. Figure B-5, Lower Graph		
P-154	Ref. Figure B-5, Lower Graph		
	Effect on Rigid Pavement Thickness		
P-401 Overlay	Ref. Figure B-7		

B.4 Availability of Support Program to Determine Pavement Characteristics.

To facilitate the use of the ACN-PCN system, FAA developed a software application that incorporates the guidance in this appendix and determines the evaluation thickness for both flexible and rigid pavements and the foundation k value for rigid pavements. The software may be downloaded from the FAA website.[3]

B.5 Using the Support Program.

The support program is a spreadsheet, which may be updated periodically. Examples are shown in Figure C-2 and Figure C-3.

[3] See http://www.faa.gov/airports/engineering/design_software/. This software is in the public domain.

Figure B-1. Flexible Pavement Stabilized Base Layer(s) Equivalency Discussion (FAA CBR method)

320. **STABILIZED BASE AND SUBBASE.** Stabilized base and subbase courses are necessary for new pavements designed to accommodate jet aircraft weighing 100,000 pounds (45 350 kg) or more. These stabilized courses may be substituted for granular courses using the equivalency factors discussed in paragraph 322. These equivalency factors are based on research studies which measured pavement performance. See FAA Report No. FAA-RD-73-198, Volumes I, II, and III. Comparative Performance of Structural Layers in Pavement Systems. See Appendix 3. A range of equivalency factors is given because the factor is sensitive to a number of variables such as layer thickness, stabilizing agent type and quantity, location of stabilized layer in the pavement structure, etc. Exceptions to the policy requiring stabilized base and subbase may be made on the basis of superior materials being available, such as 100 percent crushed, hard, closely graded stone. These materials should exhibit a remolded soaked CBR minimum of 100 for base and 35 for subbase. In areas subject to frost penetration, the materials should meet permeability and nonfrost susceptibility tests in addition to the CBR requirements. Other exceptions to the policy requiring stabilized base and subbase should be based on proven performance of a granular material such as lime rock in the State of Florida. Proven performance in this instance means a history of satisfactory airport pavements using the materials. This history of satisfactory performance should be under aircraft loadings and climatic conditions comparable to those anticipated.

321. **SUBBASE AND BASE EQUIVALENCY FACTORS.** It is sometimes advantageous to substitute higher quality materials for subbase and base course than the standard FAA subbase and base material. The structural benefits of using a higher quality material is expressed in the form of equivalency factors. Equivalency factors indicate the substitution thickness ratios applicable to various higher quality layers. Stabilized subbase and base courses are designed in this way. Note that substitution of lesser quality materials for higher quality materials, regardless of thickness, is not permitted. The designer is reminded that even though structural considerations for flexible pavements with high quality subbase and base may result in thinner flexible pavements; frost effects must still be considered and could require thicknesses greater than the thickness for structural considerations.

a. **Minimum Total Pavement Thickness.** The minimum total pavement thickness calculated, after all substitutions and equivalencies have been made, should not be less than the total pavement thickness required by a 20 CBR subgrade on the appropriate design curve.

b. **Granular Subbase.** The FAA standard for granular subbase is Item P-154, Subbase Course. In some instances it may be advantageous to utilize nonstabilized granular material of higher quality than P-154 as subbase course. Since these materials possess higher strength than P-154, equivalency factor ranges are established whereby a lesser thickness of high quality granular may be used in lieu of the required thickness of P-154. In developing the equivalency factors the standard granular subbase course, P-154, was used as the basis. Thicknesses computed from the design curves assume P-154 will be used as the subbase. If a granular material of higher quality is substituted for Item P-154, the thickness of the higher quality layer should be less than P-154. The lesser thickness is computed by dividing the required thickness of granular subbase, P-154, by the appropriate equivalency factor. In establishing the equivalency factors the CBR of the standard granular subbase, P-154, was assumed to be 20. The equivalency factor ranges are given below in Table 3-6:

TABLE 3-6. RECOMMENDED EQUIVALENCY FACTOR RANGES FOR HIGH QUALITY GRANULAR SUBBASE

Material	Equivalency Factor Range
P-208, Aggregate Base Course	1.0 - 1.5
P-209, Crushed Aggregate Base Course	1.2 - 1.8
P-2 11, Lime Rock Base Course	1.0 - 1.5

Figure B-2. Flexible Pavement Stabilized Base Layer(s) Equivalency Discussion (Continued) (FAA CBR method)

c. **Stabilized Subbase.** Stabilized subbases also offer considerably higher strength to the pavement than P-154. Recommended equivalency factors associated with stabilized subbase are presented in Table 3-7.

TABLE 3-7. RECOMMENDED EQUWALENCY FACTOR RANGES FOR STABILIZED SUBBASE

Material	Equivalency Factor Range
P-301, Soil Cement Base Course	1.0 - 1.5
P-304, Cement Treated Base Course	1.6 - 2.3
P-306, Econocrete Subbase Course	1.6 - 2.3
P-401, Plant Mix Bituminous Pavements	1.7 - 2.3

d. **Granular Base.** The FAA standard for granular base is Item P-209, Crushed Aggregate Base Course. In some instances it may be advantageous to utilize other nonstabilized granular material as base course. Other materials acceptable for use as granular base course are as follows:

TABLE 3-8. RECOMMENDED EQUIVALENCY FACTOR RANGES FOR GRANULAR BASE

Material	Equivalency Factor Range
P-208, Aggregate Base Course	1.0'
P-21 1, Lime Rock Base Course	1.0

'Substitution of P-208 for P-209 is permissible only if the gross weight of the design aircraft is 60,000 lbs (27 000 kg) or less. In addition, if P-208 is substituted for P-209, the required thickness of hot mix asphalt surfacing shown on the design curves should be increased 1 inch (25 mm).

e. **Stabilized Base.** Stabilized base courses offer structural benefits to a flexible pavement in much the same manner as stabilized subbase. The benefits are expressed as equivalency factors similar to those shown for stabilized subbase. In developing the equivalency factors Item P-209, Crushed Aggregate Base Course, with an assumed CBR of 80 was used as the basis for comparison. The thickness of stabilized base is computed by dividing the granular base course thickness requirement by the appropriate equivalency factor. The equivalency factor ranges are given below in Table 3-9. Ranges of equivalency factors are shown rather than single values since variations in the quality of materials, construction techniques, and control can influence the equivalency factor. In the selection of equivalency factors, consideration should be given to the traffic using the pavement, total pavement thickness, and the thickness of the individual layer. For example, a thin layer in a pavement structure subjected to heavy loads spread over large areas will result in an equivalency factor near the low end of the range. Conversely, light loads on thick layers will call for equivalency factors near the upper end of the ranges.

TABLE 3-9. RECOMMENDED EQUIVALENCY FACTOR RANGES FOR STABILIZED BASE

Material	Eauivalencv Factor Range
P-304, Cement Treated Base Course	1.2 - 1.6
P-306, Econocrete Subbase Course	1.2 - 1.6
P-401, Plant Mix Bituminous Pavements	1.2 - 1.6

Note: Reflection cracking may be encountered when P-304 or P-306 is used as base for a flexible pavement. The thickness of the hot mix asphalt surfacing course should be at least 4 inches (100 mm) to minimize reflection cracking in these instances.

f. **Example.** As an example of the use of equivalency factors, assume a flexible pavement is required to serve a design aircraft weighing 300,000 pounds (91 000 kg) with a dual tandem gear. The equivalent annual departures are 15,000. The design CBR for the subgrade is 7. Item P-401 will be used for the base course and the subbase course.

Figure B-3. Rigid Pavement Stabilized Subbase Layer(s) Discussion (FAA Westergaard method)

324. GENERAL. Rigid pavements for airports are composed of Portland cement concrete placed on a granular or treated subbase course that is supported on a compacted subgrade. Under certain conditions, a subbase is not required (see paragraph 326).

325. CONCRETE PAVEMENT. The concrete surface must provide a nonskid surface, prevent the infiltration of surface water into the subgrade, and provide structural support to the aircraft. The quality of the concrete, acceptance and control tests, methods of construction and handling, and quality of workmanship are covered in Item P-501, Portland Cement Concrete Pavement.

326. SUBBASE. The purpose of a subbase under a rigid pavement is to provide uniform stable support for the pavement slabs. A minimum thickness of 4 inches (100 mm) of subbase is required under all rigid pavements, except as shown in Table 3-10 below:

TABLE 3-10. CONDITIONS WHERE NO SUBBASE IS REQUIRED

Soil Classification	Good Drainage		Poor Drainage	
	No Frost	Frost	No Frost	Frost
GW	**X**	**X**	**X**	**X**
GP	**X**	**X**	**X**	
GM	**X**			
GC	**X**			
SW	**X**			

Note: X indicates conditions where no subbase is required.

327. SUBBASE QUALITY. The standard FAA subbase for rigid pavements is 4 inches (100 mm) of Item P-154, Subbase Course. In some instances, it may be desirable to use higher-quality materials or thicknesses of P-154 greater than 4 inches (100 mm). The following materials are acceptable for use as subbase under rigid pavements:

Item P-154 – Subbase Course
Item P-208 – Aggregate Base Course
Item P-209 – Crushed Aggregate Base Course
Item P-211 – Lime Rock Base Course
Item P-304 – Cement Treated Base Course
Item P-306 – Econocrete Subbase Course
Item P-401 – Plant Mix Bituminous Pavements

Materials of higher quality than P-154 and/or greater thicknesses of subbase are considered in the design process through the foundation modulus (k value). The costs of providing the additional thickness or higher-quality subbase should be weighed against the savings in concrete thickness.

328. STABILIZED SUBBASE. Stabilized subbase is required for all new rigid pavements designed to accommodate aircraft weighing 100,000 pounds (45 400 kg) or more. Stabilized subbases are as follows:

Item P-304 – Cement Treated Base Course
Item P-306 – Econocrete Subbase Course
Item P-401 – Plant Mix Bituminous Pavements

The structural benefit imparted to a pavement section by a stabilized subbase is reflected in the modulus of subgrade reaction assigned to the foundation. Exceptions to the policy of using stabilized subbase are the same as those given in paragraph 320.

329. SUBGRADE. As with a flexible pavement, the subgrade materials under a rigid pavement should be compacted to provide adequate stability and uniform support; however, the compaction requirements for rigid pavements are not as stringent as for flexible pavement because of the relatively lower subgrade stress. For cohesive soils used in fill sections, the top 6 inches (150 mm) must be compacted to 90 percent maximum density. Fill depths

Figure B-4. Rigid Pavement Stabilized Subbase Layer(s) Discussion (Continued) (FAA Westergaard method)

greater than 6 inches (150 mm) must be compacted to 90 percent maximum density or meet the requirements of Table 3-2. For cohesive soils in cut sections, the top 6 inches (150 mm) of the subgrade must be compacted to 90 percent maximum density. For noncohesive soils used in fill sections, the top 6 inches (150 mm) of fill must be compacted to 100 percent maximum density, and the remainder of the fill must be compacted to 95 percent maximum density or meet the requirements of Table 3-2. For cut sections in noncohesive soils, the top 6 inches (150 mm) of subgrade must be compacted to 100 percent maximum density and the next 18 inches (460 mm) of subgrade must be compacted to 95 percent maximum density. Swelling soils require special considerations. Paragraph 314 contains guidance on the identification and treatment of swelling soils.

a. Contamination. In rigid pavement systems, repeated loading might cause intermixing of soft subgrade soils and aggregate base or subbase. This mixing can create voids below the pavement in which moisture can accumulate, causing pumping to occur. Chemical and mechanical stabilization of the subbase or subgrade can effectively reduce aggregate contamination (see paragraph 207). Geotextiles have been found to be effective at providing separation between fine-grained subgrade soils and pavement aggregates (FHWA-HI-90-001 Geotextile Design and Construction Guidelines). Geotextiles should be considered for separation between fine-grained soils and overlying pavement aggregates. In this application, the geotextile is not considered to act as a structural element within the pavement. Therefore, the modulus of the base or subbase is not increased when a geotextile is used for stabilization. For separation applications, the geotextile is designed based on survivability properties. FHWA-HI-90-001 contains additional information about design and construction using separation geotextiles.

330. DETERMINATION OF FOUNDATION MODULUS (k VALUE) FOR RIGID PAVEMENT. In addition to the soils survey and analysis and classification of subgrade conditions, rigid pavement design also requires the determination of the foundation modulus. The k value should be assigned to the material directly beneath the concrete pavement. However, the FAA recommends that a k value be established for the subgrade and then corrected to account for the effects of the subbase.

a. Determination of k Value for Subgrade. The preferred method of determining the subgrade modulus is by testing a limited section of embankment that has been constructed to the required specifications. The plate bearing test procedures are given in AASHTO T 222, Nonrepetitive Static Plate Load Test of Soils and Flexible Pavement Components for Use in Evaluation and Design of Airport and Highway Pavements. If the construction and testing of a test section of embankment is impractical, the values listed in Table 2-3 may be used. The values in Table 2-3, however, are approximate, and engineering judgment should be used when selecting a design value. Fortunately, rigid pavement is not overly sensitive to k value, and an error in estimating k will not have a large impact on rigid pavement thickness.

b. Determination of k Value for Granular Subbase. It is usually not practical to determine a foundation modulus on top of a subbase by testing, at least in the design phase. Usually, the embankment and subbase will not be in place in time to perform any field tests, so the k value will have to be assigned without the benefit of testing. The probable increase in k value associated with various thicknesses of different subbase materials is shown in Figure 2-4. The upper graph in Figure 2-4 should be used when the subbase is composed of well-graded crushed aggregate, such as P-209. The lower graph in Figure 2-4 applies to bank-run sand and gravel, such as P-154. Both curves in Figure 2-4 apply to unstabilized granular materials. Values shown in Figure 2-4 are guides and can be tempered by local experience.

c. Determination of k Value for Stabilized Subbase. As with granular subbase, the effect of stabilized subbase is reflected in the foundation modulus. Figure 3-16 shows the probable increase in k value with various thicknesses of stabilized subbase located on subgrades of varying moduli. Figure 3-16 is applicable to cement stabilized (P-304), Econocrete (P-306), and bituminous stabilized (P-401) layers. Figure 3-16 assumes a stabilized layer is twice as effective as well-graded crushed aggregate in increasing the subgrade modulus. Stabilized layers of lesser quality than P-304, P-306, or P-401 should be assigned somewhat lower k values. After a k value is assigned to the stabilized subbase, the concrete slab thickness design procedure is the same as that described in paragraph 331.

Figure B-5. Subbase Layer Effect on Subgrade Support, k, for Rigid Pavement (FAA Westergaard method)

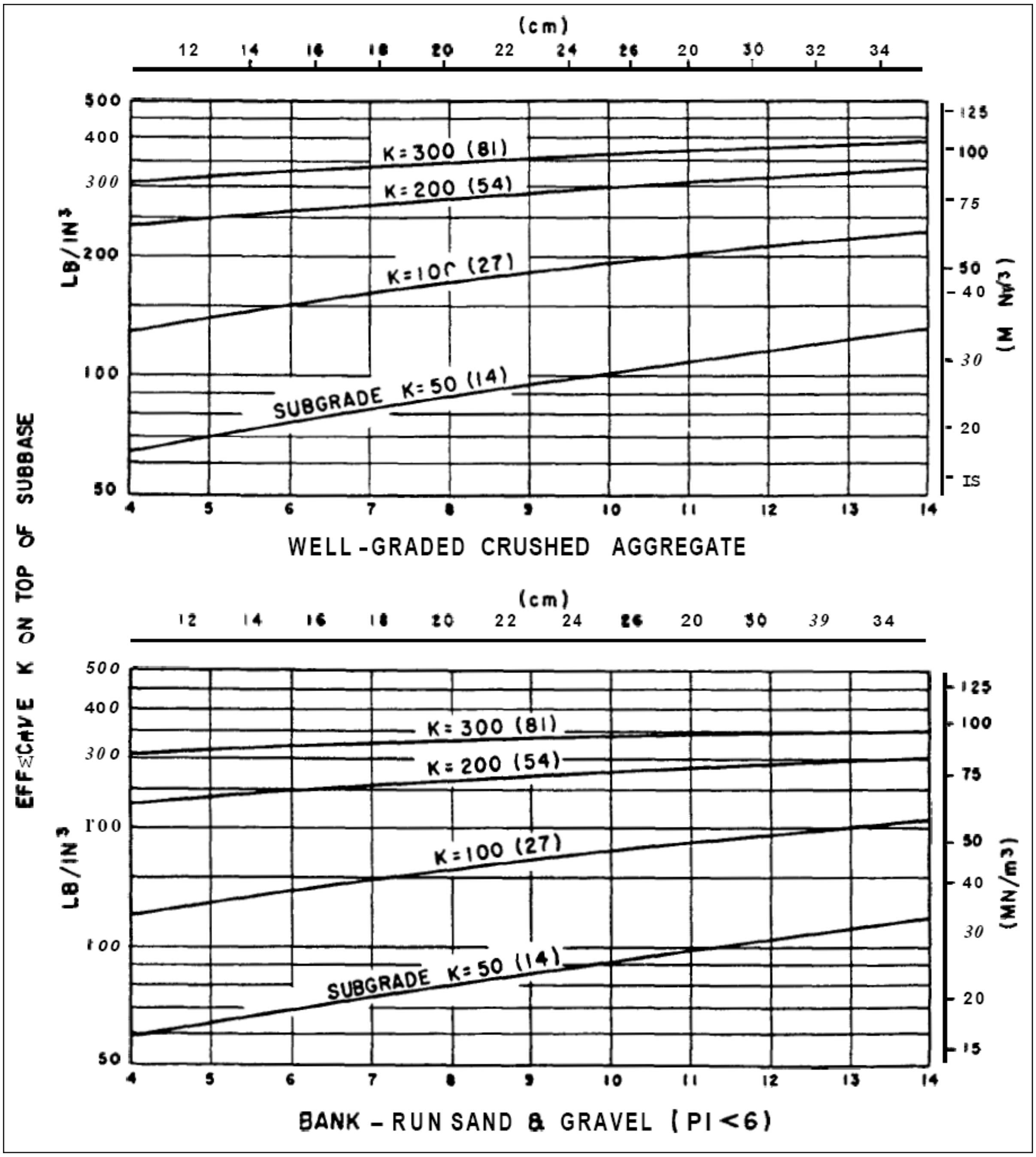


Figure B-6. Stabilized Subbase Layer Effect on Subgrade Support, k, for Rigid Pavement (FAA Westergaard method)

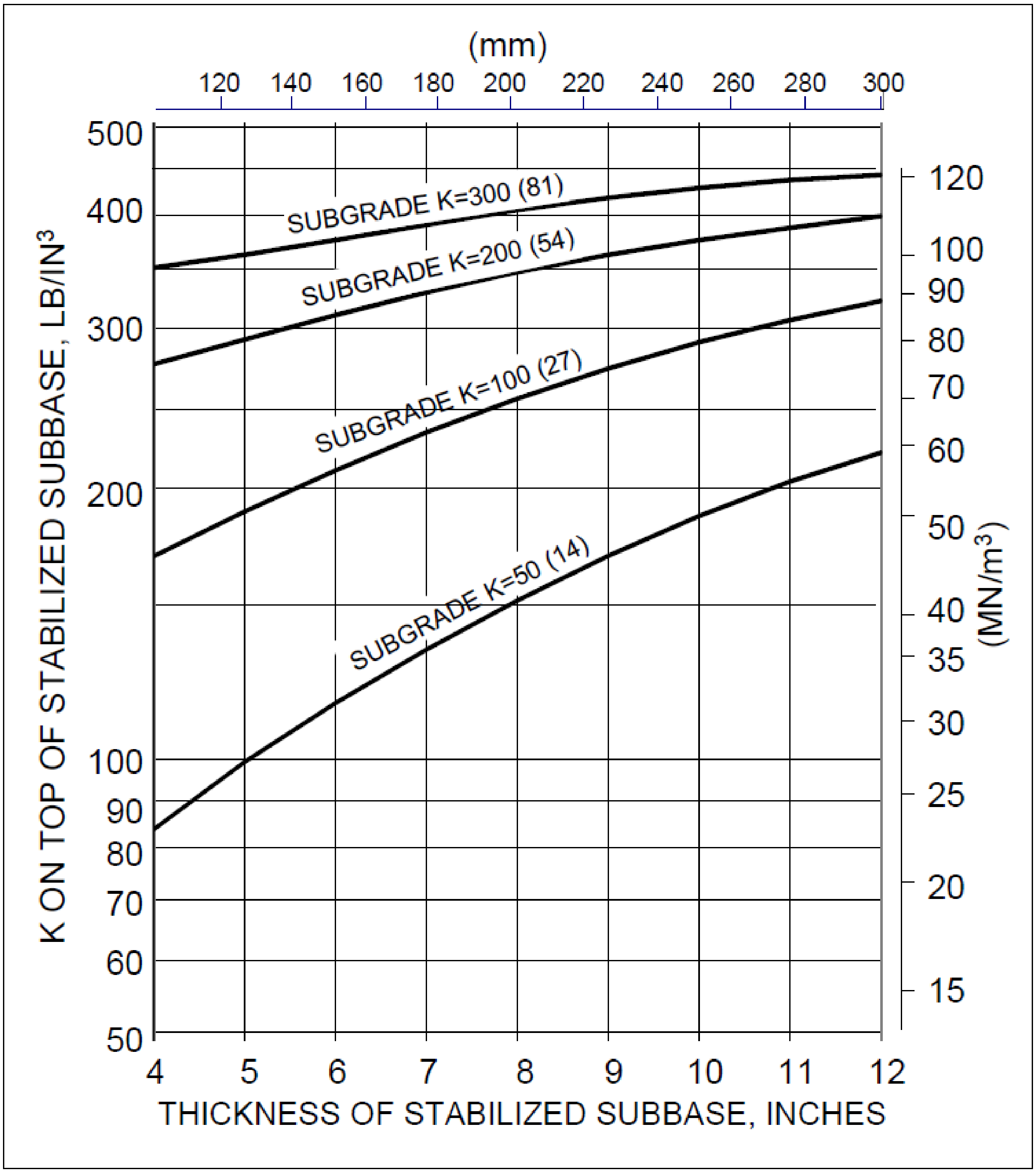


Figure B-7. Flexible Pavement quivalency to Rigid Pavement (FAA Westergaard method)

subbase must be at the equilibrium moisture content when field CBR tests are conducted. Normally, a pavement that has been in place for at least 3 years will be in equilibrium. Procedures for calculating CBR values from NDT tests are also available. Layer conversions (i.e., converting base to subbase, etc.) are largely a matter of engineering judgment. When performing the conversions, it is recommended that any converted thicknesses not be rounded off.

406. HOT MIX ASPHALT OVERLAY ON EXISTING RIGID PAVEMENT. The design of a hot mix asphalt overlay on an existing rigid pavement is also based on a thickness deficiency approach. However, new pavement thickness requirements for rigid pavements are used to compare with the existing rigid pavement. The formula for computing overlay thickness is as follows:

$$t = 2.5(Fh_d - C_b h_e)$$

Where:

t = thickness of hot mix asphalt overlay, inches (mm).

F = a factor which controls the degree of cracking in the base rigid pavement.

h_d = thickness of new rigid pavement required for design conditions, inches (mm). Use the exact value for h_d; do not round off. In calculating h_d use the k value of the existing foundation and the flexural strength of the existing concrete as design parameters.

C_b = a condition factor that indicates the structural integrity of the existing rigid pavement. Values range from 1.0 to 0.75.

h_e = thickness of existing rigid pavement, inches (mm).

a. F Factor. The "F" factor is an empirical method of controlling the amount of cracking that will occur in the rigid pavement beneath the hot mix asphalt overlay. It is a function of the amount of traffic and the foundation strength. The assumed failure mode for a hot mix asphalt overlay on a existing rigid pavement is that the underlying rigid pavement cracks progressively under traffic until the average size of the slab pieces reaches a critical value. Further traffic beyond this point results in shear failures within the foundation, producing a drastic increase in deflections. Since high strength foundations can better resist deflection and shear failure, the F factor is a function of subgrade strength as well as traffic volume. Photographs of various overlay and base pavements shown in Figure 4-2 illustrate the meaning of the F factor. Figures 4-2a, b, and c show how the overlay and base pavements fail as more traffic is applied to a hot mix asphalt overlay on an existing rigid pavement. Normally an F factor of 1.0 is recommended unless the existing pavement is in quite good condition, see paragraph 406b(1) below. Figure 4-3 should be used to determine the appropriate F factor for pavements in good condition.

b. C_b Factor. The condition factor "C_b" applies to the existing rigid pavement. The C_b factor is an assessment of the structural integrity of the existing pavement.

(1) Selection of C_b Factor. The overlay formula is rather sensitive to the C_b value. A great deal of care and judgement are necessary to establish the appropriate C_b. NDT can be a valuable tool in determining a proper value. A C_b value of 1.0 should be used when the existing slabs contain nominal structural cracking and 0.75 when the slabs contain structural cracking. The designer is cautioned that the range of C_b values used in hot mix asphalt overlay designs is different from the "C_r" values used in rigid overlay pavement design. A comparison of C_b and C_r and the recommended F factor to be used for design is shown below:

C_r	C_b	Recommended F factor
0.35 to 0.50	0.75 to 0.80	1.00
0.51 to 0.75	0.81 to 0.90	1.00
0.76 to 0.85	0.91 to 0.95	1.00
0.86 to 1.00	0.96 to 1.00	Use Figure 4.3

The minimum C_b value is 0.75. A single C_b should be established for an entire area. The C_b value should not be varied along a pavement feature. Figures 4-4 and 4-5 illustrate C_b values of 1.0 and 0.75, respectively.

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APPENDIX C. PCN DETERMINATION EXAMPLES

C.1 The Using Aircraft Method.

C.1.1 The Using aircraft method of determining PCN is presented in the following steps. This procedure can be used when there is limited knowledge of the existing traffic and runway characteristics. It is also useful when engineering analysis is neither possible nor desired. Airport authorities should be more careful in the application of a Using aircraft PCN in that the rating has not been rigorously determined.

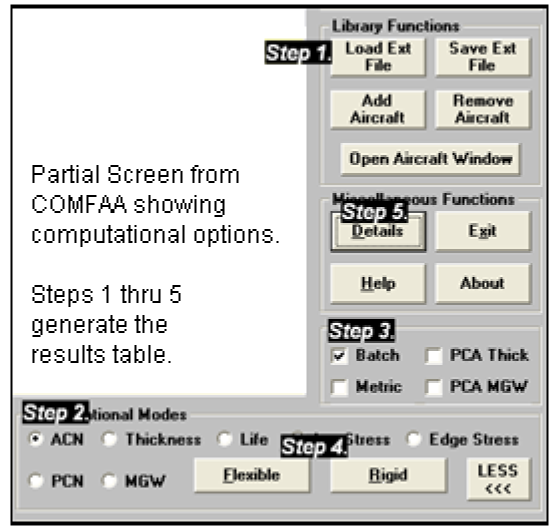
C.1.2 There are basic steps required to arrive at a Using aircraft PCN:

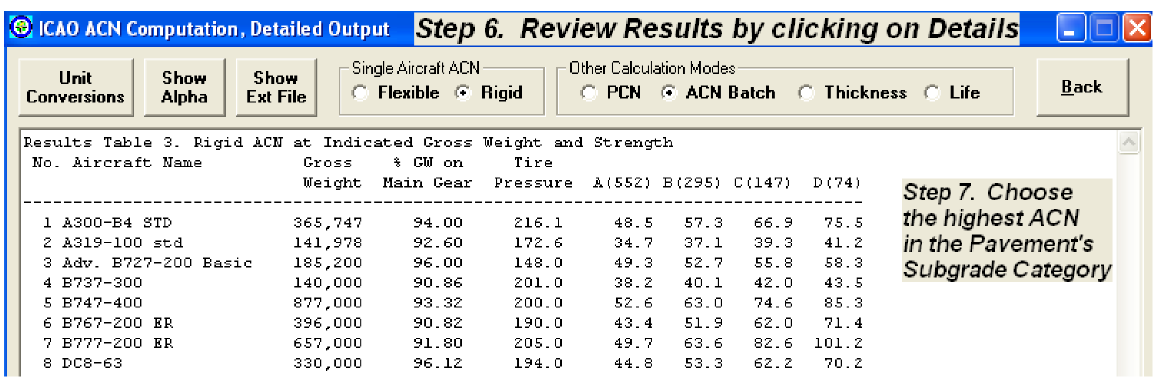
- Determine the ACN for each aircraft in the traffic mix currently using the pavement**.**
- Assign the highest ACN value as the PCN.

C.1.3 These steps are explained below in greater detail. Figure C-1 shows the steps needed to automatically perform the ACN calculations using COMFAA along with the results.

Figure C-1. Example of COMFAA ACN Batch Results

1. Load Ext file.
2. Click More to access ACN Computational Mode.
3. Check Batch.
4. Click Flexible Button or Rigid Button.
5. When calculations finish, click Details Button.
6. View results.
7. Select highest ACN for the pavement's subgrade category.





Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	A(552)	B(295)	C(147)	D(74)
1	A300-B4 STD	365,747	94.00	216.1	48.5	57.3	66.9	75.5
2	A319-100 std	141,978	92.60	172.6	34.7	37.1	39.3	41.2
3	Adv. B727-200 Basic	185,200	96.00	148.0	49.3	52.7	55.8	58.3
4	B737-300	140,000	90.86	201.0	38.2	40.1	42.0	43.5
5	B747-400	877,000	93.32	200.0	52.6	63.0	74.6	85.3
6	B767-200 ER	396,000	90.82	190.0	43.4	51.9	62.0	71.4
7	B777-200 ER	657,000	91.80	205.0	49.7	63.6	82.6	101.2
8	DC8-63	330,000	96.12	194.0	44.8	53.3	62.2	70.2

1. Assign the pavement surface type as code F or R.
2. From available records, determine the strength of the pavement subgrade. If the subgrade strength is not known, make a judgment of Medium or Low
3. Determine which aircraft has the highest ACN from the list of aircraft that regularly use the pavement, based on the surface type code assigned in Step 1 and the subgrade code in Step 2. ACN values may be determined from the COMFAA program or from ACN graphs found in the manufacturer's published ACAP manuals. Use the same subgrade code for each of the aircraft when determining the maximum ACN. Base ACNs on the highest operating weight of the aircraft at the airport if the data is available; otherwise, use an estimate or the published maximum allowable gross weight of the aircraft in question. Report the ACN from the aircraft with the highest ACN that ***regularly uses the pavement*** as the PCN for the pavement. NOTE: The FAA recommends that an aircraft be considered to 'regularly use' the pavement if the 20-year total of coverages exceeds 1,000. The number of annual departures of the aircraft corresponding to this coverage level can be obtained from COMFAA by switching to PCN or Thickness mode and entering 1000 in the 'Flex 20yr Coverages' or 'Rigid 20yr Coverages' field, as appropriate. In

COMFAA, coverages are independent of subgrade strength, so an arbitrary CBR or k value can be entered in the appropriate field to compute coverages.

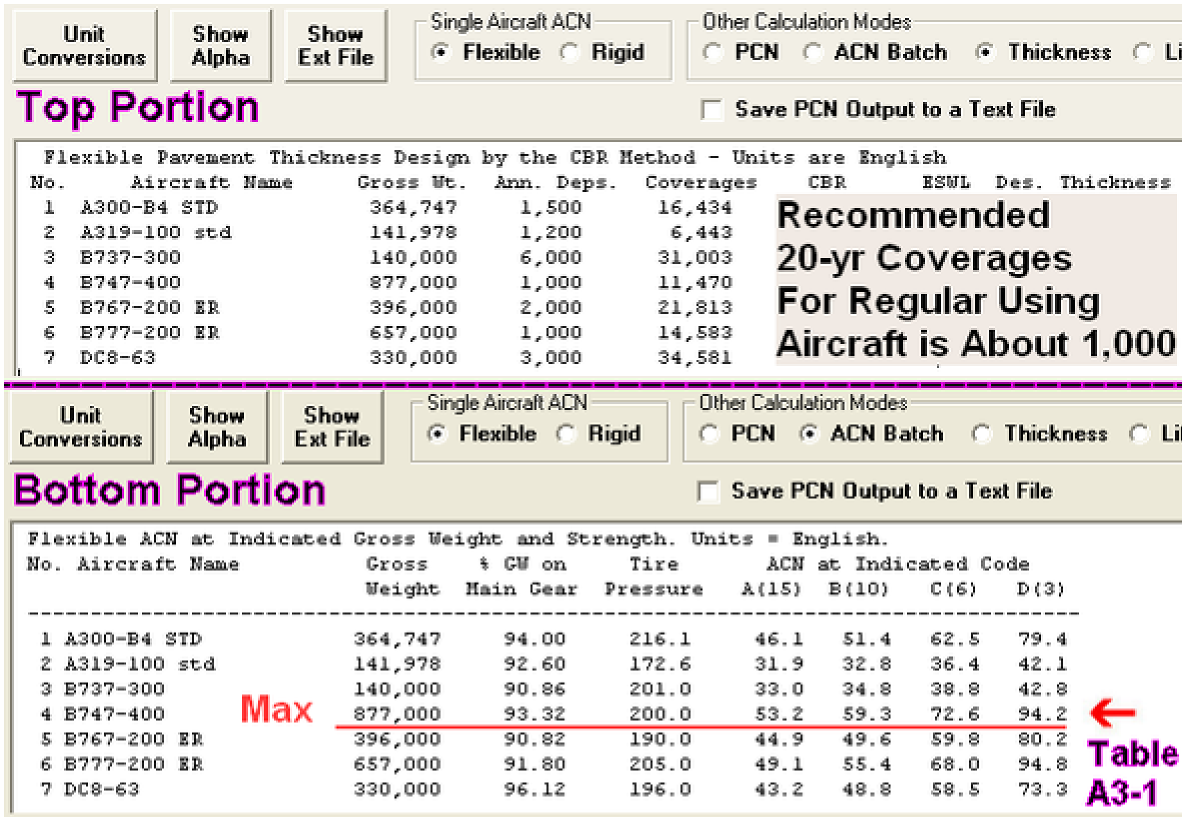
4. The PCN is simply the highest ACN with appropriate tire pressure and evaluation codes added. The numerical value of the PCN may be adjusted up or down at the preference of the airport authority. Adjustments are not considered standard practice but reasons for adjustment may include local restrictions, allowances for certain aircraft, or pavement conditions.
5. The tire pressure code (W, X, Y, or Z) should represent the highest tire pressure of the aircraft fleet currently using the pavement. For flexible pavements, code X should be used if no higher tire pressure is evident from among the existing traffic. It is commonly understood that concrete can tolerate substantially higher tire pressures, so the rigid pavement rating should normally be given as W.
6. The evaluation method for the Using aircraft method is reported as U.

C.2 Using Aircraft Example for Flexible Pavements.

C.2.1 The following example illustrates the Using aircraft PCN process for flexible pavements:

C.2.2 An airport has a runway with the known traffic mix shown in Table C-1. The runway has a flexible (asphalt-surfaced) pavement with an estimated subgrade strength of CBR 9, which puts it in subgrade category B. The flexible pavement ACNs for each aircraft in the mix are shown in Table C-1.

Table C-1. Using Aircraft and Traffic for a Flexible Pavement


Unit Conversions | Show Alpha | Show Ext File | Single Aircraft ACN: Flexible, Rigid | Other Calculation Modes: PCN, ACN Batch, Thickness, Lif

Top Portion

Save PCN Output to a Text File

Flexible Pavement Thickness Design by the CBR Method - Units are English

No.	Aircraft Name	Gross Wt.	Ann. Deps.	Coverages	CBR	ESWL	Des. Thickness
1	A300-B4 STD	364,747	1,500	16,434			
2	A319-100 std	141,978	1,200	6,443			
3	B737-300	140,000	6,000	31,003			
4	B747-400	877,000	1,000	11,470			
5	B767-200 ER	396,000	2,000	21,813			
6	B777-200 ER	657,000	1,000	14,583			
7	DC8-63	330,000	3,000	34,581			

Recommended 20-yr Coverages For Regular Using Aircraft is About 1,000

Unit Conversions | Show Alpha | Show Ext File | Single Aircraft ACN: Flexible, Rigid | Other Calculation Modes: PCN, ACN Batch, Thickness, Lif

Bottom Portion

Save PCN Output to a Text File

Flexible ACN at Indicated Gross Weight and Strength. Units = English.

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN at Indicated Code A(15)	B(10)	C(6)	D(3)
1	A300-B4 STD	364,747	94.00	216.1	46.1	51.4	62.5	79.4
2	A319-100 std	141,978	92.60	172.6	31.9	32.8	36.4	42.1
3	B737-300	140,000	90.86	201.0	33.0	34.8	38.8	42.8
4	B747-400	877,000	93.32	200.0	53.2	59.3	72.6	94.2
5	B767-200 ER	396,000	90.82	190.0	44.9	49.6	59.8	80.2
6	B777-200 ER	657,000	91.80	205.0	49.1	55.4	68.0	94.8
7	DC8-63	330,000	96.12	196.0	43.2	48.8	58.5	73.3

Max

Table A3-1

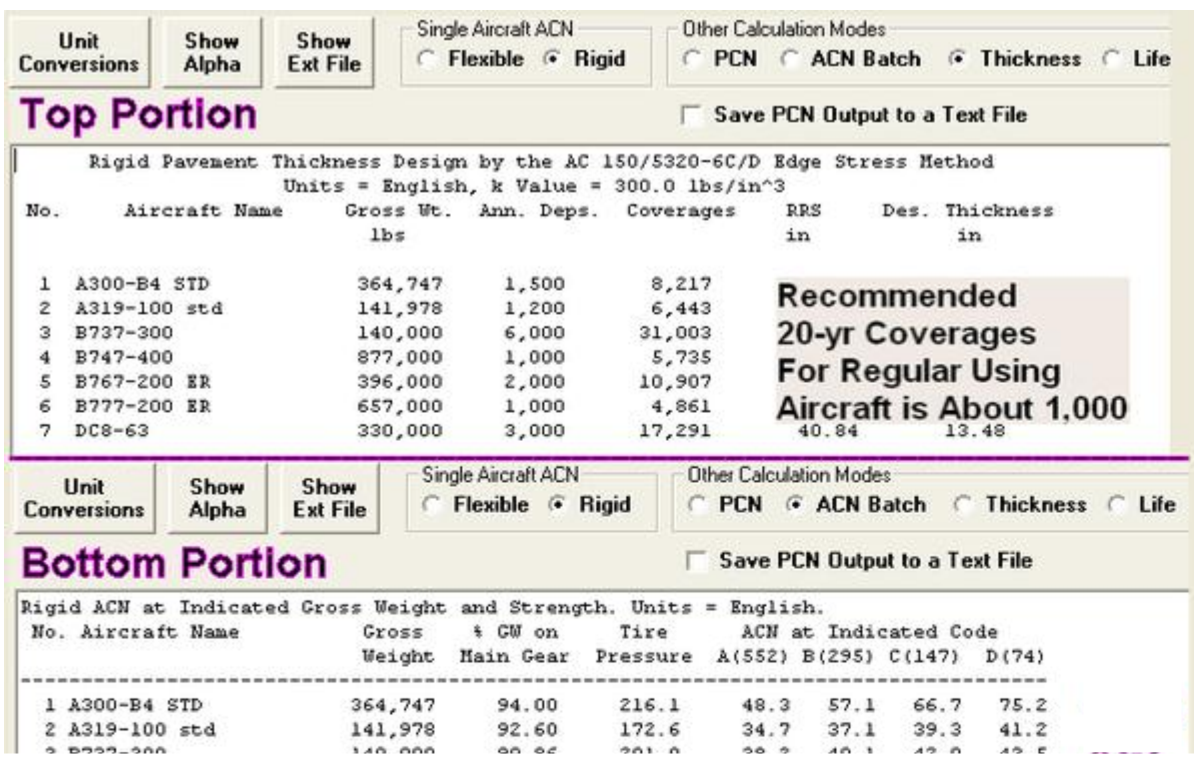
- Since this is a flexible pavement, the pavement type code is F, (Table 4-1).
- The subgrade strength under the pavement is CBR 9, or Medium category, so the appropriate code is B (Table 2-2).
- The highest tire pressure of any aircraft in the traffic mix is 216.1 psi, so the tire pressure code is X (Table 4-2).
- From the above list, the critical aircraft is the B747-400, because it has the highest ACN of the group at the operational weights shown (59.3/F/B). Additionally, it has regular service.
- Since there was minimal engineering analysis done in this example, and the rating was determined simply by examination of the current aircraft using the runway, the evaluation code from Paragraph 4.6.5 is U.
- Based on the results of the previous steps, the runway pavement should tentatively be rated as PCN 59/F/B/X/U, assuming that the pavement is performing satisfactorily under the current traffic.
- If this pavement was a taxiway, the airport could rate this taxiway as the same PCN.

C.2.3 If the pavement shows obvious signs of distress, this rating should be adjusted downward by the airport authority. If the rating is lowered, then one or more of the aircraft will have ACNs that exceed the assigned rating. This may require the airport to restrict the allowable gross weight for those aircraft or consider pavement strengthening.

C.3 Using Aircraft Example for Rigid Pavements.

An airport has a runway with the known traffic mix shown in Table C-2. The runway has a rigid (concrete-surfaced) pavement with an estimated k-value of 300 lbs/in3, which puts it in subgrade category B. The rigid pavement ACNs for each aircraft in the mix are shown in Table C-2.

Table C-2. Using Aircraft and Traffic for a Rigid Pavement



Rigid Pavement Thickness Design by the AC 150/5320-6C/D Edge Stress Method
Units = English, k Value = 300.0 lbs/in^3

No.	Aircraft Name	Gross Wt. lbs	Ann. Deps.	Coverages	RRS in	Des. Thickness in
1	A300-B4 STD	364,747	1,500	8,217		
2	A319-100 std	141,978	1,200	6,443		
3	B737-300	140,000	6,000	31,003		
4	B747-400	877,000	1,000	5,735		
5	B767-200 ER	396,000	2,000	10,907		
6	B777-200 ER	657,000	1,000	4,861		
7	DC8-63	330,000	3,000	17,291	40.84	13.48

Rigid ACN at Indicated Gross Weight and Strength. Units = English.

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN at Indicated Code A(552)	B(295)	C(147)	D(74)
1	A300-B4 STD	364,747	94.00	216.1	48.3	57.1	66.7	75.2
2	A319-100 std	141,978	92.60	172.6	34.7	37.1	39.3	41.2

- Since this is a rigid pavement, the pavement type code is *R* (Table 4-1).
- The subgrade strength under the pavement is k=300 pci, which is Medium category, so the appropriate code is B (Table 2-1).
- Concrete surfaces can tolerate high tire pressures, so tire pressure code W found in Table 4-2 should be used for rigid pavement.
- The B777-200 has the highest ACN of the group at the operational weights shown (63.6/R/B/W).

- Since there was no engineering analysis done in this example, and the rating was determined simply by examination of the current aircraft using the runway, the evaluation code from Paragraph 4.6.5 is U.
- Based on these steps, the pavement should tentatively be rated as PCN 64/R/B/W/U in order to accommodate all of the current traffic.
- If the pavement shows obvious signs of distress, this rating should be adjusted downward by the airport authority. If the rating is lowered, then one or more of the aircraft will have ACNs that exceed the assigned rating. This may require the airport to restrict the allowable gross weight for those aircraft or consideration of pavement strengthening. The rating could also be adjusted upward, depending on the performance of the pavement under the current traffic.

C.4 The Technical Evaluation Method.

Use the technical evaluation method of determining PCN when there is reliable knowledge of the existing traffic and pavement characteristics. Total thickness and cross-sectional data are needed to determine the equivalent pavement thickness as described in detail in section 2.1. Although the technical evaluation provides a good representation of existing conditions, the airport authority should recognize there are many variables in the pavement structure as well as the method of analysis itself. The objective of the technical method is to consolidate all traffic into equivalent annual departures, determine allowable gross weight, and assess the ACN for each aircraft in the traffic mixture so that a realistic PCN is selected.

Figure C-2. Flexible Layer Equivalency Spreadsheet to Support COMFAA

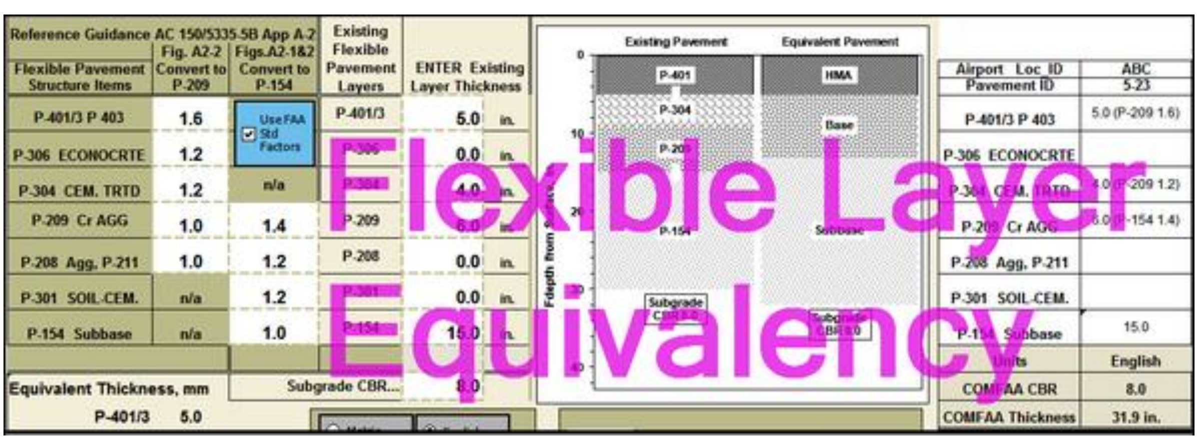
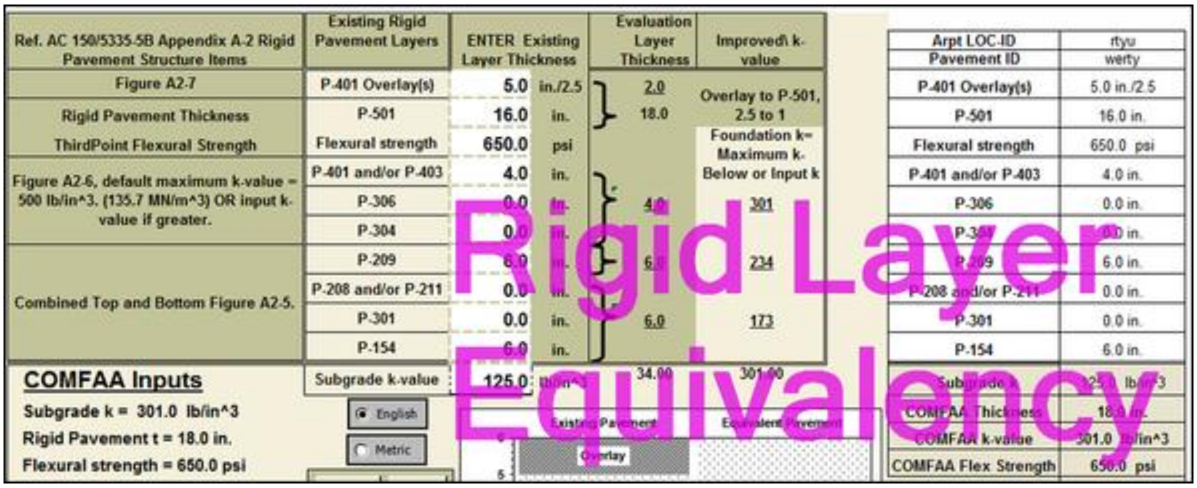


Figure C-3. Rigid Layer Equivalency Spreadsheet to Support COMFAA.



C.5 Technical Evaluation for Flexible Pavements.

C.5.1 The following list summarizes the steps for using the technical evaluation method for flexible pavements:

- Determine the traffic volume in terms of type of aircraft and number of annual departures/traffic cycles of each aircraft that the pavement will experience over its life.
- Determine the appropriate reference section to use based on the number of wheels on main gears.
- Determine pavement characteristics, including the subgrade CBR and equivalent pavement thickness.
- Calculate the maximum allowable gross weight for each aircraft on that pavement at the equivalent annual departure level.
- Calculate the ACN of each aircraft at its maximum allowable gross weight.
- Select the PCN from the ACN data provided by all aircraft.

C.5.2 These steps are explained in greater detail below. These steps are automated in the COMFAA software. The results file is presented in three tables. (This file is displayed by selecting the 'details' button in the COMFAA support spreadsheet.)

- Results Table 1 details input traffic data including thickness requirements for each aircraft at evaluation thickness and CBR.
- Results Table 2 displays the PCN values for each aircraft at the evaluation pavement thickness and subgrade CBR, where each aircraft in turn is considered the critical aircraft (i.e., all operations are converted to operations of the critical aircraft). This

table also displays the CDF value representing the damage contribution from each aircraft..

- Results Table 3 lists the ICAO standard ACN values for each aircraft in the traffic mix at the appropriate subgrade category.

C.5.3 Figure C-3 shows an example results file. Several examples using the same traffic mix with different pavement structures at the end of this section further illustrate the process.

Table C-3. Excerpt from COMFAA PCN Batch Results File for Flexible Pavement

CBR = 8.00 (Subgrade Category is C(6))
Evaluation pavement thickness = 31.90 in
Pass to Traffic Cycle (PtoTC) Ratio = 1.00
Maximum number of wheels per gear = 6
Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear. The FAA recommends a reference section assuming 5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.

Results Table 1. Input Traffic Data

Top Portion

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
[illegible]	[illegible]	365,747	94.00	216.1	1,500	16,456	29.86
2	A319-100 std	141,978	92.60	172.6	1,200	6,443	22.08
3	B737-300	140,000	90.86	201.0	6,000	31,003	25.19
4	B747-400	877,000	93.32	200.0	1,000	11,470	31.28
5	B767-200 ER	396,000	90.82	190.0	2,000	21,813	29.44
6	B777-200 ER	657,000	91.80	205.0	1,000	14,583	30.54
7	DC8-63	330,000	96.12	196.0	3,000	34,581	30.13

Results Table 2. PCN Values

Middle Portion

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	105,365	32.55	356,000	35.36	0.2580	60.3
[illegible]	[illegible]	[illegible]	32.23	139,738	27.19	0.0001	35.7
[illegible]	[illegible]	[illegible]	32.27	137,363	28.03	0.0021	37.9
4	B747-400	26,764	32.75	846,879	37.78	0.7079	68.8
5	B767-200 ER	221,077	32.45	387,137	34.60	0.1630	57.8
6	B777-200 ER	85,242	32.35	644,894	37.00	0.2826	66.0
7	DC8-63	239,928	32.44	322,435	34.27	0.2381	56.6
					Total CDF =	1.6519	

Total CDF>1

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

Bottom Portion

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	365,747	94.00	216.1	36.07	62.8
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
[illegible]	[illegible]	[illegible]	91.80	205.0	37.55	68.0
[illegible]	[illegible]	[illegible]	96.12	196.0	34.84	58.5

1. Determine the traffic volume in terms of annual departures for each aircraft that has used or is planned to use the airport during the pavement life period. Record all significant traffic, including non-scheduled, charter, and military, as accurately as possible. This includes traffic that has occurred since the original construction or last overlay and traffic that will occur before the next planned overlay or

reconstruction. If the pavement life is unknown or undetermined, assume that it will include a reasonable period of time. The normal design life for pavement is 20 years. However, the expected life can vary depending on the existing pavement conditions, climatic conditions, and maintenance practices.

2. The information necessary for the traffic volume process is—
   - Past, current, and forecasted traffic cycles of each significant aircraft.
   - Aircraft operational or maximum gross weights.
   - Typical aircraft weight distribution on the main and nose gear. If unknown, AC 150/5320-6 assumes 95 percent weight on the main gear.
   - Main gear type (dual, dual tandem, etc.).
   - Main gear tire pressure.
   - Fuel-loading practices of aircraft at the airport (P/TC ratio).
   - Type of taxiway system – parallel or central (P/TC ratio).
3. From field data or construction drawings, document the CBR of the subgrade soil. Alternatively, conduct field or laboratory tests of the subgrade soil in order to determine the CBR. Accurate portrayal of the subgrade CBR value is vital to the technical method because a small variation in CBR could result in a disproportionately large variation in the aircraft allowable gross weight and the corresponding PCN.
4. The COMFAA program calculates pavement thickness requirements based on annual departures. COMFAA allows the user to directly input either coverages or annual departures. Since the pass-to-coverage ratio for flexible pavement may be different than rigid pavement, the user must enter coverages in the appropriate location for each pavement type.
5. Determine the total pavement thickness and cross-sectional properties. The thickness of the pavement section under consideration must be converted to an equivalent pavement thickness based on a standard reference pavement section for evaluation purposes. The equivalent pavement thickness is the total thickness requirement calculated by the COMFAA program assuming minimum layer thickness for the asphalt surface, minimum base layer thickness of material with a CBR 80 or higher, and a variable subbase layer with a CBR 20 or greater. If the pavement has excess material or improved materials, the total pavement thickness may be increased according to the FAA CBR method as detailed in Appendix B. The pavement is considered to have excess asphalt, which can be converted to extra crushed aggregate equivalent thickness, when the asphalt thickness is greater than the minimum thickness of asphalt surfaced. The recommended reference section for this traffic mix is an asphalt surface course thickness of 5 inches. The pavement may also be considered to have excess crushed aggregate base thickness when the cross-section has a high quality crushed aggregate base thickness greater than 8 inches or when other improved materials such as asphalt stabilization or cement treated materials, are present. Likewise, additional subbase thickness or improved subbase materials may also be converted to additional total pavement thickness.

Using the support program facilitates converting existing pavement structures to the requisite standard equivalent structure used in COMFAA.

6. Using the annual departures and P/TC ratio for the runway, the equivalent pavement thickness, and the CBR of the subgrade, compute the maximum allowable gross weight for each aircraft at the appropriate ICAO standard subgrade support category using the COMFAA program in the pavement design mode.
7. Assign the subgrade CBR strength found in Step 2 to the appropriate standard ACN-PCN subgrade code as given in Table 2-2.
8. The ACN of each aircraft at the maximum allowable gross weight is determined from the COMFAA program in the ACN mode. Enter the allowable gross weight of the aircraft, and calculate the ACN based on the standard subgrade code corresponding to the CBR found in Step 2. Alternatively, consult an "ACN versus Gross Weight" chart as published in the manufacturer's ACAP manuals.
9. Assign the tire pressure code based on the highest tire pressure in the traffic mix from Table 4-2. Keep in mind the quality of the asphalt surface layer, as discussed in Section 2.1, when assigning this code. NOTE: Code X is recommended for pavements with 5 or more inches of EXISTING asphalt. Code Y is recommended for pavements with 3 or less inches of EXISTING asphalt.
10. When the evaluation method is technical, assign the code of *T*, as described in paragraph 4.5e.
11. The numerical value of the PCN is selected from the list of values in COMFAA Batch PCN Results Table 2. If all aircraft regularly use the airport, then select the highest PCN value correlated with the subgrade code and report it as the PCN. If some of the aircraft in the traffic mix use the airport infrequently, then further consideration must be given to the selection of the PCN. If an aircraft that operates infrequently at the airport generates a PCN value considerably higher than the rest of the traffic mix, then using this aircraft to determine the PCN may result in an unrealistic value. A more reasonable PCN can be determined if this aircraft's operations are set to 1,000 coverages.
12. If the calculated maximum allowable gross weight is equal to or greater than the critical aircraft operational gross weight required for the desired pavement life (Total CDF<1), then the pavement is capable of handling the predicted traffic for the time period established in the traffic forecast. Accordingly, the assigned PCN determined in Step 10 is sufficient. If the **allowable gross weight is less than the critical** aircraft gross weight required for the desired pavement life (Total CDF>1), then the pavement may be assigned a PCN equal to the ACN of the critical aircraft at that gross weight, but with a lower expected pavement life. Additionally, it may then be necessary to develop a relationship of allowable gross weight based on the assigned PCN versus pavement life. Appendix D provides procedures on how to relate pavement life and gross weight for flexible pavements in terms of PCN. Any overload (see Appendix D) should be treated in terms of ACN and equivalent critical aircraft operations per individual operation. Allowance for the overload should be negotiated with the airport authority since pre-approval cannot be assumed. Specific procedures on how to relate pavement life and gross weight for flexible pavements are found in Appendix D.

C.6 Technical Evaluation Examples for Flexible Pavements.

The following four examples demonstrate the technical evaluation method of determining a PCN for flexible pavements. The first example pavement is for an under-strength pavement with a traffic volume that has increased to such a level that pavement life is reduced from the original design (Total CDF > 1). The second pavement has a thickness nearly equal to the structural requirement for the 20-year traffic (Total CDF = 1). The third example pavement is the same as the first, except the taxiway has a central configuration rather than parallel, which effectively doubles the number of coverages and reduces the PCN. The fourth example demonstrates a consistent method to report PCN when the pavement under consideration contains significant excess structural capacity relative to the forecast traffic (Total CDF << 1).

C.6.1 Flexible Pavement Example 1.

C.6.1.1 An airport has a flexible (asphalt-surfaced) runway pavement with a subgrade CBR of 8 and a total thickness of 32.0 inches, as shown in Fig. C-4 (5 inch asphalt surface layer, 4 inches of stabilized base, 6 inch base layer and 17 inches subbase layer). The traffic mix is the same as in the Using Aircraft example, section 3.1. It is assumed for the purposes of this example that the traffic level is constant over the 20-year time period. Additional fuel is generally obtained at the airport before departure, and the runway has a parallel taxiway (P/TC ratio = 1). The pavement was designed for a life of 20 years. The combined thickness of the P-304 and P-209 exceeds the minimum standard for the CDF analysis method and is converted to additional P-154 as shown in Figure C-2 and Table C-4 for an equivalent pavement thickness of 31.9 inches.

Figure C-4. Screen Shot of PCN Worksheet in COMFAA Support Spreadsheet for Computing Equivalent Pavement Structure in Flexible Example 1

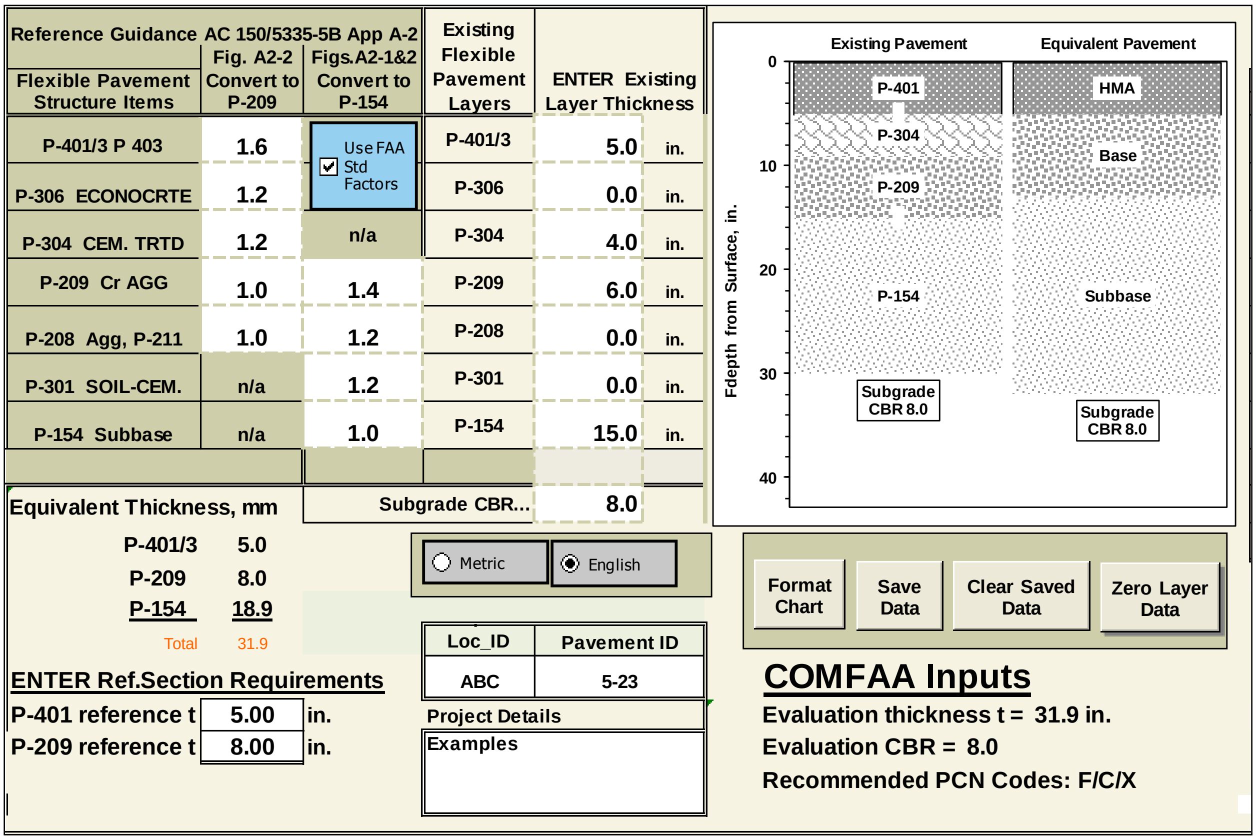


Table C-4. Conversion to Equivalent Pavement Structure in Flexible Example 1

Existing Pavement Structure. P-304 plus P-209 combined exceed P-209 requirements.	Equivalent Pavement Structure. A portion of P-304 is converted to P-209 and excess P-304 converted to P-154. This conversion results in 1.9 inches added to the equivalent pavement thickness.
5 inch asphalt surface layer (P-401) 4 inch base layer (P-304) 6 inch base layer (P-209) 17 inches subbase layer (P-154) Subgrade CBR 8	5 inch asphalt surface layer (P-401) 8 inch base layer (P-209) 20.9 inch subbase layer (P-154) 33.9 inch total thickness Subgrade CBR 8

Figure C-5. Detailed COMFAA Batch PCN Output – Flexible Example 1

CBR = 8.00 (Subgrade Category is C(6))
Evaluation pavement thickness = 31.90 in
Pass to Traffic Cycle (PtoTC) Ratio = 1.00
Maximum number of wheels per gear = 6
Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear. The FAA recommends a reference section assuming 5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	16,434	29.79
2	A319-100 std	141,978	92.60	172.6	1,200	6,443	22.08
3	B737-300	140,000	90.86	201.0	6,000	31,003	25.19
4	B747-400	877,000	93.32	200.0	1,000	11,470	31.28
5	B767-200 ER	396,000	90.82	190.0	2,000	21,813	29.44
6	B777-200 ER	657,000	91.80	205.0	1,000	14,583	30.54
7	DC8-63	330,000	96.12	196.0	3,000	34,581	30.13

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	109,787	32.54	355,252	35.31	0.2454	60.1
2	A319-100 std	>5,000,000	32.23	139,771	27.19	0.0001	35.7
3	B737-300	>5,000,000	32.27	137,402	28.03	0.0021	37.9
4	B747-400	26,559	32.73	847,310	37.80	0.7079	68.9
5	B767-200 ER	219,389	32.44	387,270	34.61	0.1630	57.8
6	B777-200 ER	84,591	32.34	645,067	37.01	0.2826	66.1
7	DC8-63	238,096	32.43	322,545	34.27	0.2381	56.6
					Total CDF =	1.6392	

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	364,747	94.00	216.1	36.00	62.5
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
6	B777-200 ER	657,000	91.80	205.0	37.55	68.0
7	DC8-63	330,000	96.12	196.0	34.84	58.5

C.6.1.2 Figure C-5 shows the results of the COMFAA Batch PCN Flexible calculations. The top portion of Figure C-5 (Results Table 1) shows the required thickness in accordance with the FAA CBR method for a flexible pavement with a CBR 8 subgrade. The B747-400 aircraft has the greatest individual pavement thickness requirement (31.3 in.) for its total traffic over 20 years. Note that the thickness requirements for several individual aircraft are approximately equal to, or slightly less than, the evaluation pavement thickness of 31.9 in. This indicates that the pavement thickness may be deficient for existing traffic.

C.6.1.3 The middle portion of Figure C-5 (Results Table 2) shows the results of the detailed method based on the cumulative damage factor (CDF) procedure that calculates the combined damage from multiple aircraft in the traffic mix. The numerical values in the CDF column represent damage to a 31.9-in. thick flexible pavement on a CBR 8 subgrade for each aircraft in the list. The total CDF represents the combined damage from this traffic. Taking each aircraft in turn as the critical aircraft, the program computes total equivalent coverages (based on a CDF analysis), the corresponding thickness for the total equivalent coverages (which is greater than the required thickness for the individual aircraft shown in Results Table 1), and a maximum allowable gross weight. The ACN of the aircraft at the maximum allowable gross weight at 10,000 coverages, at the appropriate ICAO standard CBR, is computed and reported in Results Table 2 as the PCN (last column). In this example, there are two aircraft that can load the pavement over 5,000,000 times before the pavement fails (critical aircraft total equivalent coverages > 5,000,000). These aircraft have little impact on this pavement's structural performance, and the corresponding PCNs are low. The PCN for this pavement can be reported as the highest PCN in the PCN column. Based on the information in Figure C-5, the airport may report a PCN of 69/F/C/W/T or 69/F/C/X/T.

C.6.1.4 The bottom portion of Figure C-5 shows the ICAO standard ACN of each aircraft at the input values of gross weight, percent gross weight on the main gear, and tire pressure. When the total CDF>1, as is the case in this example, at least one of the ACN values reported in Results Table 3 will exceed all of the PCN values in Results Table 2. In this example, the ACN computed for the B747 is 72.6 on subgrade category C, so the pavement does not have sufficient strength to support existing traffic.

C.6.1.5 The following notes apply when total CDF > 1:

1. At least one ACN value in Results Table 3 will be greater than all of the PCN values in Results Table 2.
2. For all aircraft, the thickness for total equivalent coverages (Column 3 in Results Table 2) will exceed the evaluation pavement thickness for the input subgrade CBR.
3. For all aircraft that have fewer than 5,000,000 total equivalent coverages as reported in Column 2 of Results Table 2, the corresponding thickness for total equivalent coverages in Column 3 will be greater than the input evaluation thickness.
4. One aircraft in the list will have the fewest equivalent coverages, greatest thickness requirement for total equivalent coverages, and greatest ACN thickness at the maximum allowable gross weight. The largest ACN thickness value in Results Table 2 (the PCN thickness value) will be less than at least one ACN thickness value in Results Table 3.

5. A project to strengthen the pavement to support forecast traffic is required.
6. An overload analysis should be performed.

C.6.2 Flexible Pavement Example 2.

C.6.2.1 This second example has the same pavement cross section and subgrade CBR as Example 1, but with reduced traffic that results in a total CDF equal to 1. As in Flexible Example 1, the taxiway has a parallel configuration (Figure A-1b) such that the P/TC ratio = 1. Since the pavement cross section is the same as in Example 1, the evaluation thickness is likewise the same (31.9 in.). The traffic is given in Table C-5.

Table C-5. Input Traffic Data for Rigid Example 1

No.	Aircraft Name	Gross Weight, lbs.	Percent GW on Main Gear	Tire Pressure, psi	Annual Departures
1	A300-B4 STD	364,747	94.00	216.1	915
2	A319-100 STD	141,978	92.60	172.6	732
3	B737-300	140,000	90.86	201.0	3,660
4	B747-400	877,000	93.32	200.0	610
5	B767-200 ER	396,000	90.82	190.0	1,220
6	B777-200 ER	657,000	91.80	205.0	610
7	DC8-63	330,000	96.12	196.0	1,830

Figure C-6. Detailed COMFAA Batch PCN Output – Flexible Example 2

```
                                       CBR = 8.00 (Subgrade Category is C(6))
               Evaluation pavement thickness = 31.90 in
         Pass to Traffic Cycle (PtoTC) Ratio = 1.00
           Maximum number of wheels per gear = 6
        Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear.  The FAA recommends a reference section assuming
5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	915	10,025	28.94
2	A319-100 std	141,978	92.60	172.6	732	3,930	21.27
3	B737-300	140,000	90.86	201.0	3,660	18,912	24.44
4	B747-400	877,000	93.32	200.0	610	6,997	30.34
5	B767-200 ER	396,000	90.82	190.0	1,220	13,306	28.65
6	B777-200 ER	657,000	91.80	205.0	610	8,896	29.90
7	DC8-63	330,000	96.12	196.0	1,830	21,095	29.41

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	66,969	31.90	364,749	36.00	0.1497	62.5
2	A319-100 std	>5,000,000	31.90	141,978	27.46	0.0001	36.4
3	B737-300	>5,000,000	31.90	140,000	28.36	0.0013	38.8
4	B747-400	16,201	31.90	877,004	38.81	0.4318	72.6
5	B767-200 ER	133,827	31.90	396,002	35.22	0.0994	59.8
6	B777-200 ER	51,600	31.90	657,002	37.55	0.1724	68.0
7	DC8-63	145,238	31.90	330,001	34.84	0.1452	58.5
					Total CDF =	0.9999	

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	364,747	94.00	216.1	36.00	62.5
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
6	B777-200 ER	657,000	91.80	205.0	37.55	68.0
7	DC8-63	330,000	96.12	196.0	34.84	58.5

C.6.2.2 Figure C-6 shows the results of the COMFAA Batch PCN Flexible calculations for Example 2. The top portion of Figure C-6 (Results Table 1) shows the required thickness using the CBR thickness design in accordance with the FAA CBR method for a flexible pavement with a CBR 8 subgrade. As in Example 1, the B747-400 aircraft has the greatest individual pavement thickness requirement (30.34 inches) for its total traffic over 20 years. In this case, all the individual aircraft thickness requirements are less than the evaluation thickness.

C.6.2.3 The middle portion of Figure C-6 (Results Table 2) shows the results of the detailed method based on the cumulative damage factor (CDF) procedure that allows the calculation of the combined effect of multiple aircraft in the traffic mix. The various columns are described in Example 1. The PCN for this pavement can be reported as the highest PCN in the last column of Results Table 2. The airport may report a PCN of 73/F/C/W/T or 73/F/C/X/T. Note that the physical structure in this case is the same as Example 1, but the PCN that can be reported is higher than in Example 1, because the technical PCN depends on the anticipated traffic as well as the structure. Results Table 3 shows that all of the aircraft have ACNs at their operating weights that are less than the reported PCN, hence no operating restrictions are needed.

C.6.2.4 Figure C-7 illustrates a useful feature of the P/TC ratio in COMFAA. In Example 1, the total CDF computed is 1.6392. To determine the reduced level of operations of the same traffic mix that would result in CDF = 1, simple take the reciprocal value of Total CDF (= 1/1.6392 = 0.61). Entering the value 0.61 in the P/TC ratio field instead of 1 results in Total CDF = 1. This allows the user to compute the PCN value applicable to the case where CDF = 1, without having to create a separate external traffic file. As shown in Example 4, this provides a consistent means of reporting PCN for pavements that are extremely strong compared to the traffic-driven structural requirement.

Figure C-7. Detailed COMFAA Batch PCN Output – Flexible Example 2, Computed Using the Traffic Mix from Example 1 and Modified P/TC Ratio

```
                                         CBR = 8.00 (Subgrade Category is C(6))
               Evaluation pavement thickness = 31.90 in
         Pass to Traffic Cycle (PtoTC) Ratio = 0.61 (non-standard)
           Maximum number of wheels per gear = 6
        Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear.  The FAA recommends a reference section assuming
5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	10,026	28.94
2	A319-100 std	141,978	92.60	172.6	1,200	3,930	21.27
3	B737-300	140,000	90.86	201.0	6,000	18,914	24.44
4	B747-400	877,000	93.32	200.0	1,000	6,997	30.34
5	B767-200 ER	396,000	90.82	190.0	2,000	13,307	28.65
6	B777-200 ER	657,000	91.80	205.0	1,000	8,897	29.90
7	DC8-63	330,000	96.12	196.0	3,000	21,096	29.41

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	66,975	31.90	364,747	36.00	0.1497	62.5
2	A319-100 std	>5,000,000	31.90	141,978	27.46	0.0001	36.4
3	B737-300	>5,000,000	31.90	140,000	28.36	0.0013	38.8
4	B747-400	16,203	31.90	876,998	38.81	0.4319	72.6
5	B767-200 ER	133,839	31.90	396,000	35.22	0.0994	59.8
6	B777-200 ER	51,605	31.90	656,999	37.55	0.1724	68.0
7	DC8-63	145,251	31.90	330,000	34.84	0.1452	58.5
					Total CDF =	1.0000	

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	364,747	94.00	216.1	36.00	62.5
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
6	B777-200 ER	657,000	91.80	205.0	37.55	68.0
7	DC8-63	330,000	96.12	196.0	34.84	58.5

C.6.2.5 The following notes apply when total CDF = 1:

1. For all aircraft, the thickness for total equivalent coverages (Results Table 2, Column 3) will be the same as the COMFAA evaluation thickness.
2. All maximum allowable gross weights in Results Table 2 will be approximately the same as the COMFAA input gross weights and ACN weights in Results Table 3.
3. All PCN values in Results Table 2 will be the same as the ACN values in Results Table 3.

C.6.3 Flexible Pavement Example 3.

C.6.3.1 The only change in this example from the second example is that the taxiway has a central configuration rather than parallel, such as that shown in Figure A-1b. Figure C-8 shows the effect when the P/TC ratio changes from 1 to 2, which results in double the number of coverages for each aircraft in the traffic mix. As expected, the required total pavement thickness for each aircraft in the traffic mix has increased. The B747-400 aircraft still has the greatest individual pavement thickness requirement (31.64 inches) for its total traffic over 20 years. Note the thickness requirements for the B747-400 now approaches the evaluation thickness (31.9 in.).

C.6.3.2 Referring to the results Table 2 in the middle portion of the output, only the B737-300 and the A319-100 std airplanes have little impact on this pavement's performance. It is apparent the pavement is not adequate to accommodate the existing traffic. As expected, changing the taxiway system from parallel to central has lowered the PCN of the pavement by effectively doubling traffic volume. The airport may report 68/F/C/W/T or 68/F/C/X/T. The ACN of two aircraft, the B747-400 and the B777-200 ER exceed the pavement PCN and the airport should plan for a pavement strengthening project or consider placing restrictions on those aircraft. The net effect of the change in taxiway configuration from that of Example 2 is the reduction by 5 in the PCN.

Figure C-8. Detailed COMFAA Batch PCN Output – Flexible Example 3

CBR = 8.00 (Subgrade Category is C(6))
Evaluation pavement thickness = 31.90 in
Pass to Traffic Cycle (PtoTC) Ratio = 2.00
Maximum number of wheels per gear = 6
Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear. The FAA recommends a reference section assuming 5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	915	20,049	30.12
2	A319-100 std	141,978	92.60	172.6	732	7,860	22.39
3	B737-300	140,000	90.86	201.0	3,660	37,824	25.48
4	B747-400	877,000	93.32	200.0	610	13,993	31.64
5	B767-200 ER	396,000	90.82	190.0	1,220	26,612	29.74
6	B777-200 ER	657,000	91.80	205.0	610	17,792	30.78
7	DC8-63	330,000	96.12	196.0	1,830	42,189	30.40

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	133,940	32.78	351,734	35.05	0.2994	59.2
2	A319-100 std	>5,000,000	32.35	138,930	27.09	0.0001	35.4
3	B737-300	>5,000,000	32.41	136,414	27.90	0.0026	37.5
4	B747-400	32,402	33.06	836,402	37.42	0.8637	67.5
5	B767-200 ER	267,653	32.66	383,894	34.37	0.1988	57.0
6	B777-200 ER	103,201	32.51	640,694	36.82	0.3448	65.4
7	DC8-63	290,476	32.63	319,773	34.07	0.2905	56.0
					Total CDF =	1.9999	

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	364,747	94.00	216.1	36.00	62.5
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
6	B777-200 ER	657,000	91.80	205.0	37.55	68.0
7	DC8-63	330,000	96.12	196.0	34.84	58.5

C.6.4 Flexible Pavement Example 4.

C.6.4.1 In some cases, the pavement to be evaluated has significant excess structural capacity compared with the requirement due to forecast traffic. This situation may arise, for example, when an overlay is added for non-structural purposes, or in cold climates where a very thick subbase may be needed to provide frost protection on a frost-susceptible subgrade. This example shows a consistent way to report PCN for flexible pavements that are extremely strong with respect to the input traffic (total CDF<<1). In Figure C-9, the pavement from Example 1 has been strengthened with a 2-inch overlay. Assuming a reference section with 5 inches of P-401 and 8 inches of P-209, the evaluation thickness for COMFAA is 36.4 inches (versus 31.9 in. prior to the overlay).

C.6.4.2 Figure C-10 shows the COMFAA output when PCN is computed using the evaluation thickness 36.4 in. and P/TC=1. For the overlaid pavement subject to the forecast traffic, total CDF is much less than 1 (total CDF= 0.0355), indicating that the 20-year traffic mix causes insignificant damage to the pavement. Similarly, the largest value of thickness for total equivalent coverages in Results Table 2 is much less than the COMFAA evaluation thickness at the evaluation CBR. Hence, it is necessary to use an unrealistic allowable gross weight for the critical aircraft to compute PCN. Using the regular COMFAA procedure without adjustment, the airport could report PCN=97/F/C/X/T for this pavement. However, this PCN is based on an unrealistically high allowable gross weight for the B747-400 (1,060,338 lbs.).

Figure C-9. Screen Shot of Flexible PCN Tab in COMFAA Support Spreadsheet for Computing Equivalent Pavement Structure in Flexible Example 4. The structure is the same as Example 1, but with a 2-inch HMA overlay, for a total P-401 thickness of 7 inches.

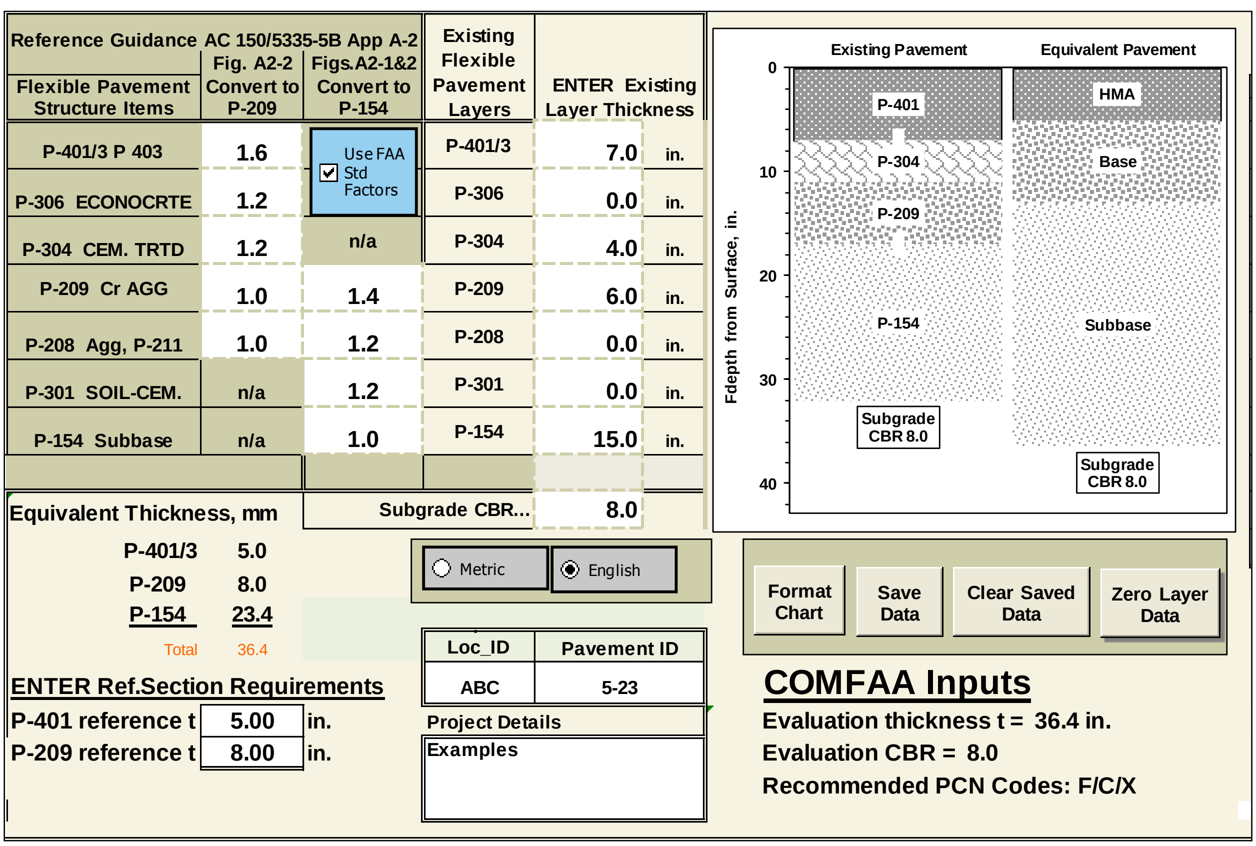


Figure C-10. Detailed COMFAA Batch PCN Output – Flexible Example 4 (unadjusted)

```
                                    CBR = 8.00 (Subgrade Category is C(6))
              Evaluation pavement thickness = 36.40 in
        Pass to Traffic Cycle (PtoTC) Ratio = 1.00
          Maximum number of wheels per gear = 6
       Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear.  The FAA recommends a reference section assuming
5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	16,434	29.79
2	A319-100 std	141,978	92.60	172.6	1,200	6,443	22.08
3	B737-300	140,000	90.86	201.0	6,000	31,003	25.19
4	B747-400	877,000	93.32	200.0	1,000	11,470	31.28
5	B767-200 ER	396,000	90.82	190.0	2,000	21,813	29.44
6	B777-200 ER	657,000	91.80	205.0	1,000	14,583	30.54
7	DC8-63	330,000	96.12	196.0	3,000	34,581	30.13

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	264,870	33.56	406,912	39.00	0.0022	73.3
2	A319-100 std	>5,000,000	35.66	146,714	28.03	0.0000	37.9
3	B737-300	>5,000,000	35.35	147,191	29.27	0.0000	41.3
4	B747-400	12,676	31.46	1,060,338	44.83	0.0321	96.9
5	B767-200 ER	1,036,028	34.02	431,320	37.67	0.0007	68.4
6	B777-200 ER	>5,000,000	36.24	660,776	37.72	0.0000	68.6
7	DC8-63	2,881,679	34.56	354,742	36.67	0.0004	64.9
					Total CDF =	0.0355	

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	364,747	94.00	216.1	36.00	62.5
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
6	B777-200 ER	657,000	91.80	205.0	37.55	68.0
7	DC8-63	330,000	96.12	196.0	34.84	58.5

C.6.4.3 The regular COMFAA procedure given in section 2.1 is most suitable when the total CDF > 0.15. When the procedure results in CDF < 0.15, as in this example, the FAA recommends adjusting the input traffic such that the PCN is reported for a total CDF = 0.150. Rather than modifying the COMFAA external aircraft file, the P/TC ratio can be used to obtain total CDF=0.150 as follows.

1. Perform a PCN Flexible Batch operation using the appropriate P/TC ratio based on the criteria in Appendix A.
2. Note the value of Total CDF in Results Table 2.
3. Multiply the original value of P/TC ratio by the factor 0.15/Total CDF, where Total CDF is taken from Step 2.

4. Enter the new value of P/TC ratio in the P/TC field in COMFAA.
5. Repeat the PCN Flexible Batch operation with the new value of P/TC ratio. This will result in a new Total CDF equal to or close to 0.15.
6. Note that the maximum value of P/TC ratio allowed in COMFAA is 10. This should be sufficient in most cases. However, if the value computed in Step 3 exceeds 10, increasing the annual departures of all input aircraft by a factor of 10 and repeating steps 1 through 5 will generally result in Total CDF=0.150.

C.6.4.4 Figure C-11 shows a re-analysis of the overlaid pavement using an adjusted value of the P/TC ratio equal to $1 \times 0.15 / 0.0355 = 4.225$. As indicated in Results Table 2, the adjusted Total CDF = 0.15. The airport can report PCN=84/F/C/X/T at Total CDF=0.150, based on a more reasonable maximum allowable gross weight of the B747-400. Results Table 3 shows that all aircraft in the existing mix operate at ACNs much lower than the reported PCN. There is no need to report a PCN higher than 84/F/C/X/T.

Figure C-11. Detailed COMFAA Batch PCN Output – Flexible Example 4 (with adjustment to P/TC ratio to force Total CDF = 0.15)

CBR = 8.00 (Subgrade Category is C(6))
Evaluation pavement thickness = 36.40 in
Pass to Traffic Cycle (PtoTC) Ratio = 4.23 (non-standard)
Maximum number of wheels per gear = 6
Maximum number of gears per aircraft = 4

At least one aircraft has 4 or more wheels per gear. The FAA recommends a reference section assuming 5 inches of HMA and 8 inches of crushed aggregate for equivalent thickness calculations.

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	69,439	31.95
2	A319-100 std	141,978	92.60	172.6	1,200	27,223	24.22
3	B737-300	140,000	90.86	201.0	6,000	131,000	27.19
4	B747-400	877,000	93.32	200.0	1,000	48,465	33.68
5	B767-200 ER	396,000	90.82	190.0	2,000	92,169	31.43
6	B777-200 ER	657,000	91.80	205.0	1,000	61,620	32.06
7	DC8-63	330,000	96.12	196.0	3,000	146,118	31.91

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	A300-B4 STD	1,119,172	34.97	385,072	37.46	0.0093	67.7
2	A319-100 std	>5,000,000	36.02	144,426	27.75	0.0000	37.2
3	B737-300	>5,000,000	35.85	143,697	28.83	0.0000	40.1
4	B747-400	53,559	33.83	963,201	41.69	0.1357	83.8
5	B767-200 ER	4,377,664	35.19	413,121	36.42	0.0032	64.0
6	B777-200 ER	>5,000,000	36.32	658,812	37.63	0.0000	68.3
7	DC8-63	>5,000,000	35.48	342,077	35.74	0.0018	61.6
					Total CDF =	0.1499	

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on C(6)
1	A300-B4 STD	364,747	94.00	216.1	36.00	62.5
2	A319-100 std	141,978	92.60	172.6	27.46	36.4
3	B737-300	140,000	90.86	201.0	28.36	38.8
4	B747-400	877,000	93.32	200.0	38.81	72.6
5	B767-200 ER	396,000	90.82	190.0	35.22	59.8
6	B777-200 ER	657,000	91.80	205.0	37.55	68.0
7	DC8-63	330,000	96.12	196.0	34.84	58.5

C.7 Technical Evaluation for Rigid Pavements.

C.7.1 The following list summarizes the steps for using the technical evaluation method for rigid pavements:

- Determine the traffic volume in terms of type of aircraft and number of annual departures of each aircraft.
- Determine the pavement characteristics, including subgrade soil modulus, k, and the concrete thickness and flexural strength.
- Perform the CDF calculations to determine the maximum allowable gross weight for each aircraft on that pavement at the equivalent annual departure level.

- Calculate the ACN of each aircraft at its maximum allowable gross weight. Select the PCN from the ACN data provided by all aircraft.

C.7.2 The above steps are explained in greater detail:

C.7.2.1 Determine the traffic volume in the same fashion as noted in Paragraph C.6 for flexible pavements.

1. From field data or construction drawings, document the k value of the subgrade soil. Alternatively, conduct field or laboratory tests of the subgrade soil in order to determine the k value. Accurate portrayal of the subgrade k value is vital to the technical method because a small variation in k value could result in a disproportionately large variation in the aircraft allowable gross weight and the corresponding PCN.
2. Using COMFAA, input annual departure level for each aircraft, input the Pass/Traffic cycle ratio (P/TC) for the runway.
3. The rigid design procedure implemented in the COMFAA program calculates pavement thickness requirements based on the concrete edge stress, which is in turn dependent on load repetitions of the total traffic mix. It is therefore a requirement to convert traffic cycles or passes to coverages repetitions by using a pass-to-coverage ratio. P/C ratios for any aircraft on rigid pavement are calculated in the COMFAA program. COMFAA allows the user to directly input annual departures or coverages and will use aircraft-specific pass-to-coverage ratios to automatically convert to coverages for calculation purposes. Since the pass-to-coverage ratio for rigid pavement may be different than flexible pavement, the user must enter coverages in the appropriate location for each pavement type.
4. Obtain the pavement characteristics including the concrete slab thickness, the concrete modulus of rupture, and average modulus, k-value, of the subgrade. Concrete elastic modulus is set at 4,000,000 psi and Poisson's ratio is set at 0.15 in the COMFAA program. Accurate subgrade modulus determination is important to the technical method, but small variations in the modulus will not affect the PCN results in a disproportionate manner. This is in contrast to flexible pavement subgrade modulus in which strength variations have a significant effect on PCN. If the pavement has a subbase course and/or stabilized subbase layers, then the subgrade modulus is adjusted upwards in the rigid design procedure to an equivalent value in order to account for the improvement in support. Subgrade modulus adjustments are made based on the FAA Westergaard method guidance included herein as Figures B-4 through B-7 and summarized in Table B-2.
5. Using the known slab thickness modified based on overlays (see Figure B-7), subgrade modulus modified based on improvements gained from subbase course(s) (see Figures B-4 and B-6), P/TC ratio for the runway, each individual aircraft's annual departure level, and each aircraft's

parameters, compute the maximum allowable gross weight of each aircraft using the COMFAA program in the pavement design mode.

6. Assign the subgrade modulus (k-value) to the nearest standard ACN-PCN subgrade code. The k-value to be reported for PCN purposes is the improved k-value seen at the top of all improved layers (k-value directly beneath the concrete layer). Subgrade codes for k-value ranges are found in Table 2-1.
7. The ACN of each aircraft may now be determined from the COMFAA program. COMFAA calculates the ACN for the appropriate subgrade codes using the allowable gross weight of each aircraft. Alternatively, consult an “ACN versus Gross Weight” chart as published in the manufacturer’s ACAP manual.
8. Assign the tire pressure code based on the highest tire pressure in the traffic mix from Table 4-2. Since rigid pavements are typically able to handle high tire pressures code W can usually be assigned.
9. The evaluation method is technical, so the code T will be used as discussed in Paragraph 4.6.5.
10. The numerical value of the PCN is selected from the list of ACN values resulting from Step 6 from all aircraft. If all aircraft regularly use the airport, then select the highest ACN value and report it as the PCN. If some of the aircraft in the traffic mix use the airport infrequently, then further consideration must be given to the selection of the PCN. If an aircraft that operates infrequently at the airport generates a PCN value considerably higher than the rest of the traffic mix, then reporting the ACN of this aircraft as the PCN will require a change to the PCN if the aircraft’s usage changes.

    Note: The recommended frequency for regularly using aircraft is equivalent to about 20-yr coverages of 1,000.
11. The numerical value of the PCN is the same as the numerical value of the ACN of the critical aircraft just calculated in Step 7.
12. If the allowable maximum gross weight of Step 11 is equal to or greater than the critical aircraft operational gross weight required for the desired pavement life, then the pavement is capable of handling the predicted traffic for the time period established in the traffic forecast. Accordingly, the assigned PCN determined in Step 11 is sufficient. If the allowable gross weight from Step 11 is less than the critical aircraft gross weight required for the desired pavement life, then the pavement may be assigned a PCN equal to the ACN of the critical aircraft at that gross weight, but with a reduced pavement life. Additionally, it may then be necessary to develop a relationship of allowable gross weight based on the assigned PCN versus pavement life. Appendix D provides procedures on how to relate pavement life and gross weight for rigid pavements in terms of PCN. Any overload (see Appendix D) should be treated in terms of ACN and equivalent critical aircraft operations

per individual operation. Allowances for overloads must be approved by the airport owner on a case by case basis.

C.8 Technical Evaluation Examples for Rigid Pavements.

The following four examples help explain the technical evaluation method of determining a PCN for rigid pavements. The first example pavement is under-designed and the traffic volume has increased to such a level that pavement life is reduced from the original design (Total CDF > 1). The second pavement has more than adequate strength to handle the forecasted traffic (Total CDF < 1). The third example pavement is the same as number two, except that the aircraft generally do not obtain fuel at the airport. The fourth example demonstrates a consistent method to report PCN when the pavement under consideration contains significant excess structural capacity relative to the forecast traffic (Total CDF << 1).

C.8.1 Rigid Pavement Example 1 (Total CDF>1).

C.8.1.1 An airport has a rigid (concrete surfaced) runway pavement with a subgrade *k*-value of 100 pci and a slab thickness of 14.5 inches, with an existing cross section as shown in the lower right portion of Figure C-12. The concrete has a flexural strength of 650 psi. The runway has a parallel taxiway, and additional fuel is obtained at the airport before departure. The pavement life is estimated to be 20 years from the original construction. The traffic shown in Table C-6 regularly uses the pavement. Table C-7 summarizes the existing rigid structure and the computation of the improved *k*-value for input into COMFAA.

Table C-6. Input Traffic Data for Rigid Example 1

No.	Aircraft Name	Gross Weight, lbs.	Percent GW on Main Gear	Tire Pressure, psi	Annual Departures
1	A300-B4 STD	364,747	94.00	216.1	1,500
2	A319-100 STD	141,978	92.60	172.6	1,200
3	B737-300	140,000	90.86	201.0	6,000
4	B747-400	877,000	93.32	200.0	1,000
5	B767-200 ER	396,000	90.82	190.0	2,000
6	B777-200 ER	657,000	91.80	205.0	1,000
7	DC8-63	330,000	96.12	196.0	3,000

Table C-7. Conversion to Equivalent Pavement Structure in Rigid Example 1.

Existing Pavement Structure	Equivalent Pavement Structure
Existing top-of-subgrade *k*-value = 100 pci	4 inch P-403 improves *k*-value to 287 pci 12 inch P-209 improves *k*-value to 215 pci
14.5 inch concrete layer (P-501) 4 inch HMA stabilized subbase layer (P-403) 12 inch crushed aggregate subbase (P-209) Subgrade *k*-value 100 pci Concrete strength 650 psi	14.5 inch concrete layer (P-501) *k*-value 287 pci Concrete strength 650 psi

C.8.1.2 The number of load repetitions depends on the number of traffic cycles, which is calculated using Equation A-1 and then converted to coverages in the COMFAA program. Since additional fuel is generally obtained at the airport, and there is a parallel taxiway, P/TC = 1. This value is entered in the appropriate field on the COMFAA main window, along with appropriate values for the concrete strength, PCC slab thickness and the value of improved *k*-value determined above, as shown in Figure C-13.

Figure C-12. Screen Sot of Rigid PCN Tab in COMFAA Support Spreadsheet for Computing Equivalent Pavement Structure in Rigid Example 1

Ref. AC 150/5335-5B Appendix A-2 Rigid Pavement Structure Items	Existing Rigid Pavement Layers	ENTER Existing Layer Thickness		Evaluation Layer Thickness	Improved\ k-value
Figure A2-7	P-401 Overlay(s)	0.0	in./2.5	0.0	Overlay to P-501, 2.5 to 1
Rigid Pavement Thickness	P-501	14.5	in.	14.5	
ThirdPoint Flexural Strength	Flexural strength	650.0	psi		Foundation k= Maximum k-Below or Input k
Figure A2-6, default maximum k-value = 500 lb/in^3. (135.7 MN/m^3) OR input k-value if greater.	P-401 and/or P-403	4.0	in.		
	P-306	0.0	in.	4.0	287
	P-304	0.0	in.		
Combined Top and Bottom Figure A2-5.	P-209	12.0	in.	12.0	215
	P-208 and/or P-211	0.0	in.		
	P-301	0.0	in.	0.0	No Uncrushed
	P-154	0.0	in.		
	Subgrade k-value	100.0	lb/in^3	30.50	287.00

COMFAA Inputs

k-value = 287.0 lb/in^3

Rigid Pavement t = 14.5 in.

Flexural strength = 650.0 psi

Recommended PCN Codes: R/B/W

(●) English
( ) Metric

Clear Saved Data | Zero Layer Data | Format Chart | Save Data

Enter Project Details

Examples

Arpt LOC-ID

IOU

Pavement ID

Rwy 5-23

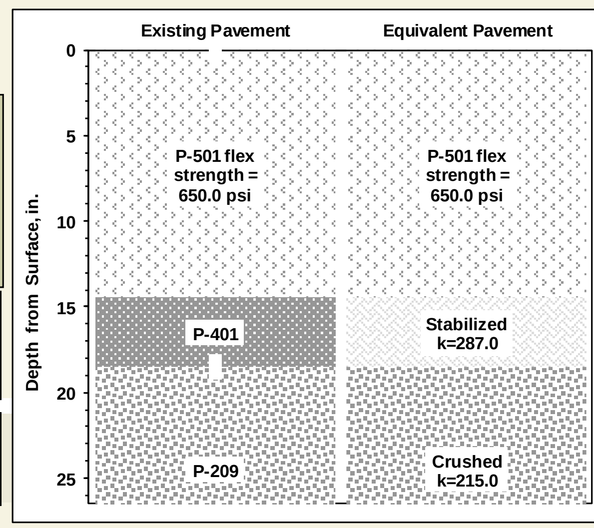


Figure C-13. Screen Shot of COMFAA Main Screen Showing the Required Inputs for Rigid Example 1

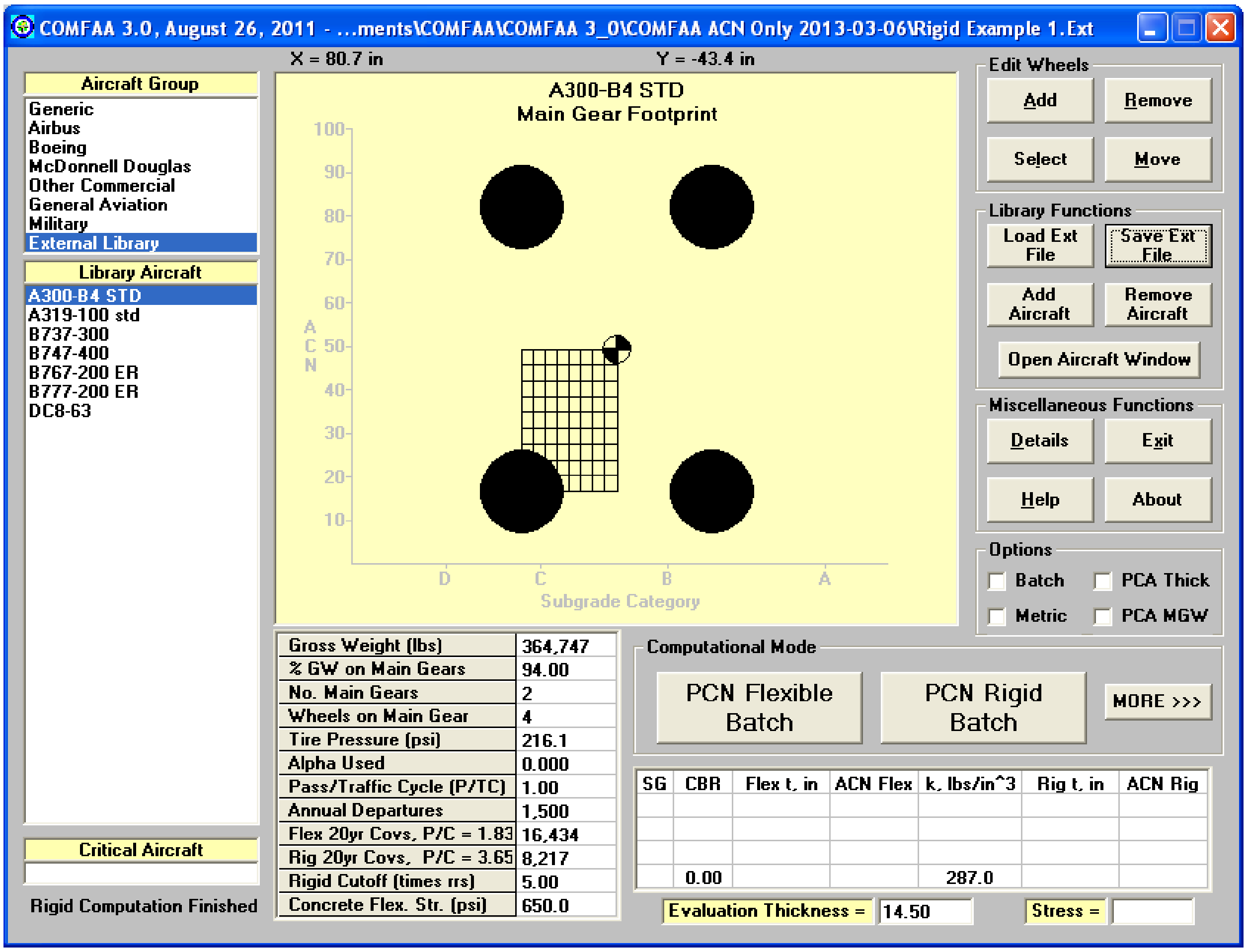


Figure C-14. Detailed COMFAA Batch PCN Output – Rigid Example 1

```
                              k Value = 287.0 lbs/in^3 (Subgrade Category is B(295))
                    flexural strength = 650.0 psi
         Evaluation pavement thickness = 14.50 in
   Pass to Traffic Cycle (PtoTC) Ratio = 1.00

       Maximum number of wheels per gear = 6
     Maximum number of gears per aircraft = 4
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	8,217	13.24
2	A319-100 std	141,978	92.60	172.6	1,200	6,443	11.84
3	B737-300	140,000	90.86	201.0	6,000	31,003	13.59
4	B747-400	877,000	93.32	200.0	1,000	5,735	13.44
5	B767-200 ER	396,000	90.82	190.0	2,000	10,907	12.80
6	B777-200 ER	657,000	91.80	205.0	1,000	4,861	11.98
7	DC8-63	330,000	96.12	196.0	3,000	17,291	13.61

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
1	A300-B4 STD	50,264	14.81	353,550	12.98	0.2332	54.6
2	A319-100 std	268,124	14.78	136,817	10.62	0.0343	35.5
3	B737-300	135,137	14.79	134,639	11.01	0.3273	38.3
4	B747-400	26,352	14.82	848,222	13.55	0.3105	60.0
5	B767-200 ER	122,316	14.79	383,570	12.41	0.1272	49.7
6	B777-200 ER	155,472	14.79	636,945	13.60	0.0446	60.5
7	DC8-63	70,572	14.80	319,394	12.57	0.3496	51.0
					Total CDF =	1.4267	

Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on B(295)
1	A300-B4 STD	364,747	94.00	216.1	13.24	57.1
2	A319-100 std	141,978	92.60	172.6	10.84	37.1
3	B737-300	140,000	90.86	201.0	11.25	40.1
4	B747-400	877,000	93.32	200.0	13.85	63.0
5	B767-200 ER	396,000	90.82	190.0	12.67	51.9
6	B777-200 ER	657,000	91.80	205.0	13.92	63.6
7	DC8-63	330,000	96.12	196.0	12.84	53.4

C.8.1.3 Figure C-14 shows the shows the results of the COMFAA Batch PCN Rigid calculations. The top portion of Figure C-14 (Results Table 1) shows the required thickness using the thickness design in accordance with the FAA Westergaard method for a concrete pavement with subgrade *k*-value of 287 pci. Note that the thickness requirements for several traffic aircraft are within about an inch of the evaluation pavement thickness (14.5 in). When the thickness of individual aircraft is close to the evaluation thickness most likely the thickness needed to accommodate the fleet will be more than the evaluation thickness resulting in a PCN of the most demanding aircraft being less than its ACN. The middle portion of Figure C-14 shows the results of the detailed method based on the cumulative damage factor (CDF) procedure that allows the calculation of the combined effect of multiple aircraft in the traffic mix. The numerical values in the CDF column represent damage to a 14.5-in. thick rigid pavement on an equivalent subgrade with k = 287 pci for each aircraft in the list. The total CDF represents the combined damage from this traffic. Total CDF exceeds 1 in this case, indicating that the pavement is under-designed for the given traffic. Taking each aircraft in turn as the critical aircraft, the program computes total equivalent coverages (based on a CDF analysis), the corresponding thickness for the total equivalent coverages (which is greater than the required thickness for the individual aircraft shown in Results Table 1), and a maximum allowable gross weight. The ACN of the aircraft at the maximum allowable gross weight, at the appropriate ICAO standard *k*-value, is computed and reported in Results Table 2 as the PCN (last column). The PCN for this pavement can be reported as the highest PCN in the PCN column. Based on the information in Figure C-14, the airport may report a PCN of 61/R/B/W/T. Note that the W code should be used for the tire pressure category because this is a rigid pavement.

C.8.1.4 Referring to the CDF calculation results shown in Results Table 2 of Figure C-14, the A319-100 std and the B777-200 contribute the least to the cumulative damage on this pavement. However, the required thickness in Column 3 of Results Table 2 is consistently greater than the evaluation thickness. This indicates that the pavement does not have sufficient strength to accommodate all existing traffic. The ACNs (Results Table 3) for several aircraft exceed the pavement PCN and the airport should plan for a pavement strengthening project or consider placing restrictions on some aircraft.

C.8.1.5 The following notes apply when total CDF > 1:

1. At least one ACN value in Results Table 3 will be greater than all of the PCN values in Results Table 2.
2. For all aircraft, the thickness for total equivalent coverages (Column 3 in Results Table 2) will exceed the evaluation pavement thickness for the input subgrade *k*-value.

3. One aircraft in the list will have the greatest thickness requirement for total equivalent coverages, and this "PCN thickness" value will be less than at least one ACN thickness value in Results Table 3.
4. A project to strengthen the pavement to support forecast traffic is required.
5. An overload analysis should be performed.

C.8.2 Rigid Pavement Example 2 (Total CDF<1).

C.8.2.1 This second example has the same traffic and other input parameters as the first, except the slab thickness is increased by 0.5 inches to 15 inches. As shown in Figure C-15, the equivalent *k*-value is the same as Example 1.

Figure C-15. Screen Shot of Rigid PCN Tab in COMFAA Support Spreadsheet for Computing Equivalent Pavement Structure in Rigid Example 2

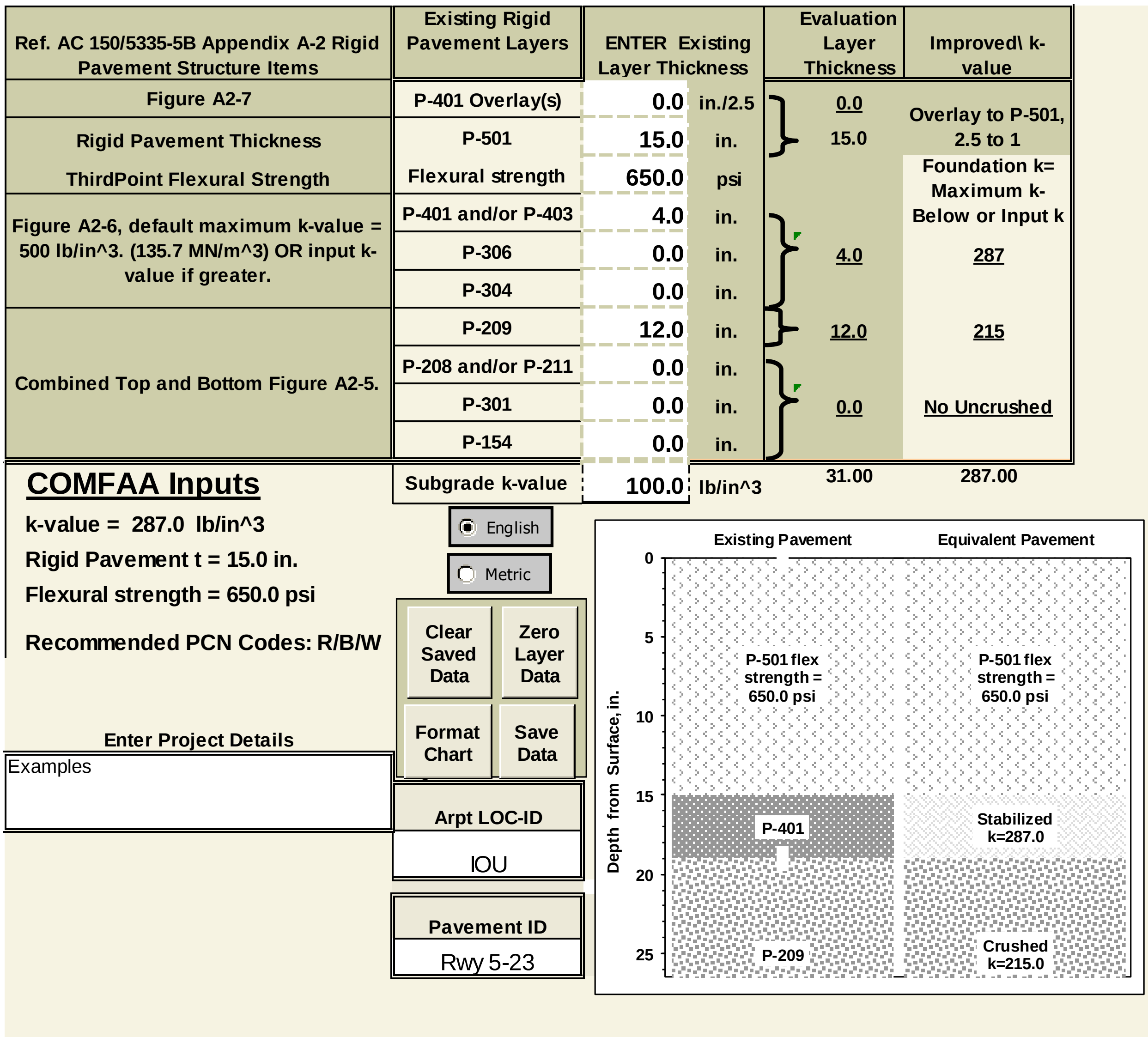


Figure C-16. Detailed COMFAA Batch PCN Output – Rigid Example 2

k Value = 287.0 lbs/in^3 (Subgrade Category is B(295))
flexural strength = 650.0 psi
Evaluation pavement thickness = 15.00 in
Pass to Traffic Cycle (PtoTC) Ratio = 1.00

Maximum number of wheels per gear = 6
Maximum number of gears per aircraft = 4

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	8,217	13.24
2	A319-100 std	141,978	92.60	172.6	1,200	6,443	11.84
3	B737-300	140,000	90.86	201.0	6,000	31,003	13.59
4	B747-400	877,000	93.32	200.0	1,000	5,735	13.44
5	B767-200 ER	396,000	90.82	190.0	2,000	10,907	12.80
6	B777-200 ER	657,000	91.80	205.0	1,000	4,861	11.98
7	DC8-63	330,000	96.12	196.0	3,000	17,291	13.61

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
1	A300-B4 STD	49,717	14.80	372,178	13.42	0.1311	58.8
2	A319-100 std	280,968	14.82	145,308	10.98	0.0182	38.1
3	B737-300	138,304	14.81	143,473	11.40	0.1778	41.3
4	B747-400	25,491	14.79	896,164	14.05	0.1784	64.9
5	B767-200 ER	124,753	14.81	403,882	12.84	0.0693	53.4
6	B777-200 ER	159,887	14.81	670,392	14.13	0.0241	65.7
7	DC8-63	70,626	14.80	336,937	13.02	0.1942	55.0
					Total CDF =	0.7931	

Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on B(295)
1	A300-B4 STD	364,747	94.00	216.1	13.24	57.1
2	A319-100 std	141,978	92.60	172.6	10.84	37.1
3	B737-300	140,000	90.86	201.0	11.25	40.1
4	B747-400	877,000	93.32	200.0	13.85	63.0
5	B767-200 ER	396,000	90.82	190.0	12.67	51.9
6	B777-200 ER	657,000	91.80	205.0	13.92	63.6
7	DC8-63	330,000	96.12	196.0	12.84	53.4

C.8.2.2 Figure C-16 shows the detailed results from COMFAA. In this case it is seen that the pavement has sufficient strength to support the traffic mix. Results Table 1 (top portion of Figure C-16) shows the required thickness for each aircraft according to the FAA Westergaard method for a concrete pavement with subgrade *k*-value of 287 pci. Note that the individual thickness requirements for all aircraft are less than the evaluation pavement thickness of 15.0 inches. Since thickness required for individual aircraft are all less than the evaluation thickness the pavement should have sufficient capacity to accommodate the entire fleet. However, the results from the cumulative damage factor (CDF) procedure are needed for confirmation.

C.8.2.3 Results Table 2 (middle portion of Figure C-16) shows the results of the detailed method based on the CDF procedure that allows the calculation of the combined effect of multiple aircraft in the traffic mix. Each aircraft in turn is treated as the critical aircraft. For each aircraft, the CDF analysis calculates a maximum allowable gross weight, equivalent coverage level, and corresponding thickness at the evaluation thickness (15.0 in.) and support conditions (287 pci). The total CDF is less than 1 (0.7931) in this case, indicating that there is adequate strength to handle the forecast traffic. The PCN for this pavement can be reported as the highest PCN in the PCN column. Based on the information in Figure C-16, the airport may report a PCN of 66/R/B/W/T. Note that the W code should be used for the tire pressure category because this is a rigid pavement.

C.8.2.4 Values in Results Table 3 are identical to the corresponding values in Results Table 3 for Example 1. This is because the operating aircraft load data are the same in both examples. All aircraft in the traffic mix have ACNs at their operating weights less than the reported PCN, hence no operating restrictions are needed.

C.8.2.5 The following notes apply when total CDF < 1:

1. For all aircraft, the thickness for total equivalent coverages (Results Table 2, Column 3) will be the less than the COMFAA evaluation thickness.
2. All maximum allowable gross weights in Results Table 2 will be greater than the corresponding COMFAA input gross weights in Results Table 1 and the ACN weights in Results Table 3.
3. At least one of the PCN values in Results Table 2 will be greater than all ACN values in Results Table 3.

C.8.3 <u>Rigid Pavement Example 3.</u>

C.8.3.1 This example is the same as Example 2, except that the taxiway has a central configuration rather than parallel, such as that shown in Figure A-1b. It is still assumed that additional fuel is obtained before departure. Referring to Table C-9, the P/TC ratio changes from 1 to 2. The change results in double the number of coverages for each aircraft in the traffic mix as shown in Results Table 1 of Figure C-17. As expected, the required total pavement thickness for each aircraft in the traffic mix has increased. Note that the thickness requirements for several traffic aircraft are within about an inch of the evaluation pavement thickness (15.0 in), indicating that the pavement strength may be inadequate for the increased number of coverages.

C.8.3.2 Column 3 of Results Table 2 shows that each aircraft requires a thickness greater than the evaluation thickness when using the CDF method. It is apparent the pavement is not adequate to accommodate double the coverages of the existing traffic. As expected, changing the taxiway system from parallel to central has lowered the PCN of the pavement. The airport may report 60/R/B/W/T. The ACN of two aircraft exceed the pavement PCN and the airport should plan for a pavement strengthening project or consider placing restrictions on those aircraft. The net effect of the change in taxiway configuration from that of Example 2 is the reduction in PCN by 6.

C.8.3.3 As an alternate way of looking at the effect of a parallel versus central taxiway effects, consider how the pavement life would change instead of the PCN. If the reported PCN from this example were to remain at 66/R/B/W/T, then the pavement life would be reduced by 50%. This is due to the change in the P/TC ratio, which effectively doubled the number of loadings. A similar effect would be noticed if fuel was not obtained at the airport. With a P/TC ratio of 3, the PCN is reduced further and the pavement life would be one-third the pavement life of the pavement with the original traffic assumptions given for example 2.

Figure C-17. Detailed COMFAA Batch PCN Output – Rigid Example 3

```
                          k Value = 287.0 lbs/in^3 (Subgrade Category is B(295))
                 flexural strength = 650.0 psi
      Evaluation pavement thickness = 15.00 in
  Pass to Traffic Cycle (PtoTC) Ratio = 2.00

     Maximum number of wheels per gear = 6
   Maximum number of gears per aircraft = 4
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	1,500	16,434	13.84
2	A319-100 std	141,978	92.60	172.6	1,200	12,885	12.39
3	B737-300	140,000	90.86	201.0	6,000	62,007	14.15
4	B747-400	877,000	93.32	200.0	1,000	11,470	14.07
5	B767-200 ER	396,000	90.82	190.0	2,000	21,813	13.37
6	B777-200 ER	657,000	91.80	205.0	1,000	9,722	12.54
7	DC8-63	330,000	96.12	196.0	3,000	34,581	14.20

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
1	A300-B4 STD	99,435	15.40	350,788	12.91	0.2622	54.0
2	A319-100 std	561,937	15.36	135,508	10.57	0.0364	35.1
3	B737-300	276,609	15.38	133,325	10.95	0.3556	37.9
4	B747-400	50,983	15.42	841,137	13.48	0.3569	59.3
5	B767-200 ER	249,506	15.38	380,285	12.34	0.1387	49.1
6	B777-200 ER	319,773	15.38	632,027	13.52	0.0482	59.7
7	DC8-63	141,252	15.39	316,787	12.50	0.3883	50.4
					Total CDF =	1.5863	

Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on B(295)
1	A300-B4 STD	364,747	94.00	216.1	13.24	57.1
2	A319-100 std	141,978	92.60	172.6	10.84	37.1
3	B737-300	140,000	90.86	201.0	11.25	40.1
4	B747-400	877,000	93.32	200.0	13.85	63.0
5	B767-200 ER	396,000	90.82	190.0	12.67	51.9
6	B777-200 ER	657,000	91.80	205.0	13.92	63.6
7	DC8-63	330,000	96.12	196.0	12.84	53.4

C.8.4 Rigid Pavement Example 4 (Total CDF<<1).

C.8.4.1 This example demonstrates a consistent method of reporting PCN for rigid pavements that are extremely strong with respect to the input traffic. This situation may arise, for example, where an existing rigid pavement is given a HMA overlay for non-structural reasons. Assume that the rigid pavement in Example 1 receives a 5-in P-401 HMA overlay. Using the Rigid PCN tab of the COMFAA Support Spreadsheet (Figure C-18), the evaluation thickness is 16.5 inches versus 14.5 inches prior to the overlay. The traffic for this example is given in Table C-7, and all other input values are as in Example 1.

Table C-8. Input Traffic Data for Rigid Example 4

No.	Aircraft Name	Gross Weight, lbs.	Percent GW on Main Gear	Tire Pressure, psi	Annual Departures
1	A300-B4 STD	364,747	94.00	216.1	400
2	A319-100 STD	141,978	92.60	172.6	300
3	B737-300	140,000	90.86	201.0	1,500
4	B747-400	877,000	93.32	200.0	200
5	B767-200 ER	396,000	90.82	190.0	500
6	B777-200 ER	657,000	91.80	205.0	320
7	DC8-63	330,000	96.12	196.0	750

Figure C-18. Screen Shot of Rigid PCN Tab in COMFAA Support Spreadsheet for Computing Equivalent Pavement Structure in Rigid Example 4

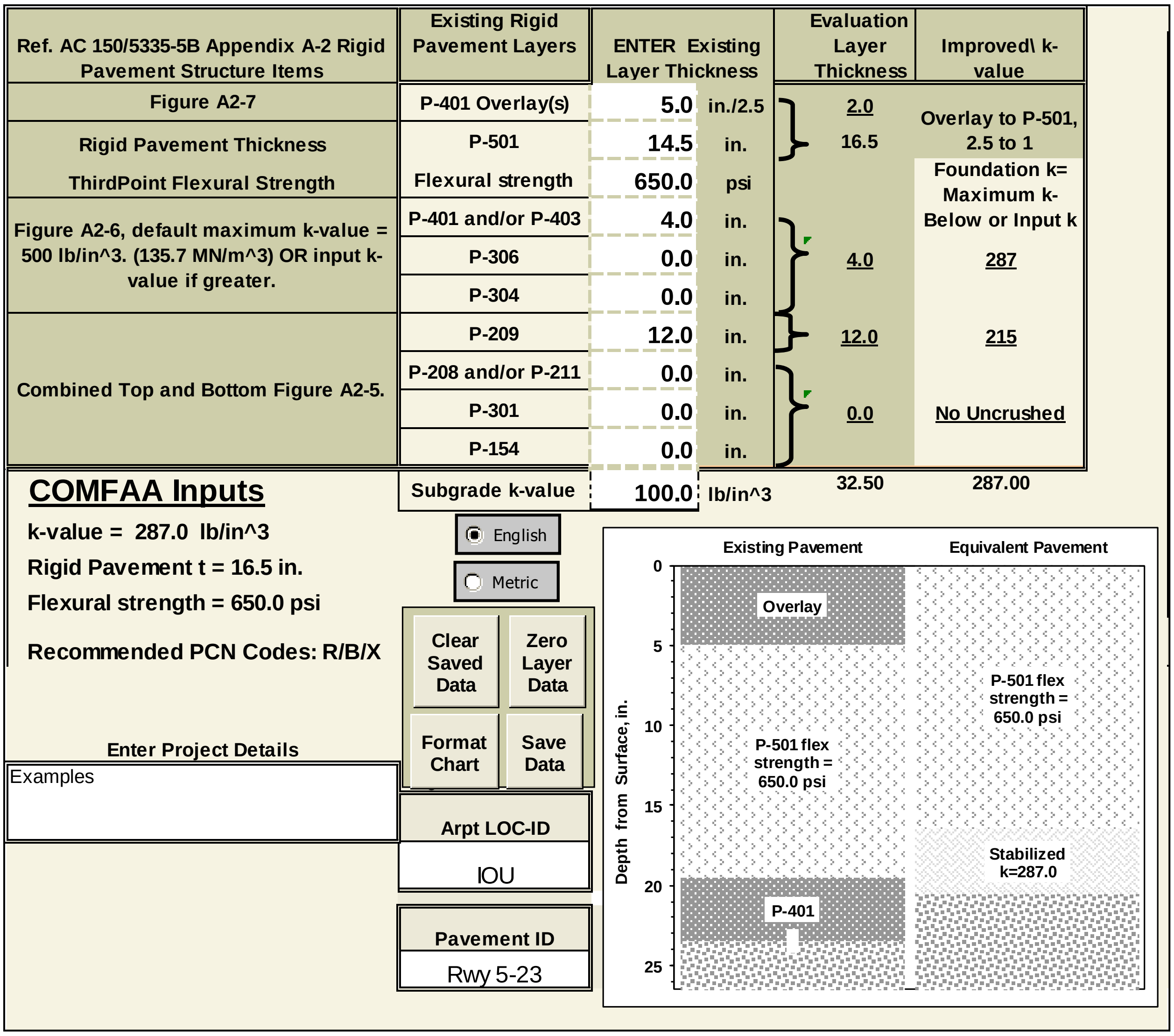


Figure C-19. Detailed COMFAA Batch PCN Output – Rigid Example 4 (unadjusted)

```
                                k Value = 287.0 lbs/in^3 (Subgrade Category is B(295))
                        flexural strength = 650.0 psi
             Evaluation pavement thickness = 16.50 in
        Pass to Traffic Cycle (PtoTC) Ratio = 1.00

           Maximum number of wheels per gear = 6
         Maximum number of gears per aircraft = 4
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	400	2,191	12.48
2	A319-100 std	141,978	92.60	172.6	300	1,611	11.24
3	B737-300	140,000	90.86	201.0	1,500	7,751	12.45
4	B747-400	877,000	93.32	200.0	200	1,147	12.72
5	B767-200 ER	396,000	90.82	190.0	500	2,727	11.93
6	B777-200 ER	657,000	91.80	205.0	320	1,556	11.57
7	DC8-63	330,000	96.12	196.0	750	4,323	12.49

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
1	A300-B4 STD	11,697	13.54	487,831	16.06	0.0062	86.6
2	A319-100 std	78,605	13.81	198,394	13.03	0.0007	55.1
3	B737-300	36,045	13.71	197,844	13.61	0.0071	60.5
4	B747-400	5,610	13.42	1,202,217	17.10	0.0068	99.3
5	B767-200 ER	32,180	13.69	527,343	15.33	0.0028	78.3
6	B777-200 ER	42,279	13.73	857,882	17.04	0.0012	98.6
7	DC8-63	17,210	13.60	441,572	15.59	0.0083	81.3
					Total CDF =	0.0331	

Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on B(295)
1	A300-B4 STD	364,747	94.00	216.1	13.24	57.1
2	A319-100 std	141,978	92.60	172.6	10.84	37.1
3	B737-300	140,000	90.86	201.0	11.25	40.1
4	B747-400	877,000	93.32	200.0	13.85	63.0
5	B767-200 ER	396,000	90.82	190.0	12.67	51.9
6	B777-200 ER	657,000	91.80	205.0	13.92	63.6
7	DC8-63	330,000	96.12	196.0	12.84	53.4

C.8.4.2 Figure C-19 shows the COMFAA output when PCN is computed using the evaluation thickness 16.5 in. and P/TC=1. For the overlaid pavement subject to the forecast traffic, total CDF is much less than 1 (total CDF= 0.0331), indicating that the 20-year traffic mix causes insignificant damage to the pavement. Similarly, the largest value of thickness for total equivalent coverages in Results Table 2 is much less than the COMFAA evaluation thickness at the evaluation *k*-value. Hence, it may be necessary to use an unrealistic allowable gross weight for the critical aircraft to compute PCN. Using the regular COMFAA procedure without adjustment, the airport could report PCN=99/R/B/X/T for this pavement. However, this PCN is based on an unrealistically high allowable gross weight for the B747-400 (1,202,217 lbs.).

C.8.4.3 The regular COMFAA procedure given in section 2.3 is most suitable when the total CDF > 0.15. When the procedure results in CDF < 0.15, as in this example, the FAA recommends adjusting the input traffic such that the PCN is reported for a total CDF = 0.150. Rather than modifying the COMFAA external aircraft file, the P/TC ratio can be used to obtain total CDF=0.150 as follows.

1. Perform a PCN Rigid Batch operation using the appropriate P/TC ratio based on the criteria in Appendix A.
2. Note the value of Total CDF in Results Table 2.
3. Multiply the original value of P/TC ratio by the factor 0.15/Total CDF, where Total CDF is taken from Step 2.
4. Enter the new value of P/TC ratio in the P/TC field in COMFAA.
5. Repeat the PCN Rigid Batch operation with the new value of P/TC ratio. This will result in a new Total CDF equal to or close to 0.15.
6. Note that the maximum value of P/TC ratio allowed in COMFAA is 10. This should be sufficient in most cases. However, if the value computed in Step 3 exceeds 10, increasing the annual departures of all input aircraft by a factor of 10 and repeating steps 1 through 5 will generally result in Total CDF=0.150.

C.8.4.4 Figure C-20 shows a re-analysis of the overlaid pavement using an adjusted value of the P/TC ratio equal to $1 \times 0.15 / 0.0331 = 4.532$. As indicated in Results Table 2, the adjusted Total CDF = 0.15. The airport can report PCN=83/R/B/X/T or 83/R/B/W/T at Total CDF=0.150, based on a more reasonable maximum allowable gross weight of the B777-200 ER. Results Table 3 shows that all aircraft in the existing mix operate at ACNs much lower than the reported PCN. There is no need to report a PCN higher than 83.

Figure C-20. Detailed COMFAA Batch PCN Output – Rigid Example 4 (with adjustment to P/TC ratio to force Total CDF = 0.15)

```
                                      k Value = 287.0 lbs/in^3 (Subgrade Category is B(295))
                            flexural strength = 650.0 psi
                 Evaluation pavement thickness = 16.50 in
       Pass to Traffic Cycle (PtoTC) Ratio = 4.53 (non-standard)

            Maximum number of wheels per gear = 6
          Maximum number of gears per aircraft = 4
```

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	A300-B4 STD	364,747	94.00	216.1	400	9,930	13.40
2	A319-100 std	141,978	92.60	172.6	300	7,300	11.94
3	B737-300	140,000	90.86	201.0	1,500	35,127	13.69
4	B747-400	877,000	93.32	200.0	200	5,198	13.36
5	B767-200 ER	396,000	90.82	190.0	500	12,357	12.90
6	B777-200 ER	657,000	91.80	205.0	320	7,050	12.27
7	DC8-63	330,000	96.12	196.0	750	19,590	13.71

Results Table 2. PCN Values

No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
1	A300-B4 STD	53,012	14.85	422,581	14.60	0.0281	70.5
2	A319-100 std	356,237	15.00	169,542	11.95	0.0031	45.7
3	B737-300	163,356	14.95	168,242	12.44	0.0323	49.9
4	B747-400	25,424	14.79	1,044,448	15.56	0.0307	80.9
5	B767-200 ER	145,838	14.94	459,691	13.98	0.0127	64.2
6	B777-200 ER	191,606	14.96	772,114	15.72	0.0055	82.7
7	DC8-63	77,997	14.89	386,745	14.27	0.0377	67.1
					Total CDF =	0.1501	

Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on B(295)
1	A300-B4 STD	364,747	94.00	216.1	13.24	57.1
2	A319-100 std	141,978	92.60	172.6	10.84	37.1
3	B737-300	140,000	90.86	201.0	11.25	40.1
4	B747-400	877,000	93.32	200.0	13.85	63.0
5	B767-200 ER	396,000	90.82	190.0	12.67	51.9
6	B777-200 ER	657,000	91.80	205.0	13.92	63.6
7	DC8-63	330,000	96.12	196.0	12.84	53.4

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APPENDIX D. PAVEMENT OVERLOAD EVALUATION BY THE ACN-PCN SYSTEM

D.1 ICAO Pavement Overload Evaluation Guidance.

D.1.1 In the life of a pavement, it is possible that either the current or the future traffic will load the pavement in such a manner that the assigned pavement rating is exceeded. ICAO provides a simplified method to account for minor pavement overloading in which the overloading may be adjusted by applying a fixed percentage to the existing PCN.

D.1.2 The ICAO procedure for overload operations is based on minor or limited traffic having ACNs that exceed the reported PCN. Loads that are larger than the defined PCN will shorten the pavement design life, while smaller loads will use up the life at a reduced rate. With the exception of massive overloading, pavements do not suddenly or catastrophically fail. As a result, occasional minor overloading is acceptable with only limited loss of pavement life expectancy and relatively small acceleration of pavement deterioration.

D.1.3 The following guidelines are recommended when evaluating overloads:

- For flexible pavements, occasional traffic cycles by aircraft with an ACN not exceeding 10 percent above the reported PCN should not adversely affect the pavement. For example, a pavement with PCN=60 can support some limited traffic of aircraft with ACN=66.
- For rigid or composite pavements, occasional traffic cycles by aircraft with an ACN not exceeding 5 percent above the reported PCN should not adversely affect the pavement. For example, a pavement with PCN=60 can support some limited traffic of aircraft with ACN=63.
- The annual number of overload traffic cycles should not exceed approximately 5 percent of the total annual aircraft traffic cycles. There is no exact guidance for choosing a number of operations that represents 5 percent. For consistency, the FAA recommends using 500 coverages of aircraft with ACN=1.1xPCN for flexible pavements ACN=1.05xPCN for rigid pavements. The PCN is 10,000 coverages of an aircraft with a derived ACN=PCN when CDF=1, five percent of this total equivalent operations is 500 coverages.
- Overloads should not normally be permitted on pavements already exhibiting signs of distress, during periods of thaw following frost penetration, or when the strength of the pavement or its subgrade could be weakened by water.
- When overload operations are conducted, the airport owner should regularly inspect the pavement condition. Periodically the airport owner should review the criteria for overload operations. Excessive repetition of overloads can cause in a significant reduction in pavement life or accelerate when a pavement will require a major rehabilitation.

D.1.4 These criteria provide consistent, repeatable process the airport owner can use to monitor the impact of these overload operations on the pavement in terms of pavement life reduction or increased maintenance requirements. This appendix discusses methods for making overload allowances for both flexible and rigid pavements that will clearly indicate these effects and will give the authority the ability to determine the impact both economically and in terms of pavement life.

D.2 Overload Guidance.

D.2.1 The overload evaluation guidance in this appendix applies primarily to flexible and rigid pavements that have PCN values that were established by the technical method. Pavements that have ratings determined by the using aircraft method can use the overload guidelines provided very frequent pavement inspection procedures are followed. The procedures presented here rely on the COMFAA program.

D.2.2 The adjustments for pavement overloads start with the assumption that some of the aircraft in the traffic mix have ACNs that exceed the PCN. If the steps outlined in Appendix C have been followed for the technical method, then most of the necessary data already exists to perform an examination of overloading.

D.2.3 The recommended PCN is not adequate for the traffic mix when the Total CDF>1. Airports have three options when evaluating what pavement strength rating to publish:

1. Let the PCN remain as derived from the technical evaluation method, but retain local knowledge that there are some aircraft in the traffic mix that can be allowed to operate with ACNs that exceed the published PCN or at a reduced weight to not exceed the PCN.
2. Provide for an increased PCN by adding an overlay or by reconstruction to accommodate aircraft with higher ACNs.
3. Adjust the PCN upward to that of the aircraft with the highest ACN, but recognize the need to expect possible severe maintenance. This will result in earlier and increased costs for reconstruction or overlay projects.

D.3 Adjustments for Flexible Pavement Overloads.

D.3.1 First Option.

The first option requires that the airport owner is constantly aware of the composition of the entire traffic mix in terms of operating gross weights and loading frequency. If the traffic mix has changes that affect the factors involved in developing a technically based PCN, then the PCN will need to be adjusted to reflect the changes. The airport authority will also have to internally make allowance for or prevent aircraft operations that exceed the PCN. A consistent method to determine when aircraft ACN and frequency exceed allowable overloads is presented in the following paragraphs.

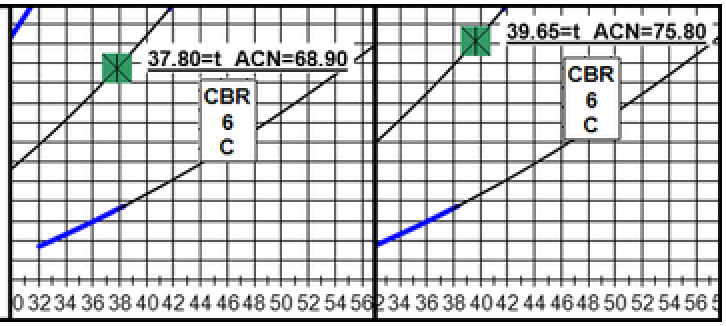
D.3.1.1 For flexible pavement example Total CDF>1. The B-747-400 has the highest CDF-PCN combination. The traffic aircraft with the highest CDF-PCN combination is the basis for overload analysis. The PCN=68.9 and the traffic mix is equivalent to 10,000 coverages of a B747-400 with a gross weight, MGW=847,310 lbs. on a 37.8 in. pavement with CBR = 6. Aircraft with PCN=(1.1x68,9)=75.8 can operate at 500 coverages total with minimal impact on the load carrying capacity. The gross weight of a B747-400 at ACN=75.8 is the MGW from COMFAA using 10,000 coverages, 39.65 in., and CBR=6.

Figure D-1. CDF-PCN Results for the B-747-100 – Flexible Pavement Overload Option One

Results Table 2. PCN Values

Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
355,252	35.31	0.2454	60.1
139,771	27.19	0.0001	35.7
137,402	28.03	0.0021	37.9
847,310	37.80	0.7079	68.9
387,270	34.61	0.1630	57.8
645,067	37.01	0.2826	66.1
322,545	34.27	0.2381	56.6
	Total CDF =	1.6392	

Total CDF>1



D.3.1.2 COMFAA MGW results at 39.65 in., CBR=6 for the B747-400 traffic aircraft is MGW=901,739 lbs. COMFAA Batch ACN results confirm that increasing MGW from 847,310 lbs. to 901,739 lbs. increases ACN 10 percent.

Figure D-2. COMFAA Batch ACN Results – Flexible Pavement Overload Option One

CBR = 6.00
Evaluation pavement thickness = 39.65 in

Results Table: Maximum Allowable Gross Weight Computations, Units = Imperial.

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	6D Thick	20-yr Coverages	Max. Allowable Gross Weight
1	B747-400orig	847,310	93.32	200.0	887	37.80	10,000	901,739

Flexible ACN at Indicated Gross Weight and Strength. Units = English.

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN at Indicated Code A(15)	B(10)	C(6)	D(3)
1	B747-400orig	847,310	93.32	200.0	51.0	56.5	68.9	90.1
2	B747-400	901,739	93.32	200.0	55.2	61	75.8	97.7

D.3.1.3 COMFAA PCN results with 500 coverages of the aircraft with 10 percent higher ACN confirms minor impact on this flexible pavement. However, the PCN=74.8, which is less than ACN=75.8. Overloads are occurring at the input traffic gross weight and frequency.

Figure D-3. COMFAA Batch PCN Results – Flexible Pavement Overload Option One

CBR = 6.00 Subgrade Category is C(6), Thickness = 37.80 in

Results Table 1. Input Traffic Data

No.	Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
1	B747-400orig	847,310	93.32	200.0	887	10,000	37.80
2	B747-400	901,739	93.32	200.0	43	500	30.62

Results Table 2. PCN Values

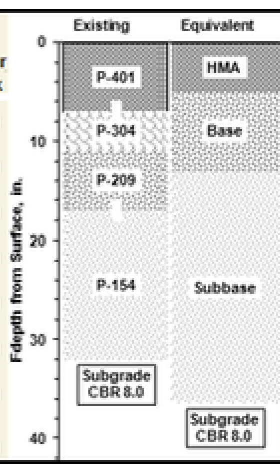
No.	Aircraft Name	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
1	B747-400orig	11,022	38.02	840,892	37.58	0.9980	68.1
2	B747-400	5,390	38.06	893,804	39.38	0.1020	→74.8
				Total CDF>1	Total CDF =	1.1000	

D.3.2 Second Option.

The second option alleviates the problems discussed for the first option, but it does require additional expense to bring the pavement up to the strength required by the combination of aircraft in the traffic mix. The two inch overlay increases the PCN from 68.9 to 96.9, providing added pavement strength allows operations at current levels and weights until the overlay project is programmed.

Figure D-4. COMFAA PCN Results – Flexible Pavement Overload Option Two

Flexible Layers	Layer Thick
P-401/3	7.0
P-306	0.0
P-304	4.0
P-209	6.0
P-208	0.0
P-301	0.0
P-154	15.0
CBR	8.0



CBR = 8.00 (Subgrade Category is C(6))
Evaluation pavement thickness = 36.40 in

Results Table 2. PCN Values

Aircraft	Critical Aircraft Tot Equiv. Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on C(6)
A300-B4	264,870	406,912	39.00	0.0022	73.3
A319-100	>5,000,000	146,714	28.03	0.0000	37.9
B737-300	>5,000,000	147,191	29.27	0.0000	41.3
B747-400	12,676	1,060,338	44.83	0.0321	96.9
B767-200	1,036,028	431,320	37.67	0.0007	68.4
B777-200	>5,000,000	660,776	37.72	0.0000	68.6
DC8-63	2,881,679	354,742	36.67	0.0004	64.9
			Total CDF =	0.0355	

Total CDF<<1

D.3.3 Third Option.

The third option has the benefit of allowing all aircraft in the traffic mix to operate as necessary. However, by increasing the PCN, which only implies higher pavement strength, the pavement life will be reduced by an estimated 40 percent.

Figure D-5. CDF-PCN Results – Flexible Pavement Overload Option Three

Results Table 1.
Input Traffic Data

No.	Aircraft Name	Gross Weight	Total CDF 1.6392 Annual Deps	1.1001 Annual Deps
1	A300-B4 STD	364,747	1,500	1,007
2	A319-100 std	141,978	1,200	805
3	B737-300	140,000	6,000	4,026
4	B747-400	877,000	1,000	671
5	B767-200 ER	396,000	2,000	1,342
6	B777-200 ER	657,000	1,000	671
7	DC8-63	330,000	3,000	2,013

COMFAA can be used to analyze the sensitivity of the traffic characteristics on the pavement. In the example the Total CDF=1.6392 for input traffic and Total CDF=1.10 at overload level. Setting P/TC ratio to 1.10/1.6392 shows how limiting the CDF to 1.1. reduces the Annual Departures.

D.4 Adjustments for Rigid Pavement Overloads.

D.4.1 First Option.

The first option requires that the airport authority be constantly aware of the composition of the entire traffic mix in terms of operating gross weights and loading frequency. If the traffic mix has changes that affect the factors involved in developing a technically based PCN, then the PCN will need to be adjusted to reflect the changes. The airport authority will also have to internally make allowance for or prevent aircraft operations that exceed the PCN. A consistent method to determine when aircraft ACN and frequency exceed allowable overloads is presented in the following paragraphs.

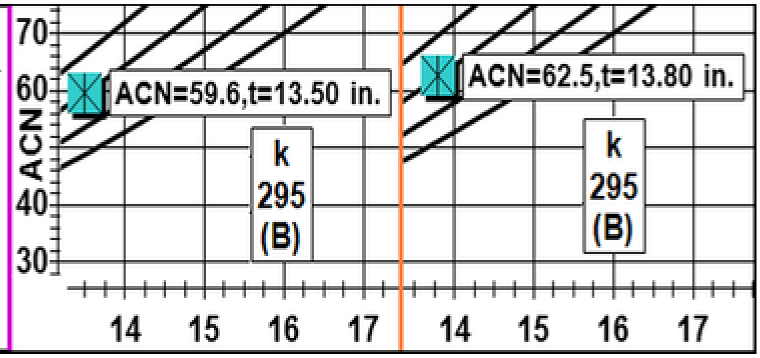
D.4.1.1 For rigid pavement example Total CDF>1. The B-747-400 has the highest CDF-PCN combination. The traffic aircraft with the highest CDF-PCN combination is the basis for overload analysis. The PCN=59.4 and the traffic mix is equivalent to 10,000 coverages of a B747-400 with a gross weight, MGW=841,758 lbs. on a 13.49 in. pavement with k-value=295 pci. Aircraft with PCN=(1.05x59.4)=62.4 can operate at 500 coverages total with minimal impact on the load carrying capacity. The gross weight of a B747-400 at ACN=62.4 is the MGW from COMFAA using 10,000 coverages, 13.49 in., and k-value=295 pci.

Figure D-6. CDF-PCN Results for the B-747-400 – Rigid Pavement Overload Option One

Results Table 2. PCN Values

Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
351,047	12.92	0.2564	54.1
135,813	10.58	0.0362	35.2
133,544	10.96	0.3412	38.0
841,758	13.49	0.3388	→ 59.4
381,236	12.36	0.1401	49.2
632,397	13.53	0.0491	59.8
317,177	12.51	0.3784	50.5
	Total CDF =	1.5402	

Total CDF>1



D.4.1.2 COMFAA MGW results at 13.8 in., and k-value=295 pci for the B747-400 traffic aircraft is MGW=871,000 lbs. COMFAA Batch ACN results confirm that increasing MGW from 841,758 lbs. to 871,000 lbs. increases ACN 5 percent.

Figure D-7. COMFAA Batch ACN Results – Rigid Pavement Overload Option One

k Value = 295.0 lbs/in^3
flexural strength = 650.0 psi
Evaluation pavement thickness = 13.79 in

Maximum Allowable Gross Weight Computations, Units = Imperial.

Aircraft Name	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	6D Thick	20-yr Coverages	Max. Allowable Gross Weight
B747-400 at 105pct	871,700	93.32	200.0	1,749	13.79	10,000	→ 871,800

Rigid ACN at Indicated Gross Weight and Strength. Units = English.

Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN at Indicated Code A(552)	B(295)	C(147)	D(74)
B747-400 at 105pct	871,800	93.32	200.0	52.	→ 62.4	74.0	84.6
B747-400 at 13.49in	841,758	93.32	200.0	49.	→ 59.4	70.5	80.7

D.4.1.3 COMFAA PCN results with 500 coverages of the aircraft with 5 percent higher ACN confirms minor impact on this rigid pavement. However, the PCN=62.0, which is less than ACN=63.6. Overloads are occurring at the input traffic gross weight and frequency.

Figure D-8. COMFAA PCN Results – Rigid Pavement Overload Option One

Results Table 1. Input Traffic Data

Aircraft	Gross Weight	Percent Gross Wt	Tire Press	Annual Deps	20-yr Coverages	6D Thick
B747-400 orig	841,758	93.32	200.0	1,779	10,000	13.48
B747-400 105pct	871,800	93.32	200.0	87	500	12.24

Results Table 2. PCN Values

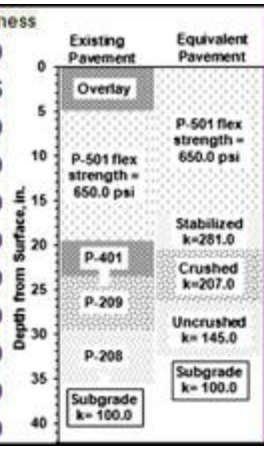
Aircraft	Critical Aircraft Total Equiv. Covs.	Thickness for Total Equiv.Covs.	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
B747-400 orig	10,711	13.54	837,343	13.44	0.9843	59.0
B747-400 105pct	7,534	13.54	867,181	13.75	0.070	62.0
			Total CDF>1	Total CDF =	1.0543	

D.4.2 Second Option.

The second option alleviates the problems discussed for the first option, but it does require additional expense to bring the pavement up to the strength required by the combination of aircraft in the traffic mix. The five-inch flexible overlay is converted to an additional two inches of rigid pavement. The PCN increases from PCN=63.6 to PCN= 98.1. Providing added pavement strength allows operations at current levels and weights until the overlay project is programmed.

Figure D-9. COMFAA PCN Results –Rigid Pavement Overload Option Two

Pavement Layers	Thickness
P-401 Overlay(s)	5.0
P-501	14.5
Flexural strength	650.0
P-401 and/or P-403	4.0
P-306	0.0
P-304	0.0
P-209	6.0
P-208 and/or P-211	6.0
P-301	0.0
P-154	0.0
Subgrade k-value	100.0



Aircraft	Maximum Allowable Gross Weight	ACN Thick at Max. Allowable Gross Weight	CDF	PCN on B(295)
A300-B4 STD	485,122	16.00	0.0069	86.0
A319-100 st(	196,884	12.98	0.0007	54.6
B737-300	196,092	13.54	0.0075	59.9
B747-400	1,192,659	17.01	0.0075	98.1
B767-200 ER	524,353	15.27	0.0031	77.7
B777-200 ER	850,329	16.92	0.0014	97.1
DC8-63	438,214	15.51	0.0091	80.4
		Total CDF =	0.0362	

Total CDF<<1

Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN Thick	ACN on B(295)
B747-400	877,000	93.32	200.0	13.85	63.0
B777-200 ER	657,000	91.80	205.0	13.92	63.6

D.4.3 Third Option.

The third option has the benefit of allowing all aircraft in the traffic mix to operate as necessary. However, by increasing the PCN, which only implies higher pavement strength, the pavement life will be reduced by an estimated 40 percent.

Figure D-10. COMFAA PCN Results – Rigid Pavement Overload Option Three

k-value=281 pci, Flex Stren=650.0 psi, Thick=14.5 in

Traffic Aircraft	Gross Weight	Percent GrossWt	Tire Press	Annual Deps	Annual Deps
A300-B4	364,747	94.00	216.1	1,500	662
A319-100	141,978	92.60	172.6	1,200	821
B737-300	140,000	90.86	201.0	6,000	4,107
B747-400	877,000	93.32	200.0	1,000	685
B767-200	396,000	90.82	190.0	2,000	1,369
B777-200	657,000	91.80	205.0	1,000	685
DC8-63	330,000	96.12	196.0	3,000	2,054
				CDF=1.5402	CDF=0.9919

COMFAA can be used to analyze the sensitivity of the traffic characteristics on the pavement. In the example the Total CDF=1.5402 for input traffic and Total CDF=1.0543 at overload level. Setting P/TC ratio to 1.0543/1.5402 shows how the additional damage is expressed as an Annual Departure reduction.

APPENDIX E. REPORTING CHANGES TO CERTAIN AIRPORT RUNWAY DATA ELEMENTS

This Advisory Circular affects the following airport runway data.

E.1 Allowable Gross Weight.

Aircraft weight data is reported using this AC based upon the PCN calculated for the pavement being evaluated. With PCN there is not a “design aircraft”.

E.1.1 Source of Data.

Runway weight bearing capacity data must be submitted through the FAA Airports Division Regional Office (RO) or FAA Airports District Office (ADO). Information is submitted electronically to the FAA Air Traffic Aeronautical Information Services for publication in FAA Flight Information manuals using the secure web site 5010WEB, monitored by GCR & Associates on behalf the FAA. Currently this data base accepts gross aircraft weight data for single wheel landing gear (S), dual wheel landing gear (D), dual tandem landing gear (2D) and double dual tandem wheel type landing gear (2D/2D2). All other gear types may only be reported with the PCN. Note when reporting PCN it must be all five elements, e.g. 73/F/C/W/T. All changes to Runway Weight Bearing Capacity data must be submitted through the FAA. State airport inspectors may not submit changes to Runway Weight Bearing Capacity Data directly to Aeronautical Information Services for publication. Instead, they must submit the data changes to the RO and ADO for validation, and in turn, the RO or ADO submits changes to Runway Weight Bearing Capacity Data electronically to Aeronautical Information Services using the steps enumerated above on behalf of the State Aviation Agency.

E.1.2 Reporting Allowable Gross Weight.

The allowable gross aircraft weight for each gear configuration that may utilize the subject runway is published on FAA Form 5010. In addition a PCN number should also be published for each Runway at the airport. Note the PCN ‘number’ to report is the entire PCN string of Pavement Classification Number combined with subgrade category, tire pressure, and method of calculation. A list of PCN-based maximum gross weights for reporting Runway Weight Bearing Capacity Data has been developed. The listing is posted on the FAA website with this AC. Local experience can be considered to report a lower weight, but higher weights are not recommended.

E.2 Pavement Classification Number (PCN).

E.2.1 Source of Data.

The source for Pavement Classification Number (PCN) data is the airport operator. FAA Part 139 airport inspectors and State non-Part 139 airport inspectors are instructed to request PCN data from the airport manager as part of the manager interview before an airport inspection. If the airport manager has PCN data, the inspector may accept the data for immediate publication in flight information publications; however, if the airport manager does not have PCN data, then the inspector has no PCN data available for publication.

E.2.2 Reporting PCN.

For purposes of airport runway data elements generally published on FAA Form 5010, Airport Master Record, the PCN is a number that expresses the load-carrying capacity of a pavement based on all aircraft traffic that regularly operates on the pavement. The PCN determined earlier (see Appendices 1 through 3) is the PCN to report.

E.3 Assigning Aircraft Gross Weight Data.

E.3.1 Tables E-1 and E-2 summarize the process used to assign allowable aircraft gross weight. Table E-1 shows the flexible ACNs. Table E-2 shows the rigid ACNs. Allowable gross weight is based on aircraft gear configuration as issued in FAA Order 5300.7, Standard Naming Convention for Aircraft Landing Gear Configurations (October 6, 2005), coupled with tire pressure and wheel spacing ranges. The ACN for these standard aircraft results in a recommended maximum gross weight for Runway Weight Bearing Capacity. See Chapter 3 for instructions for using the COMFAA software to determine ACN values under certain conditions. The COMFAA external file will be posted on the FAA website.

Table E-1. Flexible ACN Data Used to Establish Allowable Gross Weight

Results Table 3. Flexible ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	A(15)	B(10)	C(6)	D(3)
1	S-7.5std	7,500	95.00	52.5	1.4	1.9	2.5	2.8
2	S-15std	15,000	95.00	60.0	3.2	4.2	5.2	5.8
3	S-30std	30,000	95.00	75.0	8.0	9.6	11.3	11.8
4	S-45std	45,000	95.00	90.0	13.7	16.1	17.5	18.3
5	S-60std	60,000	95.00	105.0	20.3	22.6	23.7	24.8
6	S-75std	75,000	95.00	120.0	27.4	29.8	30.2	31.3
7	S-90st	90,000	95.00	135.0	35.1	37.2	36.9	37.8
8	S-105std	105,000	95.00	150.0	42.4	43.6	43.2	44.4
9	S-120std	120,000	95.00	165.0	50.5	50.3	50.5	51.0
10	D-37.5	37,500	95.00	65.0	5.5	7.1	8.8	10.9
11	D-50	50,000	95.00	80.0	8.9	11.0	12.9	15.2
12	D-75	75,000	95.00	110.0	16.9	19.0	21.8	24.0
13	D-100	100,000	95.00	140.0	25.8	27.6	30.7	32.8
14	D-125	125,000	95.00	150.0	31.7	33.6	37.8	40.7
15	D-150	150,000	95.00	160.0	37.4	39.3	44.5	48.5
16	D-175	175,000	95.00	180.0	44.0	47.1	52.5	56.8
17	D-200	200,000	95.00	200.0	51.1	54.7	60.4	65.2
18	D-225	225,000	95.00	220.0	58.3	62.1	68.3	73.5
19	D-250	250,000	95.00	240.0	65.3	69.3	76.1	81.7
20	2D-100	100,000	95.00	120.0	10.6	11.5	13.9	17.4
21	2D-150	150,000	95.00	140.0	18.2	20.3	24.2	29.6
22	2D-200	200,000	95.00	160.0	26.4	30.2	35.0	42.9
23	2D-250	250,000	95.00	170.0	34.1	39.2	45.4	55.5
24	2D-300	300,000	95.00	190.0	42.3	48.4	56.0	68.1
25	2D-350	350,000	95.00	190.0	49.5	56.9	66.2	80.4
26	2D-400	400,000	95.00	200.0	56.6	64.9	76.2	92.4
27	2D-450	450,000	95.00	210.0	62.3	71.8	85.3	103.8
28	2D-500	500,000	95.00	220.0	67.3	76.4	92.2	113.8
29	2D-550	550,000	95.00	230.0	70.9	79.3	96.1	121.6
30	2D/2D2-40	640,000	95.00	210.0	36.6	39.6	46.2	63.1
31	2D/2D2-50	800,000	95.00	220.0	48.9	53.7	64.9	85.6
32	2D/2D2-60	960,000	95.00	230.0	62.2	69.4	85.9	108.3
33	2D/2D2-70	1,120,000	95.00	240.0	77.7	87.4	108.4	131.1
34	3D-40	480,000	95.00	210.0	34.2	37.5	44.4	62.9
35	3D-50	600,000	95.00	220.0	46.4	51.2	62.4	87.4
36	3D-60	720,000	95.00	230.0	60.1	66.8	83.1	113.1
37	3D-70	840,000	95.00	240.0	74.6	83.7	105.9	138.6
38	2D/3D2-40W	800,000	36.75	210.0	32.7	34.5	38.7	51.3
39	2D/3D2-50W	1,000,000	36.75	220.0	43.0	46.0	52.5	72.1
40	2D/3D2-60W	1,200,000	36.75	230.0	54.1	58.6	68.4	93.6
41	2D/3D2-70W	1,400,000	36.75	240.0	65.6	72.2	86.7	115.4
42	2D/3D2-40B	800,000	55.75	210.0	30.8	33.1	38.0	52.0
43	2D/3D2-50B	1,000,000	55.75	220.0	41.0	44.7	52.5	74.1
44	2D/3D2-60B	1,200,000	55.75	230.0	52.5	57.4	69.0	97.4
45	2D/3D2-70B	1,400,000	55.75	240.0	65.3	71.7	87.7	121.8

Table E-2. Rigid ACN Data Used to Establish Allowable Gross Weight

Results Table 3. Rigid ACN at Indicated Gross Weight and Strength

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	A(552)	B(295)	C(147)	D(74)
1	S-7.5std	7,500	95.00	52.5	2.1	2.2	2.3	2.2
2	S-15std	15,000	95.00	60.0	4.3	4.5	4.7	4.8
3	S-30std	30,000	95.00	75.0	9.3	9.7	10.0	10.2
4	S-45std	45,000	95.00	90.0	14.9	15.4	15.8	16.1
5	S-60std	60,000	95.00	105.0	21.1	21.6	22.1	22.4
6	S-75std	75,000	95.00	120.0	27.7	28.2	28.7	29.0
7	S-90st	90,000	95.00	135.0	34.8	35.2	35.6	35.9
8	S-105std	105,000	95.00	150.0	42.2	42.6	42.9	43.1
9	S-120std	120,000	95.00	165.0	50.0	50.2	50.4	50.5
10	D-37.5	37,500	95.00	65.0	7.3	8.1	9.0	9.6
11	D-50	50,000	95.00	80.0	11.0	12.1	13.0	13.8
12	D-75	75,000	95.00	110.0	19.4	20.8	22.0	23.0
13	D-100	100,000	95.00	140.0	28.7	30.3	31.7	32.8
14	D-125	125,000	95.00	150.0	35.1	37.1	39.0	40.4
15	D-150	150,000	95.00	160.0	41.3	43.8	46.1	47.9
16	D-175	175,000	95.00	180.0	49.8	52.6	55.1	57.1
17	D-200	200,000	95.00	200.0	58.6	61.5	64.2	66.4
18	D-225	225,000	95.00	220.0	67.4	70.6	73.4	75.8
19	D-250	250,000	95.00	240.0	76.4	79.7	82.7	85.2
20	2D-100	100,000	95.00	120.0	10.3	12.2	14.6	16.9
21	2D-150	150,000	95.00	140.0	18.5	22.1	26.0	29.6
22	2D-200	200,000	95.00	160.0	28.1	33.2	38.5	43.1
23	2D-250	250,000	95.00	170.0	36.6	43.2	49.8	55.5
24	2D-300	300,000	95.00	190.0	45.8	53.8	61.7	68.4
25	2D-350	350,000	95.00	190.0	52.9	62.4	71.8	79.8
26	2D-400	400,000	95.00	200.0	60.2	71.0	81.8	91.0
27	2D-450	450,000	95.00	210.0	66.3	78.3	90.5	101.0
28	2D-500	500,000	95.00	220.0	70.1	83.0	96.6	108.5
29	2D-550	550,000	95.00	230.0	72.0	85.0	99.7	113.0
30	2D/2D2-40	640,000	95.00	210.0	36.2	42.2	49.9	57.6
31	2D/2D2-50	800,000	95.00	220.0	49.4	58.4	68.8	78.4
32	2D/2D2-60	960,000	95.00	230.0	64.7	76.5	89.4	100.9
33	2D/2D2-70	1,120,000	95.00	240.0	81.9	96.5	111.7	124.9
34	3D-40	480,000	95.00	210.0	34.9	41.6	53.5	66.7
35	3D-50	600,000	95.00	220.0	47.3	59.5	76.7	94.0
36	3D-60	720,000	95.00	230.0	62.9	80.8	103.2	124.1
37	3D-70	840,000	95.00	240.0	80.7	104.3	131.4	155.7
38	2D/3D2-40W	800,000	36.75	210.0	31.4	35.1	40.8	47.5
39	2D/3D2-50W	1,000,000	36.75	220.0	41.5	47.4	55.8	64.8
40	2D/3D2-60W	1,200,000	36.75	230.0	53.1	61.5	72.5	83.6
41	2D/3D2-70W	1,400,000	36.75	240.0	65.9	77.0	90.7	103.8
42	2D/3D2-40B	800,000	55.75	210.0	34.0	34.8	42.9	54.2
43	2D/3D2-50B	1,000,000	55.75	220.0	43.3	47.9	61.1	76.9
44	2D/3D2-60B	1,200,000	55.75	230.0	52.6	63.7	82.2	102.2
45	2D/3D2-70B	1,400,000	55.75	240.0	65.5	82.0	105.9	129.9

E.3.2 The data in the tables were used to develop a list of maximum gross weights for Runway Weight Bearing Capacity Data. The listings that correlates gross weights with known PCN values for flexible and rigid pavement (see Appendix F) provide recommended maximum gross weights based on PCN determination.

E.3.3 There will be cases where the gross weight of an aircraft exceeds the gross weight in Tables E-1 and E-2 for a reported PCN determined using the procedures in Appendices 1 through 3. The values in the tables are not as accurate as the gross weights associated with the ACN assigned by the aircraft manufacturer. The reported PCN is the basis for data in the tables, and the airport manager should rely on the reported PCN rather than the gross weight data in the table when the ACN of the departing or landing aircraft is known.

E.3.4 Table E-3 shows the format of the list and brief instructions on its use. The first example shown in the table is for a pavement that supports single, dual, and dual tandem wheel gear aircraft, and the airport can report a PCN of 30 with subgrade category B support. At the intersection of the PCN value with the gear types SW, DW, and DTWS and Subgrade Support Category B, 76,000 pounds is the maximum allowable gross weight for single wheel aircraft, 115,000 pounds is the maximum allowable gross weight for dual wheel aircraft, and 215,000 pounds is the maximum allowable gross weight for dual tandem wheel aircraft. Local experience can be considered to use a lower weight, but higher weights are not recommended.

Table E-3. Excerpt From Listing of Maximum Gross Weight Data

FLEXIBLE PCN					RIGID PCN			
Airplane gross weight (1,000's lbs) for each Subgrade Category B								
	SW	DW	DTW	DDTW	SW	DW	DTW	DDTW
	B(10)	B(10)	B(10)	B(10)	B(295)	B(295)	B(295)	B(295)
PCN								
23	62	90	180	----	64	80	160	----
24	64	90	185	----	66	85	160	----
25	[illegible]	[illegible]5	[illegible]90	----	69	85	165	----
30	76	115	215	----	80	100	190	----
35	87	140	245	----	91	120	215	----
37	91	145	260	620	[illegible]5	[illegible]30	225	----
40	98	160	275	660	101	140	245	630
45	111	175	305	720	111	160	265	680
4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	*PCN = 43RBWT, perform straight line interpolation*							
5								

E.3.5 The second example in the table is for a pavement that supports aircraft with single and dual wheel gear configurations. The pavement has a PCN of 43/R/B/W/T. The gross weights at the intersection of the PCN value for a B category subgrade with each gear type is between PCN values 40 and 45. Straight line interpolation between values is recommended. Single wheel gross weight is 107,000 pounds. Dual wheel gross weight is 152,000. Local experience can be considered to use lower weights, but higher weights are not recommended.

APPENDIX F. MAXIMUM AIRCRAFT GROSS WEIGHT TABLES FOR FAA FORM 5010 REPORTING BASED ON PCN DETERMINATION

Table F-1. Subgrade Strength Category A

FLEXIBLE PCN Subgrade Category A					RIGID PCN Subgrade Category A			
Aircraft gross weight (1,000's lbs): Subgrade Category A								
	SW	DW	DTW	DDTW	SW	DW	DTW	DDTW
	A(15)	A(15)	A(15)	A(15)	A(552)	A(552)	A(552)	A(552)
PCN								
3	15	---	---	---	---	---	---	---
4	18	---	---	---	14	---	---	---
5	21	---	---	---	17	---	---	---
6	25	40	---	---	21	---	---	---
7	27	45	---	---	23	35	---	---
8	30	45	---	---	27	40	---	---
9	33	50	---	---	30	45	---	---
10	36	55	95	---	32	50	100	---
12	41	60	110	---	38	55	115	---
13	44	65	120	---	41	60	120	---
14	47	65	125	---	43	60	125	---
15	49	70	130	---	46	65	135	---
16	51	75	140	---	49	65	140	---
17	53	75	145	---	51	70	145	---
18	56	80	150	---	53	70	150	---
19	58	80	160	---	56	75	155	---
20	60	85	165	---	58	80	160	---
25	71	100	195	---	70	90	190	---
30	81	120	230	---	81	110	220	---
34	89	140	260	---	89	125	245	625

FLEXIBLE PCN Subgrade Category A					RIGID PCN Subgrade Category A			
Aircraft gross weight (1,000's lbs): Subgrade Category A								
	SW	DW	DTW	DDTW	SW	DW	DTW	DDTW
PCN	A(15)	A(15)	A(15)	A(15)	A(552)	A(552)	A(552)	A(552)
35	91	145	265	630	92	130	250	635
40	102	165	295	700	102	150	275	700
45	111	185	335	770	112	165	310	765
48	116	195	355	810	116	175	335	800
49	---	195	360	820	---	175	340	810
50	---	200	370	835	---	180	350	825
55	---	220	410	900	---	195	385	880
60	---	240	460	960	---	210	425	930
65	---	---	520	1015	---	225	485	980
70	---	---	---	1065	---	240	---	1030
71	---	---	---	1075	---	240	---	1040
72	---	---	---	1085	---	---	---	1050
75	---	---	---	---	---	---	---	1080

Note: When the PCN falls between two values, use straight line interpolation to determine the allowable gross weight for the gear types.

Table F-2. Subgrade Strength Category B

FLEXIBLE PCN Subgrade Category B					RIGID PCN Subgrade Category B			
Airplane gross weight (1,000's lbs): Subgrade Category B								
	SW	DW	DTW	DDTW	SW	DW	DTW	DDTW
PCN	B(10)	B(10)	B(10)	B(10)	B(295)	B(295)	B(295)	B(295)
3	15	---	---	---	14	---	---	---
6	23	35	---	---	22	---	---	---
7	26	40	---	---	25	35	---	---
8	29	45	100	---	28	40	---	---
9	32	50	105	---	32	45	---	---
10	34	50	110	---	34	50	---	---

FLEXIBLE PCN Subgrade Category B					RIGID PCN Subgrade Category B			
Airplane gross weight (1,000's lbs): Subgrade Category B								
PCN	SW B(10)	DW B(10)	DTW B(10)	DDTW B(10)	SW B(295)	DW B(295)	DTW B(295)	DDTW B(295)
11	36	55	120	---	37	50	100	---
12	38	60	125	---	39	55	105	---
13	41	60	130	---	42	55	110	---
14	43	65	135	---	45	60	115	---
16	48	70	150	---	50	65	130	---
18	52	75	160	---	55	70	140	---
20	57	80	170	---	59	75	150	---
22	62	90	180	---	64	80	160	---
24	66	95	190	---	69	85	165	---
25	76	115	215	---	80	100	190	---
30	87	140	245	---	91	120	215	---
35	91	145	260	620	95	130	225	---
37	98	160	275	660	101	140	245	630
40	111	175	305	720	111	160	265	680
45	116	185	325	755	116	165	280	715
48	---	190	335	780	---	170	290	735
50	---	210	370	835	---	185	325	785
55	---	225	400	885	---	200	355	835
60	---	---	440	935	---	215	385	880
65	---	---	505	985	---	230	420	925
70	---	---	---	1005	---	235	435	940
72	---	---	---	1015	---	240	440	950
73	---	---	---	1025	---	240	450	960
74	---	---	---	1035	---	---	455	965
75	---	---	---	1045	---	---	470	975
76	---	---	---	1055	---	---	490	985
77	---	---	---	1065	---	---	515	990
78	---	---	---	1080	---	---	---	1010
80	---	---	---	---	---	---	---	1050
85	---	---	---	---	---	---	---	1085
89	---	---	---	---	---	---	---	---

Note: When the PCN falls between two values, use straight line interpolation to determine the allowable gross weight for the gear types.

Table F-3. Subgrade Strength Category C

	FLEXIBLE PCN Subgrade Category C				RIGID PCN Subgrade Category C			
	Airplane gross weight (1,000's lbs): Subgrade Category C							
PCN	SW C(6)	DW C(6)	DTW C(6)	DDTW C(6)	SW C(147)	DW C(147)	DTW C(147)	DDTW C(147)
4	12	---	---	---	13	---	---	---
6	17	---	---	---	19	---	---	---
8	22	---	---	---	25	---	---	---
10	27	40	---	---	31	40	---	---
12	32	50	---	---	36	50	---	---
13	35	50	100	---	38	50	---	---
14	37	55	105	---	41	55	100	---
15	40	60	110	---	44	55	105	---
20	52	70	135	---	56	70	130	---
25	64	85	160	---	68	85	150	---
30	76	100	180	---	79	100	170	---
35	87	120	205	---	90	115	190	---
40	99	140	230	---	100	135	215	---
43	106	150	245	625	107	145	230	---
45	111	155	255	640	111	150	235	---
46	113	160	260	650	113	155	240	---
47	115	165	265	660	115	155	245	625
48	116	165	270	670	116	160	250	635
50	---	170	280	690	---	165	260	655
55	---	190	305	735	---	180	280	700
60	---	205	330	780	---	195	305	745
65	---	220	355	820	---	205	330	785
70	---	240	385	860	---	220	355	830
71	---	240	390	870	---	225	360	835
75	---	---	415	900	---	235	385	870
76	---	---	420	905	---	240	390	875
77	---	---	425	915	---	240	395	885
80	---	---	440	940	---	---	410	910
85	---	---	480	975	---	---	440	945
88	---	---	520	1000	---	---	465	970
90	---	---	---	1015	---	---	490	985
92	---	---	---	1030	---	---	525	1000
95	---	---	---	1050	---	---	---	1025
100	---	---	---	1085	---	---	---	1060
102	---	---	---	---	---	---	---	1075
103	---	---	---	---	---	---	---	1080

Note: When the PCN falls between two values, use straight line interpolation to determine the allowable gross weight for the gear types.

Table F-4. Subgrade Strength Category D

PCN	FLEXIBLE PCN Subgrade Category D SW D(3)	DW D(3)	DTW D(3)	DDTW D(3)	RIGID PCN Subgrade Category D SW D(74)	DW D(74)	DTW D(74)	DDTW D(74)
	Airplane gross weight (1,000's lbs): Subgrade Category D							
4	---	---	---	---	13	---	---	---
5	13	---	---	---	16	---	---	---
6	16	---	---	---	19	---	---	---
8	21	---	---	---	24	---	---	---
10	26	---	---	---	30	40	---	---
11	29	40	---	---	32	45	---	---
12	31	40	---	---	35	45	---	---
15	38	50	---	---	43	55	---	---
16	40	55	---	---	46	55	100	---
20	50	65	115	---	55	70	115	---
25	62	80	135	---	67	80	135	---
30	74	95	155	---	78	95	155	---
35	85	110	175	---	89	110	175	---
40	97	125	195	---	100	130	195	---
45	109	145	215	---	111	145	215	---
48	116	155	225	---	116	155	225	---
50	---	160	235	---	---	160	235	---
54	---	170	250	---	---	170	250	625
59	---	185	270	625	---	185	270	665
60	---	190	275	630	---	185	275	675
65	---	205	295	670	---	200	295	715
70	---	220	320	705	---	215	320	755
75	---	235	340	740	---	230	345	790
77	---	245	350	755	---	235	350	810
80	---	---	360	780	---	240	365	830
85	---	---	380	815	---	---	390	865
90	---	---	405	850	---	---	415	905
95	---	---	425	885	---	---	440	940
100	---	---	450	920	---	---	475	975
105	---	---	475	960	---	---	530	1010
110	---	---	510	995	---	---	---	1045
113	---	---	530	1015	---	---	---	1065
115	---	---	---	1030	---	---	---	1080
116	---	---	---	1040	---	---	---	1085
120	---	---	---	1065	---	---	---	---
122	---	---	---	1080	---	---	---	---

Note: When the PCN falls between two values, use straight line interpolation to determine the allowable gross weight for the gear types.

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APPENDIX G. RELATED READING MATERIAL

The following publications were used during the development of this AC:

1. AC 150/5320-6, Airport Pavement Design and Evaluation. The FAA makes this publication available for free on the FAA website at http://www.faa.gov.
2. ICAO Bulletin, Official Magazine of International Civil Aviation, Airport Technology, Volume 35, No. 1, Montreal, Quebec, Canada H3A 2R2, January 1980.