



Ukiah Municipal Airport Pavement Management System

Prepared for
City of Ukiah



City of Ukiah

and

Federal Aviation Administration



Prepared by

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1. INTRODUCTION

This report was prepared by Mead & Hunt, Inc. (Consultant) as part of the Airport Pavement Management System (APMS) for Ukiah Municipal Airport (Airport), operated by the City of Ukiah (City). The term APMS can be used interchangeably with “Pavement Management Program” (PMP) and “Pavement Maintenance Management Program” (PMMP). The APMS is a set of defined procedures for collecting, analyzing, maintaining, and reporting pavement data. Per Advisory Circular 150/5380-7B, federally obligated airports should perform a detailed inspection of airports every year, and every three years if a Pavement Condition Index (PCI) survey is performed. This report is intended to provide specific recommendations on maintenance needs for each airport pavement surface, as well as more specific programming of the timing of those recommendations over the next five years.

Methods and techniques used in the preparation of this report are in conformance with Federal Aviation Administration (FAA) Advisory Circular 150/5380-7B, *Airport Pavement Management Program*. This Advisory Circular defines acceptable pavement management programs for airports and methods in preparing such documents.

A Pavement Classification Number (PCN) evaluation was also performed, in accordance with the FAA Advisory Circular 150/5335-5C, *Standardized Method of Reporting Airport Pavement Strength – PCN*. This Advisory Circular provides guidance for using the standardized method, known as the Aircraft Classification Number-Pavement Classification Number (ACN-PCN) for reporting pavement strength.

2. SCOPE OF SERVICES

In general, the Scope of Services for this APMS study consisted of the following elements:

2.1 OBTAIN DATA

Consultant obtained available data relating to pavement construction history from a geotechnical report.

2.2 PREPARE PAVEMENT INVENTORY

Consultant prepared an inventory of existing pavement. The following data was depicted:

- 1) Identification of runways, taxiways, taxilanes, aprons, parking lots, and service roads broken into sections having similar properties;
- 2) Dimensions and areas of pavements and pavement sections;
- 3) Type of pavement surface; and
- 4) Year of construction and most recent rehabilitation (if known).

2.3 VISUAL CONDITION SURVEY

Consultant conducted a visual condition survey of City-maintained airfield pavement areas to identify and quantify pavement distress.

2.4 PAVEMENT CONDITION INDEX (PCI) RATINGS

Based upon the results of the visual condition survey, the Consultant input calculated distress quantities into the FAA program PAVEAIR to determine PCI ratings for each pavement section.

2.5 PREPARE SCHEDULE OF MAINTENANCE

Based upon the results of the visual condition survey and analysis, the Consultant prepared a schedule of recommended pavement maintenance with estimated project costs.

2.6 PCN EVALUATION

The PCN calculations were performed using the FAA COMFAA program in accordance with Advisory Circular 150/5335-5C.

The Consultant worked with the City to prepare and develop an aircraft fleet mix (see Chapter 8 – PCN Evaluation). The complete fleet mix was used for the analysis on the runway and taxiways, and then modified/reduced as necessary for the pavement areas on aprons and taxilanes served by the various aircraft.

3. BACKGROUND

3.1 PREVIOUS STUDIES

Prior to 2007, the APMS’s were developed using the MicroPAVER computer program. It has been determined that the maintenance recommendations that the MicroPAVER program generated were too generic to effectively be used as a budgeting tool for programming projects. The Consultant will use a more pavement-specific approach, based on the visual condition survey, in developing this APMS.

3.2 PAVEMENT FEATURES

This report breaks down individual sections of each pavement feature based on the history and composition of the pavement section. Pavement features and their individual sections are identified graphically in *Exhibit A*. A summarized list of the pavement features is shown below:

Pavement Features
Runway 15-33
Parallel Taxiway A
Taxiway Connector B
Taxiway Connector C
Taxiway Connector D
Taxiway Connector E
Helipad Apron
Helipad & Hangar Apron
Tie-Down Apron 1
Tie-Down Apron 2
Tie-Down Apron 3
Hangar Area 1 Taxilanes
Hangar Area 2 Taxilane
North Service Road
West Service Road
Parking Lot

3.3 PAVEMENT HISTORY

In order to develop an inventory of all pavement features and their respective pavement construction and maintenance histories, previous record drawings have been reviewed but provided limited information. This data has been consolidated into a table, which includes a chronology of pavement construction and maintenance projects for each pavement feature, as well as the year of construction, pavement section composition and thicknesses, subgrade treatment (if applicable), and known subgrade California Bearing Ratio (CBR) values as determined by geotechnical investigations. This pavement section history table is included as *Exhibit B*.

4. VISUAL CONDITION SURVEY

To determine the PCI rating for each pavement feature, a visual condition survey was performed on September 11, 2017. The survey consisted of inspecting the pavement for various distresses. The distresses evaluated are defined in the Paver Distress Identification Manuals, developed by the US Army Corps of Engineers, and available as supplemental material to AC 150/5380-7B.

The distresses can be caused by a variety of factors, most of which occur over time when exposed to natural conditions. The more serious distresses can be caused by subgrade failure and repeated traffic loading. The most common observed distresses and their typical causes are listed below:

4.1 AC PAVEMENT DISTRESS

4.1.1 Alligator Cracking

Series of interconnecting cracks caused by fatigue failure of the AC surface under repeated traffic loading. This distress indicates a structural failure and is associated with subgrade bearing strength.

4.1.2 Block Cracking

Occurs over time due to shrinkage of the AC surface. These cracks typically form when longitudinal and transverse cracking is allowed to persist over a longer period of time.

4.1.3 Longitudinal and Transverse Cracking

Longitudinal cracks are parallel to the pavement's centerline or laydown direction while transverse cracks extend across the pavement at approximately right angles to the pavement centerline or direction of laydown. Occurs over time due to shrinkage of the AC surface, which is usually driven by temperature cycles and hardening of the AC. Sometimes cracks will result from older cracks in pavement beneath the surface course. Longitudinal cracks will typically form along paving lane joints as well.

4.1.4 Patching

A patch is an area where the original pavement has been removed and replaced by a filler material.

4.1.5 Weathering

Occurs over time on all pavements due to the wearing of AC binder and fine aggregate matrix from the pavement surface.

4.2 PCC PAVEMENT DISTRESS

4.2.1 Cracking

Usually caused by a combination of load repetition, curling stresses, and shrinkage stresses. Typically develops first as a mid-panel crack, then further divides into three or more pieces.

4.2.2 Corner Break

A corner break is a crack that intersects the joints at a distance less than or equal to one-half the slab length on both sides, measured from the corner of the slab.

4.2.3 Patching

A patch is an area where the original pavement has been removed and replaced by a filler material.

4.2.4 Popouts

A popout is a small piece of pavement that breaks loose from the surface due to freeze-thaw action in combination with expansive aggregates.

4.2.3 Spalling

Breakdown of slab edges or corners, results from excessive stresses at the joint or crack, typically caused by infiltration of incompressible materials or traffic loads.

4.2.4 Alkali Silica Reaction

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.

The observed distresses for the airfield pavements are detailed below, with photos from the visual condition survey. The overall conditions are summarized in section 5. A color-coded matrix summarizing the distresses and their severity levels is included as *Exhibit C*.

4.3 RUNWAYS

4.3.1 Runway 15-33

Runway 15-33 is 4,423 feet long by 150 feet wide, including a 590-foot overrun on Runway 15. There are three distinct sections, with regards to pavement condition: Runway 15 Overrun and South Section (Sections 1 and 4), North Section (Section 2), and Central Section (Section 3). The observed distresses in each area are listed below:

Severity	Distress (Sections 1 and 4)
Low	Longitudinal and Transverse Cracking
Medium	Weathering
High	Longitudinal and Transverse Cracking



Runway 15-33 (Section 4): Longitudinal and Transverse Cracking

Severity	Distress (Section 2)
Low	Longitudinal and Transverse Cracking
Medium	Block Cracking, Weathering
High	Block Cracking, Longitudinal and Transverse Cracking



Runway 15-33 (Section 2): Block Cracking

Severity	Distress (Section 3)
Low	Longitudinal and Transverse Cracking, Patching
Medium	Weathering
High	Longitudinal and Transverse Cracking



Runway 15-33 (Section 3): Patching

4.4 TAXIWAYS

4.4.1 Parallel Taxiway A

Parallel Taxiway A is composed of four distinct sections, with regards to pavement condition: North Section (Section 5), Central Section 1 (Section 6), Central Section 2 (Section 7) and South Section (Section 8). The observed distresses in each area are listed below:

Severity	Distress (Section 5)
Medium	Alligator Cracking, Longitudinal and Transverse Cracking, Weathering



Parallel Taxiway A (Section 5): Alligator Cracking

Severity	Distress (Section 6)
Medium	Longitudinal and Transverse Cracking, Weathering



Parallel Taxiway A (Section 6): Longitudinal and Transverse Cracking

Severity	Distress (Section 7)
Low	Patching
Medium	Weathering
High	Longitudinal and Transverse Cracking



Parallel Taxiway A (Section 7): Longitudinal and Transverse Cracking

Severity	Distress (Section 8)
Medium	Weathering
High	Longitudinal and Transverse Cracking



Parallel Taxiway A (Section 8): Longitudinal and Transverse Cracking

4.4.2 Taxiway Connectors

The Taxiway Connectors include Taxiways B, C, D and E. Four distinct sections were observed, with regards to pavement condition: Taxiway B (Section 9), Taxiway C (Section 10), Taxiway D

(Section 11), and Taxiway E (Section 12). Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 9)
Low	Longitudinal and Transverse Cracking
Medium	Longitudinal and Transverse Cracking, Patching, Weathering
High	Longitudinal and Transverse Cracking, Weathering



Taxiway Connector B: Longitudinal and Transverse Cracking

Severity	Distress (Section 10)
Low	Longitudinal and Transverse Cracking
Medium	Longitudinal and Transverse Cracking, Patching, Weathering



Taxiway Connector C: Patching

Severity	Distress (Section 11)
Medium	Weathering
High	Block Cracking, Longitudinal and Transverse Cracking, Patching



Taxiway Connector D: Longitudinal and Transverse Cracking

Severity	Distress (Section 12)
Low	Longitudinal and Transverse Cracking, Patching
Medium	Weathering



Taxiway Connector E: Patching

4.5 APRONS AND HANGAR TAXILANES

4.5.1 Hangar Area 1 Taxilanes

Hangar Area 1 Taxilanes are comprised of five distinct sections, with regards to pavement condition: Taxilane 1 (Section 13), Taxilanes 2 and 4 (Sections 14 and 16, respectively), Taxilanes 3, 5 and 6 (Sections 15, 17 and 18, respectively), Taxilane 7 (Section 19), and the Shade Hangars (Section 20). Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 13)
Low	Longitudinal and Transverse Cracking, Weathering
Medium	Alligator Cracking, Longitudinal and Transverse Cracking, Patching



Taxilane 1: Alligator Cracking

Severity	Distress (Sections 14 and 16)
Low	Block Cracking, Patching, Weathering
Medium	Block Cracking



Taxilane 2: Block Cracking and Patching

Severity	Distress (Sections 15, 17 and 18)
Low	Block Cracking, Weathering
Medium	Block Cracking



Taxilane 5: Block Cracking

Severity	Distress (Section 19)
Low	Patching, Weathering
Medium	Block Cracking



Taxilane 7: Patching

Severity	Distress (Section 20)
Low	Weathering



Shade Hangars: Weathering

4.5.2 Hangar Area 2 Taxilane

The Hangar Area 2 Taxilane is located on the southwest side of the Airport. Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 21)
Low	Longitudinal/Transverse Cracking, Weathering
Medium	Longitudinal/Transverse Cracking



Hangar Area 2 Taxilane: Longitudinal and Transverse Cracking

4.5.3 Helipad Apron

Helipad Apron (Section 22) is located on the north side of the Airport. Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 22)
Low	Alligator Cracking, Longitudinal and Transverse Cracking, Weathering
Medium	Longitudinal and Transverse Cracking
High	Longitudinal and Transverse Cracking



Helipad Apron: Longitudinal and Transverse Cracking

4.5.4 Hangar Apron

The Hangar Apron (Section 23) is located on the west side of the Airport. The observed distresses in this area are listed below:

Severity	Distress (Sections 23)
Low	Longitudinal and Transverse Cracking, Weathering



Hangar Apron: Longitudinal and Transverse Cracking

4.5.5 Tie-Down Apron 1

Tie-Down Apron 1 (Section 24) is located on the west side of the airport. Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 24)
Low	Block Cracking, Weathering
Medium	Alligator Cracking
High	Alligator Cracking



Tie-Down Apron 1: Block Cracking

4.5.6 Tie-Down Apron 2

The Tie-Down Apron 2 consists of six distinct sections, with regards to pavement condition: North Tie-Downs (Section 25), Main Section AC 1 (Section 26), PCC Section 1 (Section 27), PCC Section 2 (Section 28), Main Section AC 2 (Section 29), and Fuel Farm (Section 30). The observed distresses in each area are listed below:

Severity	Distress (Section 25)
Low	Longitudinal/Transverse Cracking, Weathering



North Tie-Downs: Longitudinal and Transverse Cracking

Severity	Distress (Section 26)
Low	Longitudinal and Transverse Cracking, Weathering
Medium	Block Cracking, Longitudinal and Transverse Cracking, Patching, Weathering
High	Alligator Cracking



Main Section AC 1: Alligator Cracking

Severity	Distress (Section 27)
Low	Corner Break, Linear Cracking, Patching, Joint Spalling, Alkali Silica Reaction
Medium	Linear Cracking
High	Patching



PCC Section 1: Linear Cracking and Patching

Severity	Distress (Section 28)
Low	Corner Break, Linear Cracking, Alkali Silica Reaction



PCC Section 2: Linear Cracking

Severity	Distress (Section 29)
Medium	Patching, Weathering
High	Alligator Cracking, Block Cracking, Depression



Main Section AC 2: Block Cracking

Severity	Distress (Section 30)
Low	Corner Break, Linear Cracking, Joint Spalling
Medium	Linear Cracking

4.5.7 Tie-Down Apron 3

Tie-Down Apron 3 (Section 31) is located on the southwest side of the Airport. Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 31)
Low	Block Cracking
Medium	Block Cracking, Patching, Weathering



Tie-Down Apron 3: Patching

4.6 AIRPORT ROADS AND PARKING

4.6.1 North Service Road

North Service Road consists of two distinct sections, with regard to pavement condition: North Service Road 1 (Section 32) and North Service Road 2 (Section 33). The observed distresses in each area are listed below:

Severity	Distress (Section 32)
Low	Weathering
Medium	Depression



North Service Road 1: Depression

Severity	Distress (Section 33)
Low	Longitudinal and Transverse Cracking, Weathering

4.6.2 West Service Road

West Service Road includes two distinct sections, with regards to pavement condition: West Service Road 1 (Section 34) and West Service Road 2 (Section 35). The observed distresses in each area are listed below:

Severity	Distress (Section 34)
High	Weathering



West Service Road 1: Weathering

Severity	Distress (Section 35)
Low	Weathering
Medium	Alligator Cracking



West Service Road 2: Alligator Cracking

4.6.3 Parking Lot

The Parking Lot (Section 36) is located on the west side of the Airport. Currently, the pavement exhibits the following distresses:

Severity	Distress (Section 36)
Low	Longitudinal and Transverse Cracking, Weathering



Parking Lot: Weathering

5. PAVEMENT CONDITION SUMMARY

Based on the results of the visual condition survey, the observed distresses were quantified and input into the FAA program PAVEAIR, in order to determine the PCI value for each pavement section. The PCI calculation process utilized by PAVEAIR conforms to the test method defined in ASTM D5340-12, *Standard Test Method for Airport Pavement Condition Index Surveys*. In this method, the PCI values are derived by starting with a value of 100 and subtracting a deduct value for each distress observed. The deduct values are based on specific pavement deduct curves shown in ASTM D5340-12.

The PCI values correspond to a verbal classification, defined in ASTM D5340-12 as the Pavement Condition Rating. Pavement conditions in this report will be rated as Good, Satisfactory, Fair, Poor, Very Poor, Serious, or Failed, based on PCI values derived from PAVEAIR. The table below shows how the pavement condition ratings correspond to each range of PCI values.

Pavement Condition Rating	PCI Range	
Good	85-100	
Satisfactory	70-85	
Fair	55-70	
Poor	40-55	
Very Poor	25-40	
Serious	10-25	
Failed	0-10	

The current PCI and pavement condition rating for each section are summarized in the following table. Current pavement conditions are also shown graphically in the Pavement Condition Plan included in *Exhibit D* of this report.

PAVEMENT CONDITION TABLE				
PAVEMENT FEATURE	SECTION	DESCRIPTION	CURRENT PCI	CURRENT CLASSIFICATION
Runway 15-33	1	Runway 15 Overrun	46	Poor
	2	North Section	38	Very Poor
	3	Central Section	45	Poor
	4	South Section	37	Very Poor
Parallel Taxiway A	5	North Section	64	Fair
	6	Central Section 1	69	Fair
	7	Central Section 2	47	Poor
	8	South Section	51	Poor
Taxiway Connector B	9	Taxiway Connector B	32	Very Poor
Taxiway Connector C	10	Taxiway Connector C	63	Fair
Taxiway Connector D	11	Taxiway Connector D	51	Poor
Taxiway Connector E	12	Taxiway Connector E	68	Fair
Hangar Area 1 Taxilanes	13	Taxilane 1	63	Fair
	14	Taxilane 2	57	Fair
	15	Taxilane 3	61	Fair
	16	Taxilane 4	56	Fair
	17	Taxilane 5	61	Fair
	18	Taxilane 6	61	Fair
	19	Taxilane 7	59	Fair
	20	Shade Hangars	94	Good
Hangar Area 2 Taxilane	21	Hangar Area 2 Taxilane	82	Satisfactory
Helipad Apron	22	Helipad Apron	74	Satisfactory
Hangar Apron	23	Hangar Apron	77	Satisfactory
Tie-Down Apron 1	24	Tie-Down Apron 1	34	Very Poor
Tie-Down Apron 2	25	North Tie-Downs	85	Satisfactory
	26	Main Section AC 1	44	Poor
	27	PCC Section 1	45	Poor
	28	PCC Section 2	67	Fair
	29	Main Section AC 2	0	Failed
	30	Fuel Farm	42	Poor
Tie-Down Apron 3	31	Tie-Down Apron 3	43	Poor
North Service Road	32	North Service Road 1	15	Serious
	33	North Service Road 2	88	Good
West Service Road	34	West Service Road 1	63	Fair
	35	West Service Road 2	35	Very Poor
Parking Lot	36	Parking Lot	87	Good

6. PAVEMENT MAINTENANCE RECOMMENDATIONS

6.1 GENERAL

The day after a pavement is constructed, deterioration begins. In addition to the action of traffic, environmental factors such as age, hardening of the AC, and cycles of freeze-thaw and wet-dry, reduce the performance characteristics of the pavement. The increased use of a pavement by aircraft that are heavier than the design aircraft can greatly increase the rate of deterioration and reduce pavement life. The rate of deterioration on a pavement starts slowly and then tends to accelerate with time. The goal of a Pavement Management System is to program necessary maintenance before rapid deterioration begins, in order to get the maximum benefit from each maintenance dollar and to prolong pavement life as much as possible. The maintenance history for the pavements at Ukiah Municipal Airport, along with recommended pavement maintenance is summarized in *Exhibit E*.

Pavement maintenance recommendations and costs are detailed in the following section. The first cost is based on the present value of the work in 2018. A rough estimate of the effect of inflation was provided for the years from 2019 to 2022. Note that the cost estimates represent the recommended project based only on the condition of the pavement. Additional project elements that are not driven by pavement condition (such as electrical, sewer, fence, changes to geometric layout etc.) are not included in the project costs, although they may become a part of the actual project for different reasons. A graphic showing the recommended pavement projects is also included as *Exhibit F*.

For recommended reconstruction projects, it is assumed that there will be no additional impervious area added to the site, and that the existing drainage characteristics will remain unchanged. If any of these conditions change in the design process, an analysis will have to be performed to determine whether stormwater mitigation is necessary, which could impact the cost of the project. A cost estimate for drainage improvements is included where drainage structures are part of the existing pavement.

Cost estimates for reconstructions and rehabilitations are based on preliminary pavement section recommendations. The pavement sections were determined based on available geotechnical data for subgrade strength, as well as the fleet mix used for the PCN Evaluation included as *Exhibit G*. A geotechnical investigation and detailed design will need to be performed for each project to determine what the actual pavement sections and may impact actual construction costs.

The recommended maintenance program prioritizes projects based on the PCI values of the different pavement sections, as defined on the date of the visual condition survey. Changes in traffic loading, schedule of recommended maintenance, extreme weather conditions may affect actual project costs.

6.2 MAINTENANCE PROGRAM (LISTED IN ORDER OF PRIORITY)

6.2.1 Project 1: Rehabilitation of Runway 15-33

The pavement on Runway 15-33 (Sections 1, 2, 3 and 4) is in poor-to-very poor condition. The pavement in this area exhibits several high-severity cracking issues, all attributable to thermal related and aging issues. Since no structural related cracking was observed during the visual inspection survey, a rehabilitation of Runway 15-33 is recommended to restore condition of the pavement. The recommended project will include milling the top 3-inches of AC, crack sealing, the placement of a 3-inch layer of new AC, and markings application. The estimated cost for this project is reported below:

Construction Cost

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$50,000.00	\$50,000.00
2	Construction Staking and Survey Layout	LS	1	\$20,000.00	\$20,000.00
3	Access Route Improvements/Repair	T&E	1	\$20,000.00	\$20,000.00
4	Mobilization	LS	1	\$293,000.00	\$293,000.00
5	Miscellaneous Removals and Site Preparation	LS	1	\$15,000.00	\$15,000.00
6	Pulverize/Mill Asphalt Concrete Pavement	SY	83,800	\$3.50	\$293,300.00
7	Sawcut Asphalt Concrete	LF	500	\$6.00	\$3,000.00
8	Prepare Storm Water Pollution Prevention Plan (SWPPP)	LS	1	\$8,000.00	\$8,000.00
9	Implement SWPPP / Install Temporary Erosion Control	LS	1	\$17,000.00	\$17,000.00
10	Crack Seal	LF	6,000	\$5.00	\$30,000.00
11	Surface Preparation	SY	83,800	\$1.50	\$125,700.00
12	Unclassified Excavation, On-site Disposal	CY	7,000	\$15.00	\$105,000.00
13	Bituminous Surface Course, P-401	TON	14,900	\$145.00	\$2,160,500.00
14	Pavement Markings, with Reflective Media	LS	1	\$79,000.00	\$79,000.00
TOTAL					\$3,219,500.00

Total Project Cost

COUNTY ADMINISTRATION	\$64,400.00
DESIGN	\$322,000.00
TOPOGRAPHIC SURVEY	\$0.00
GEOTECHNICAL INVESTIGATION	\$0.00
CONSTRUCTION	\$3,219,500.00
RESIDENT ENGINEERING	\$257,500.00
MATERIALS TESTING	\$96,600.00
CONTINGENCY (15%)	\$594,000.00
TOTAL	\$4,554,000.00

Total Adjusted for Price Escalation (2019)	\$4,645,080.00
Total Adjusted for Price Escalation (2020)	\$4,737,981.60
Total Adjusted for Price Escalation (2021)	\$4,832,741.23
Total Adjusted for Price Escalation (2022)	\$4,929,396.06

Note: Price Escalation assumes 2% per year

6.2.2 Project 2: Rehabilitation of Taxiway A

The pavement on Taxiway A (Sections 5, 6, 7 and 8) exhibits thermal and aging related cracking, as well as localized structural related cracking. Although the pavement in this area is in fair-to-poor condition, the distresses observed do not show evidence of structural failure. For this reason, a rehabilitation of Taxiway A is recommended. The recommended project will include milling the top 2-inches of AC, crack sealing and pavement repair, the placement of a 2-inch layer of new AC, and markings application. The estimated cost for this project is reported below:

Construction Cost

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$60,000.00	\$60,000.00
2	Construction Staking and Survey Layout	LS	1	\$20,000.00	\$20,000.00
3	Access Route Improvements/Repair	T&E	1	\$10,000.00	\$10,000.00
4	Mobilization	LS	1	\$96,000.00	\$96,000.00
5	Miscellaneous Removals and Site Preparation	LS	1	\$10,000.00	\$10,000.00
6	Pulverize/Mill Asphalt Concrete Pavement	SY	26,500	\$5.00	\$132,500.00
7	Sawcut Asphalt Concrete	LF	3,300	\$4.50	\$14,850.00
8	Prepare Storm Water Pollution Prevention Plan (SWPPP)	LS	1	\$8,000.00	\$8,000.00
9	Implement SWPPP / Install Temporary Erosion Control	LS	1	\$17,000.00	\$17,000.00
10	Crack Seal	LF	6,400	\$5.00	\$32,000.00
11	Pavement Repair	SF	100	\$40.00	\$4,000.00
12	Surface Preparation	SY	26,500	\$1.50	\$39,750.00
13	Unclassified Excavation, On-site Disposal	CY	1,500	\$25.00	\$37,500.00
14	Bituminous Surface Course, P-401	TON	3,200	\$165.00	\$528,000.00
15	Pavement Markings, with Reflective Media	LS	1	\$37,000.00	\$37,000.00
				TOTAL	\$1,046,600.00

Total Project Cost

COUNTY ADMINISTRATION	\$21,000.00
DESIGN	\$104,700.00
TOPOGRAPHIC SURVEY	\$10,000.00
GEOTECHNICAL INVESTIGATION	\$15,000.00
CONSTRUCTION	\$1,046,600.00
RESIDENT ENGINEERING	\$125,600.00
MATERIALS TESTING	\$31,400.00
CONTINGENCY (15%)	\$203,145.00
TOTAL	\$1,557,445.00

Total Adjusted for Price Escalation (2019)	\$1,588,593.90
Total Adjusted for Price Escalation (2020)	\$1,620,365.78
Total Adjusted for Price Escalation (2021)	\$1,652,773.09
Total Adjusted for Price Escalation (2022)	\$1,685,828.56

Note: Price Escalation assumes 2% per year

6.2.3 Project 3: Reconstruction of Tie-Down Apron 1 and Tie-Down Apron 2

The AC pavement within Tie-Down Apron 1 (Section 24) and Tie-Down Apron 2 (Sections 26, 27, 28 and 29) is in poor-to-very poor condition and it is partially failed on Tie-Down Apron 2. Tie-Down Apron 2 includes also two PCC sections which condition ranges from fair to poor. The sections in these areas are severely affected by thermal and aging related cracking, as well as structural distresses. A reconstruction of these areas is recommended in order to maintain the structural capacity of the pavement. The project will consist of pulverizing the AC pavement and the suitable base, removing the PCC pavement, and placing 9 inches of AC (only 4 inches of AC if C130 is not part of the fleet mix) over 6 inches of AB. The AC will include 4 inches of surface layer and 5 inches of stabilized base. The existing PCC sections will be replaced by AC in order to decrease the cost of pavement maintenance. The estimated cost for this project is shown below:

Construction Cost - C130 Included

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$30,000.00	\$30,000.00
2	Construction Staking and Survey Layout	LS	1	\$15,000.00	\$15,000.00
3	Access Route Improvements/Repair	T&E	1	\$30,000.00	\$30,000.00
4	Mobilization	LS	1	\$223,000.00	\$223,000.00
5	Miscellaneous Removals and Site Preparation	LS	1	\$20,000.00	\$20,000.00
6	Remove Tie-Downs and Chains	SET	21	\$400.00	\$8,400.00
7	Pulverize/Mill Asphalt Concrete Pavement and Suitable Base	SY	14,000	\$6.00	\$84,000.00
8	Sawcut Asphalt Concrete Pavement	LF	1,500	\$5.00	\$7,500.00
9	Remove Portland Cement Concrete Pavement	SY	3,800	\$20.00	\$76,000.00
10	Prepare Storm Water Pollution Prevention Plan (SWPPP)	LS	1	\$8,000.00	\$8,000.00
11	Implement SWPPP / Install Temporary Erosion Control	LS	1	\$17,000.00	\$17,000.00
12	Unclassified Excavation	CY	500	\$50.00	\$25,000.00
13	Unclassified Excavation, On-site Disposal	CY	7,300	\$15.00	\$109,500.00
14	Excavation Below Subgrade	CY	300	\$75.00	\$22,500.00
15	Subgrade Preparation	SY	17,000	\$2.00	\$34,000.00
16	Crushed Aggregate Base Course, P-209	CY	2,900	\$75.00	\$217,500.00
17	Bituminous Surface Course, P-401	TON	4,100	\$165.00	\$676,500.00
18	Bituminous Surface Course, P-403	TON	5,000	\$155.00	\$775,000.00
19	Pavement Markings	LS	1	\$5,000.00	\$5,000.00
20	Tie-Down Anchors and Chains	SET	21	\$1,000.00	\$21,000.00
21	Drainage Improvements	LS	1	\$41,000.00	\$41,000.00
TOTAL					\$2,383,900.00

Total Project Cost

COUNTY ADMINISTRATION	\$47,700.00
DESIGN	\$191,000.00
TOPOGRAPHIC SURVEY	\$12,000.00
GEOTECHNICAL INVESTIGATION	\$10,000.00
CONSTRUCTION	\$2,383,900.00
RESIDENT ENGINEERING	\$280,000.00
MATERIALS TESTING	\$71,600.00
CONTINGENCY (15%)	\$449,430.00
TOTAL	\$3,445,630.00

Total Adjusted for Price Escalation (2019) \$3,514,542.60

Total Adjusted for Price Escalation (2020) \$3,584,833.45

Total Adjusted for Price Escalation (2021) \$3,656,530.12

Total Adjusted for Price Escalation (2022) \$3,729,660.72

Note: Price Escalation assumes 2% per year

Construction Cost - C130 Not Included

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$30,000.00	\$30,000.00
2	Construction Staking and Survey Layout	LS	1	\$15,000.00	\$15,000.00
3	Access Route Improvements/Repair	T&E	1	\$30,000.00	\$30,000.00
4	Mobilization	LS	1	\$131,000.00	\$131,000.00
5	Miscellaneous Removals and Site Preparation	LS	1	\$20,000.00	\$20,000.00
6	Remove Tie-Downs and Chains	SET	21	\$400.00	\$8,400.00
7	Pulverize/Mill Asphalt Concrete Pavement and Suitable Base	SY	14,000	\$6.00	\$84,000.00
8	Sawcut Asphalt Concrete Pavement	LF	1,500	\$5.00	\$7,500.00
9	Remove Portland Cement Concrete Pavement	SY	3,800	\$20.00	\$76,000.00
10	Prepare Storm Water Pollution Prevention Plan (SWPPP)	LS	1	\$8,000.00	\$8,000.00
11	Implement SWPPP / Install Temporary Erosion Control	LS	1	\$17,000.00	\$17,000.00
12	Unclassified Excavation, On-site Disposal	CY	4,800	\$15.00	\$72,000.00
13	Subgrade Preparation	SY	17,000	\$2.00	\$34,000.00
14	Crushed Aggregate Base Course, P-209	CY	2,900	\$75.00	\$217,500.00
15	Bituminous Surface Course, P-401	TON	4,100	\$165.00	\$676,500.00
16	Pavement Markings	LS	1	\$5,000.00	\$5,000.00
17	Tie-Down Anchors and Chains	SET	21	\$1,000.00	\$21,000.00
18	Drainage Improvements	LS	1	\$41,000.00	\$41,000.00
				TOTAL	\$1,431,900.00

Total Project Cost

COUNTY ADMINISTRATION	\$28,700.00
DESIGN	\$145,000.00
TOPOGRAPHIC SURVEY	\$12,000.00
GEOTECHNICAL INVESTIGATION	\$10,000.00
CONSTRUCTION	\$1,431,900.00
RESIDENT ENGINEERING	\$175,000.00
MATERIALS TESTING	\$43,000.00
CONTINGENCY (15%)	\$276,840.00
TOTAL	\$2,122,440.00

Total Adjusted for Price Escalation (2019)	\$2,164,888.80
Total Adjusted for Price Escalation (2020)	\$2,208,186.58
Total Adjusted for Price Escalation (2021)	\$2,252,350.31
Total Adjusted for Price Escalation (2022)	\$2,297,397.31

Note: Price Escalation assumes 2% per year

6.2.4 Project 4: Rehabilitation of Hangar Area 1 Taxilanes

As part of a good maintenance practice, a rehabilitation of Hangar Area 1 Taxilanes (Sections 14 to 19) is recommended. Since the pavement did not show any sign of structural failure, but only age-related distresses, such as longitudinal and transverse cracking, block cracking, and weathering, a mill-and-fill is suggested as a possible rehabilitation treatment. The project includes milling the top 2-inches of AC, crack sealing, the placement of a 2-inch layer of new AC, and markings application. The estimated cost for this project is reported below:

Construction Cost

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$35,000.00	\$35,000.00
2	Construction Staking and Survey Layout	LS	1	\$15,000.00	\$15,000.00
3	Access Route Improvements/Repair	T&E	1	\$5,000.00	\$5,000.00
4	Miscellaneous Removals and Site Preparation	LS	1	\$10,000.00	\$10,000.00
5	Mobilization	LS	1	\$59,000.00	\$59,000.00
6	Pavement Pulverization	SY	17,000	\$5.00	\$85,000.00
7	Prepare Storm Water Pollution Prevention Plan (SWPPP)	LS	1	\$8,000.00	\$8,000.00
8	Implement SWPPP / Install Temporary Erosion Control	LS	1	\$7,000.00	\$7,000.00
9	Unclassified Excavation, Off-site Disposal	CY	1,000	\$20.00	\$20,000.00
10	Surface Preparation	SY	17,000	\$2.00	\$34,000.00
11	Crack Seal	LF	5,000	\$3.50	\$17,500.00
12	Bituminous Surface Course, P-401	TON	2,000	\$165.00	\$330,000.00
13	Pavement Markings, with Reflective Media	LS	1	\$15,000.00	\$15,000.00
				TOTAL	\$640,500.00

Total Project Cost

COUNTY ADMINISTRATION	\$12,900.00
DESIGN	\$64,100.00
TOPOGRAPHIC SURVEY	\$10,000.00
GEOTECHNICAL INVESTIGATION	\$7,000.00
CONSTRUCTION	\$640,500.00
RESIDENT ENGINEERING	\$80,000.00
MATERIALS TESTING	\$19,300.00
CONTINGENCY (15%)	\$125,070.00
TOTAL	\$958,870.00

Total Adjusted for Price Escalation (2019)	\$978,047.40
Total Adjusted for Price Escalation (2020)	\$997,608.35
Total Adjusted for Price Escalation (2021)	\$1,017,560.51
Total Adjusted for Price Escalation (2022)	\$1,037,911.73

Note: Price Escalation assumes 2% per year

6.2.5 Project 5: Rehabilitation of Taxilane 1, Hangar Area 2 Taxilane, Hangar Apron, North Tie-Downs and Tie-Down Apron 3

It is important to maintain pavements in fair-to-good condition with periodic surface treatment, in order to prolong the pavement life and reduce the need for an expensive reconstruction in the future. The pavement listed above (Sections 13, 21, 23, 25 and 31) do not exhibit serious distresses. There are age-related distresses such as longitudinal cracking and weathering, and isolated structural distresses. A rehabilitation is recommended to provide a new surface course and extend the life of the pavement section. The recommended project includes crack sealing, isolated pavement repairs, surface preparation (including cleaning and marking removal), application of a surface treatment, and markings application. Options for surface treatment include slurry seal, seal coat, microsurfacing, and fog seal. The type of surface treatment will be confirmed at the time of design, based on pavement condition. The estimated cost for this project is shown below:

Construction Cost

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$20,000.00	\$20,000.00
2	Mobilization	LS	1	\$17,000.00	\$17,000.00
3	Pavement Repair	SF	100	\$40.00	\$4,000.00
4	Surface Preparation	SY	15,000	\$2.50	\$37,500.00
5	Crack Seal	LF	5,100	\$4.00	\$20,400.00
6	Surface Treatment	SY	15,000	\$5.00	\$75,000.00
7	Pavement Markings	LS	1	\$9,000.00	\$9,000.00
TOTAL					\$182,900.00

Total Project Cost

COUNTY ADMINISTRATION	\$3,700.00
DESIGN	\$45,000.00
TOPOGRAPHIC SURVEY	\$10,000.00
GEOTECHNICAL INVESTIGATION	\$5,000.00
CONSTRUCTION	\$182,900.00
RESIDENT ENGINEERING	\$55,000.00
MATERIALS TESTING	\$10,000.00
CONTINGENCY (15%)	\$46,740.00
TOTAL (2018)	\$358,340.00

Total Adjusted for Price Escalation (2019) \$365,506.80

Total Adjusted for Price Escalation (2020) \$372,816.94

Total Adjusted for Price Escalation (2021) \$380,273.27

Total Adjusted for Price Escalation (2022) \$387,878.74

Note: Price Escalation assumes 2% per year

6.2.6 Project 6: Reconstruction of West Service Road and Rehabilitation of Helipad Apron and Parking Lot.

In general, the pavement within Helipad Apron (Section 22) and Parking Lot (Section 36) is in satisfactory-to-good condition. The pavement exhibits some longitudinal cracking and low-severity weathering. A surface treatment is recommended in these areas; this project will include crack sealing, isolated pavement repairs, surface preparation (including cleaning and marking removal), application of a surface treatment, and markings application. Options for surface treatment include slurry seal, seal coat, microsurfacing, and fog seal. The type of surface treatment will be confirmed at the time of design, based on pavement condition. The pavement on West Service Road Sections 34 and 35) is in fair-to-poor condition. The pavement sections in this area show a substantial amount of structural and age-related distresses. In order to improve the structural section of the pavement, a reconstruction is recommended. The recommended project includes the removal of the existing AC pavement, and placing 3 inches of AC over 6 inches of AB. The estimated cost for this project is shown below:

Construction Cost

Item	Description	Unit	Quantity	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	\$15,000.00	\$15,000.00
2	Construction Staking and Survey Layout	LS	1	\$12,000.00	\$12,000.00
3	Mobilization	LS	1	\$30,000.00	\$30,000.00
4	Miscellaneous Removals and Site Preparation	LS	1	\$10,000.00	\$10,000.00
5	Pavement Removal	SY	2,800	\$6.00	\$16,800.00
6	Implement Storm Water Pollution Prevention Plan (SWPPP)	LS	1	\$8,000.00	\$8,000.00
7	Unclassified Excavation	CY	100	\$60.00	\$6,000.00
8	Unclassified Excavation, On-Site Disposal	CY	700	\$40.00	\$28,000.00
9	Excavation Below Subgrade	CY	20	\$80.00	\$1,600.00
10	Surface Preparation	SY	7,200	\$3.50	\$25,200.00
11	Subgrade Preparation	SY	2,800	\$6.00	\$16,800.00
12	Crack Seal	LF	1,000	\$5.00	\$5,000.00
13	Surface Treatment	SY	7,200	\$6.00	\$43,200.00
14	Aggregate Base (Class 2)	CY	500	\$70.00	\$35,000.00
15	Asphalt Concrete (Caltrans)	TON	500	\$130.00	\$65,000.00
16	Pavement Markings, with Reflective Media	LS	1	\$6,000.00	\$6,000.00
				TOTAL	\$323,600.00

Total Project Cost

COUNTY ADMINISTRATION	\$6,500.00
DESIGN	\$30,000.00
TOPOGRAPHIC SURVEY	\$10,000.00
GEOTECHNICAL INVESTIGATION	\$8,500.00
CONSTRUCTION	\$323,600.00
RESIDENT ENGINEERING	\$45,000.00
MATERIALS TESTING	\$10,000.00
CONTINGENCY (15%)	\$65,040.00
TOTAL	\$498,640.00

Total Adjusted for Price Escalation (2019)	\$508,612.80
Total Adjusted for Price Escalation (2020)	\$518,785.06
Total Adjusted for Price Escalation (2021)	\$529,160.76
Total Adjusted for Price Escalation (2022)	\$539,743.97

Note: Price Escalation assumes 2% per year

7. LONG RANGE MAINTENANCE REQUIREMENTS

The last column of *Exhibit E* shows the next expected maintenance for each pavement area. These recommendations assume the traffic served by each paved area remains the same and that the historic rate of deterioration is constant. These recommendations should be used for general planning only, since any estimate of expected pavement condition beyond three years is highly subjective.

8. PCN EVALUATION

A PCN evaluation was performed on the airfield pavements. The PCN values were determined using both the technical evaluation method, where a geotechnical report was available, and the "using aircraft method" for the other areas. The fleet mix was based on analysis of operations listed on the master record and Traffic Flow Management System Counts (TFMSC). The operations were then divided based on specific pavement use. Using the COMFAA program, the recommended PCN values for each section were obtained. The complete PCN Evaluation is included as *Exhibit G*.

Submitted by:

MEAD & HUNT, Inc.



Edoardo Barber
Project Engineer

Exhibits

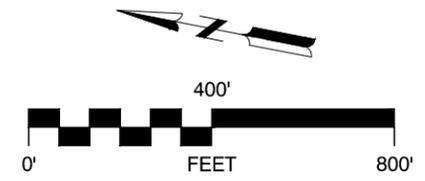
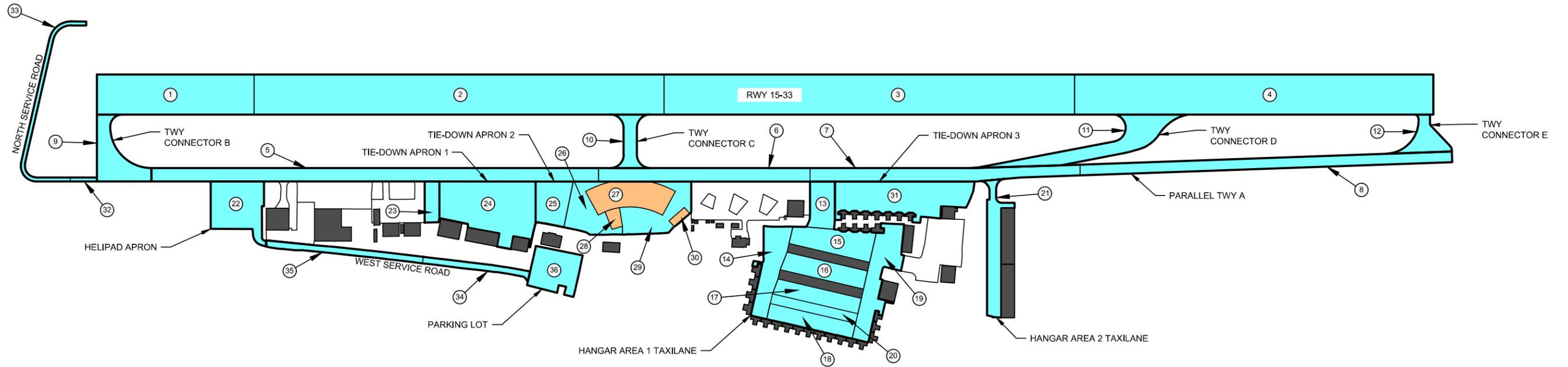
Exhibit A	Pavement Features
Exhibit B	Pavement Section History
Exhibit C	Pavement Distress
Exhibit D	Pavement Conditions
Exhibit E	Maintenance History and Programming
Exhibit F	Recommended Projects
Exhibit G	PCN Evaluation

EXHIBITS

Exhibit A – Pavement Features

LEGEND

- PCC PAVEMENT
- AC PAVEMENT
- BUILDING
- TWY TAXIWAY
- RWY RUNWAY
- Ⓜ PAVEMENT SECTION ID. NO.



REFER TO EXHIBIT B FOR
PAVEMENT SECTION DATA

Exhibit A

Pavement Features Ukiah Municipal Airport

Exhibit B – Pavement Section History

PAVEMENT FEATURE	SECTION ¹	DESCRIPTION	EXISTING PAVEMENT SECTION				PAVEMENT DATA SOURCE
			AC THICKNESS	PCC THICKNESS	AB THICKNESS	SUBGRADE CBR (TEST YEAR)	
Runway 15-33	1	Runway 15 Overrun	NA		NA	NA	NA
	2	North Section	6 Inches		11 Inches AB	1 (2017)	Geotech report 2017
	3	Central Section	7 Inches		8.5 Inches AB	1 (2017)	Geotech report 2017
	4	South Section	8 Inches		7 Inches AB	1 (2017)	Geotech report 2017
Parallel Taxiway A	5	North Section	NA		NA	NA	NA
	6	Central Section 1	NA		NA	NA	NA
	7	Central Section 2	NA		NA	NA	NA
	8	South Section	NA		NA	NA	NA
Taxiway Connector B	9	Taxiway Connector B	NA		NA	NA	NA
Taxiway Connector C	10	Taxiway Connector C	5 Inches		16 Inches AB	1 (2017)	Geotech report 2017
Taxiway Connector D	11	Taxiway Connector D	NA		NA	NA	NA
Taxiway Connector E	12	Taxiway Connector E	4 Inches		20 Inches AB	1 (2017)	Geotech report 2017
Hangar Area 1 Taxilanes	13	Taxilane 1	NA		NA	NA	NA
	14	Taxilane 2	NA		NA	NA	NA
	15	Taxilane 3	NA		NA	NA	NA
	16	Taxilane 4	NA		NA	NA	NA
	17	Taxilane 5	NA		NA	NA	NA
	18	Taxilane 6	NA		NA	NA	NA
	19	Taxilane 7	NA		NA	NA	NA
	20	Shade Hangars	NA		NA	NA	NA
Hangar Area 2 Taxilane	21	Hangar Area 2 Taxilane	NA		NA	NA	NA
Helipad Apron	22	Helipad Apron	NA		NA	NA	NA
Helipad & Hangar Apron	23	Hangar Apron	NA		NA	NA	NA
Tie-Down Apron 1	24	Tie-Down Apron 1	NA		NA	NA	NA
Tie-Down Apron 2	25	North Tie-Downs	NA		NA	NA	NA
	26	Main Section AC 1	NA		NA	NA	NA
	27	PCC Section 1		NA	NA	NA	NA
	28	PCC Section 2		NA	NA	NA	NA
	29	Main Section AC 2	NA		NA	NA	NA
	30	Fuel Farm		NA	NA	NA	NA
Tie-Down Apron 3	31	Tie-Down Apron 3	NA		NA	NA	NA
North Service Road	32	North Service Road 1	NA		NA	NA	NA
	33	North Service Road 2	NA		NA	NA	NA
West Service Road	34	West Service Road 1	NA		NA	NA	NA
	35	West Service Road 2	NA		NA	NA	NA
Parking Lot	36	Parking Lot	NA		NA	NA	NA

1: Section identification number referenced in Exhibit A: Pavement Features

Legend:

AC - Asphalt Concrete

NA - Not Available

PCC - Portland Cement Concrete

AB - Aggregate Base

Exhibit B

Pavement Section History

Ukiah Municipal Airport

Exhibit C – Pavement Distress

Legend:

Low Severity	High Severity
Medium Severity	No Severity Level Defined

PAVEMENT FEATURE	SECTION ¹	DESCRIPTION	ASPHALT SURFACE DISTRESS TYPES ²																
			ALLIGATOR OR FATIGUE CRACKING	BLEEDING	BLOCK CRACKING	CORRUGATION	DEPRESSION	JET BLAST EROSION	JOINT REFLECTIVE CRACKING	LONG. & TRANS. CRACKING	OIL SPILLAGE	PATCHING AND UTILITY CUT PATCH	POLISHED AGGREGATE	RAVELING	RUTTING	SHOVING	SLIPPAGE CRACKING	SWELL	WEATHERING
Runway 15-33	1	Runway 15 Overrun									Low/High								Medium
	2	North Section			Medium/High						Low/High								Medium
	3	Central Section									Low/High		Low						Medium
	4	South Section									Low/High								Medium
Parallel Taxiway A	5	North Section	Medium								Medium								Medium
	6	Central Section 1									Medium								Medium
	7	Central Section 2									High		Low						Medium
	8	South Section									High								Medium
Taxiway Connector B	9	Taxiway Connector B									Low/Medium/High		Medium					Medium/High	
Taxiway Connector C	10	Taxiway Connector C									Low/Medium		Medium					Medium	
Taxiway Connector D	11	Taxiway Connector D			High						High							Medium	
Taxiway Connector E	12	Taxiway Connector E									Low		Low					Medium	
Hangar Area 1 Taxilanes	13	Taxilane 1	Medium								Low/Medium		Medium					Low	
	14	Taxilane 2			Low/Medium								Low					Low	
	15	Taxilane 3			Low/Medium													Low	
	16	Taxilane 4			Low/Medium								Low					Low	
	17	Taxilane 5			Low/Medium													Low	
	18	Taxilane 6			Low/Medium													Low	
	19	Taxilane 7			Medium								Low					Low	
20	Shade Hangars																	Low	
Hangar Area 2 Taxilane	21	Hangar Area 2 Taxilane									Low/Medium							Low	
Helipad Apron	22	Helipad Apron	Low								Low/Medium/High							Low	
Hangar Apron	23	Hangar Apron									Low							Low	
Tie-Down Apron 1	24	Tie-Down Apron 1	Medium/High		Low													Low	
Tie-Down Apron 2	25	North Tie-Downs									Low							Low	
	26	Main Section AC 1	High		Medium						Low/Medium		Medium					Low/Medium	
	29	Main Section AC 2	High		High		High						Medium					Medium	
Tie-Down Apron 3	31	Tie-Down Apron 3			Low/Medium								Medium					Medium	
North Service Road	32	North Service Road 1					Medium											Low	
	33	North Service Road 2									Low							Low	
West Service Road	34	West Service Road 1																High	
	35	West Service Road 2	Medium															Low	
Parking Lot	36	Parking Lot									Low							Low	

PAVEMENT FEATURE	SECTION ¹	DESCRIPTION	PCC SURFACE DISTRESS TYPES ²																
			BLOWUP	CORNER BREAK	CRACKS	DURABILITY "D" CRACKING	JOINT SEAL DAMAGE	PATCHING, SMALL	PATCHING, LARGE	POPOUTS	PUMPING	SCALING	SETTLEMENT OR FAULTING	SHATTERED SLAB	SHRINKAGE CRACKS	SPALLING (JOINT)	SPALLING (CORNER)	ALKALI SILICA REACTION	
Tie-Down Apron 2	27	PCC Section 1		Low	Low/Medium					Low/High	No Severity					Low		Low	
	28	PCC Section 2		Low	Low						No Severity							Low	
	30	Fuel Farm		Low	Low/Medium											Low			

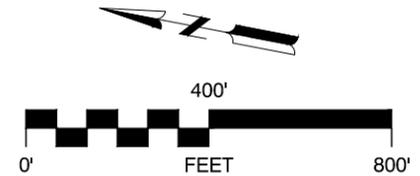
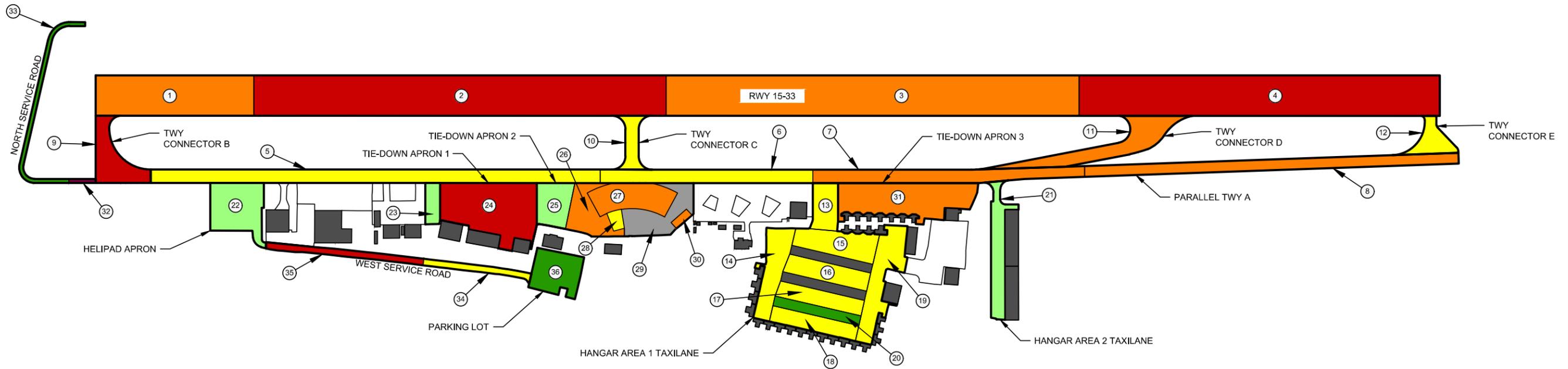
1: Section identification number referenced in Exhibit A: Pavement Features

2: The highest severity of each type of distress is shown for each pavement section. See Section 4 of the report for a more detailed analysis of the pavement conditions.

Exhibit D – Pavement Condition

LEGEND

- GOOD (PCI 85-100)
- SATISFACTORY (PCI 70-85)
- FAIR (PCI 55-70)
- POOR (PCI 40-55)
- VERY POOR (PCI 25-40)
- SERIOUS (10-25)
- FAILED (0-10)
- TWY** TAXIWAY
- RWY** RUNWAY
- PAVEMENT SECTION ID. NO.



REFER TO EXHIBIT B FOR PAVEMENT SECTION DATA

Exhibit D

Pavement Condition Ukiah Municipal Airport

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Exhibit E – Maintenance History and Programming

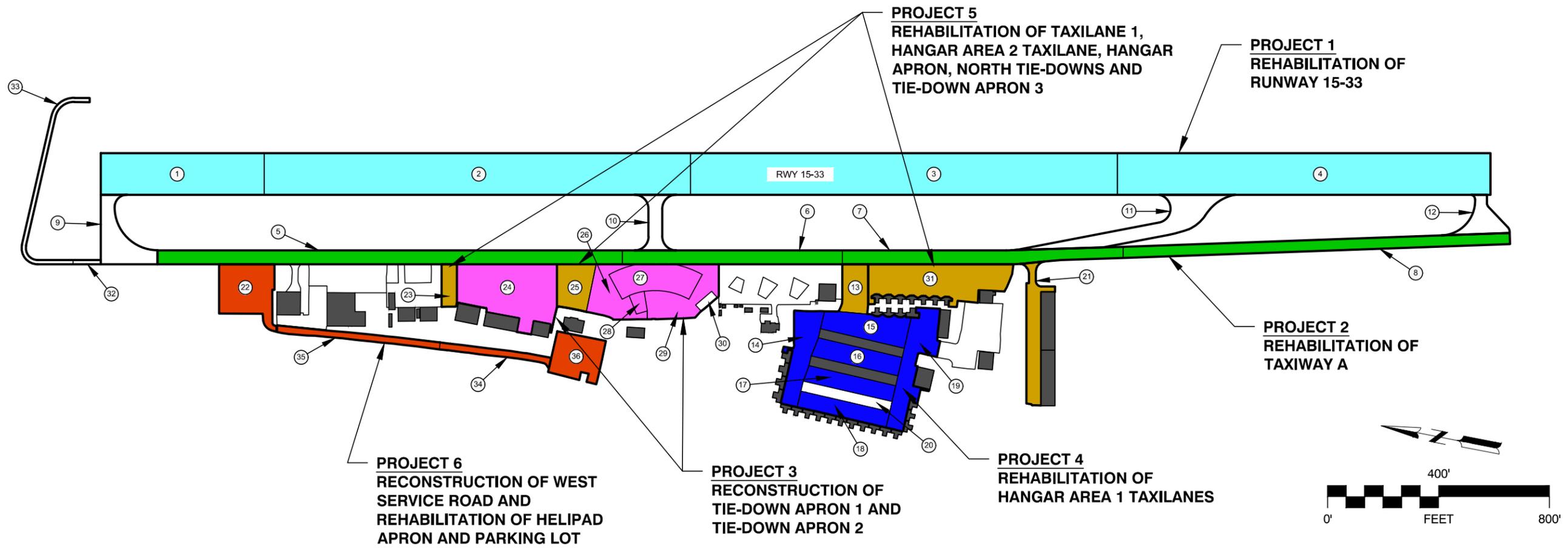
PAVEMENT FEATURE	SECTION ¹	DESCRIPTION	FUTURE PROJECTS					
			1	2	3	4	5	6
Runway 15-33	1	Runway 15 Overrun	Rehabilitation					
	2	North Section	Rehabilitation					
	3	Central Section	Rehabilitation					
	4	South Section	Rehabilitation					
Parallel Taxiway A	5	North Section		Rehabilitation				
	6	Central Section 1		Rehabilitation				
	7	Central Section 2		Rehabilitation				
	8	South Section		Rehabilitation				
Taxiway Connector B	9	Taxiway Connector B						
Taxiway Connector C	10	Taxiway Connector C						
Taxiway Connector D	11	Taxiway Connector D						
Taxiway Connector E	12	Taxiway Connector E						
Hangar Area 1 Taxilanes	13	Taxilane 1					Surface Treatment	
	14	Taxilane 2				Rehabilitation		
	15	Taxilane 3				Rehabilitation		
	16	Taxilane 4				Rehabilitation		
	17	Taxilane 5				Rehabilitation		
	18	Taxilane 6				Rehabilitation		
	19	Taxilane 7				Rehabilitation		
20	Shade Hangars							
Hangar Area 2 Taxilane	21	Hangar Area 2 Taxilane					Surface Treatment	
Helipad Apron	22	Helipad Apron						Surface Treatment
Hangar Apron	23	Hangar Apron					Surface Treatment	
Tie-Down Apron 1	24	Tie-Down Apron 1			Reconstruction			
Tie-Down Apron 2	25	North Tie-Downs					Surface Treatment	
	26	Main Section AC 1			Reconstruction			
	27	PCC Section 1			Reconstruction			
	28	PCC Section 2			Reconstruction			
	29	Main Section AC 2			Reconstruction			
30	Fuel Farm							
Tie-Down Apron 3	31	Tie-Down Apron 3					Surface Treatment	
North Service Road	32	North Service Road 1						
	33	North Service Road 2						
West Service Road	34	West Service Road 1						Reconstruction
	35	West Service Road 2						Reconstruction
Parking Lot	36	Parking Lot						Surface Treatment

1: Section identification number referenced in Exhibit A: Pavement Features

Exhibit F – Recommended Projects

LEGEND

- PROJECT 1
- PROJECT 2
- PROJECT 3
- PROJECT 4
- PROJECT 5
- PROJECT 6
- BUILDING
- TWY TAXIWAY
- RWY RUNWAY
- Ⓝ PAVEMENT SECTION ID. NO.



REFER TO EXHIBIT B FOR
PAVEMENT SECTION DATA

Exhibit F

Recommended Projects Ukiah Municipal Airport

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Exhibit G – PCN Report



1360 19th Hole Drive
Suite 200
Windsor, California 95492
707-526-5010
meadhunt.com

May 15, 2018

Mr. Greg Owen
Airport Manager
City of Ukiah
1403 S State Street
Ukiah, CA 95482

Project: Ukiah Municipal Airport – Airport Pavement Management System (APMS)

Subject: Pavement Classification Number (PCN) Analysis

Dear Mr. Owen:

Per your request, Mead & Hunt, Inc. (Mead & Hunt) has performed an assessment of the pavements at Ukiah Municipal Airport (Airport), in accordance with the Federal Aviation Administration (FAA) Advisory Circular 150/5335-5C, “Standardized Method of Reporting Airport Pavement Strength - PCN.” The Advisory Circular provides guidance for using the standardized method, known as the Aircraft Classification Number–Pavement Classification Number (ACN-PCN) for reporting pavement strength. The FAA requires that all general aviation (GA) airports that receive Airport Improvement Program (AIP) funds perform a PCN analysis, and subsequently update the FAA Form 5010 and Airport Master Record with PCN and aircraft gross weight data.

The ACN-PCN system is only intended as a method of reporting relative pavement strength so airport operators can evaluate acceptable operations of aircraft. There are two methods that have been established for reporting PCN values: 1) the “using aircraft method,” and 2) the “technical evaluation method.” The “using aircraft method” is a simple procedure; the ACN values for all aircraft currently permitted to use the pavement facility are evaluated and the largest ACN value of the aircraft with the qualifying amount of coverages is reported as the PCN. The “technical evaluation method” determines pavement strength/rating by considering the current aircraft fleet mix, pavement structural section, and subgrade bearing strength. The “technical evaluation method” is preferred over the “using aircraft method” because of the level of accuracy, thus, the “technical evaluation method” is used in our analysis, where information about the pavement structure is available. In all the other areas, the PCN was evaluated through the “using aircraft method”

The following is a list of the information and assumptions that were used for the analysis:

1. **Aircraft Fleet Mix** (*See Attachment 1*) – The fleet mix was developed by analyzing aircraft operation data from the 5010 master record and Traffic Flow Management System Counts (TFMSC). The annual

departures were then divided into area-specific fleet mixes based on the estimated frequency of aircraft taxiing through the taxiway, aprons, and taxilanes.

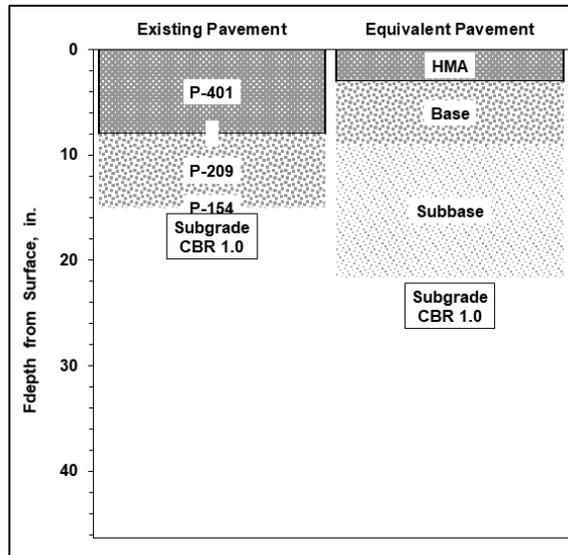
According to Advisory Circular 150/5335-5C, Appendix C, Section C.5.3, traffic volume to be modeled should include annual departures for each aircraft that has used or is planned to use the airport during the pavement life period.

2. **Pass to Traffic Cycle (P/TC)** – According to Advisory Circular 150/5335-5C, Appendix A, Section 2, it is important to determine which aircraft movements need to be counted when considering pavement stress. Typically, aircraft arrive at an airport with a lower amount of fuel than is used to 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. For purposes of this assessment, we have assumed that each departure creates one pass in the aircraft loading model.
3. **Pavement Structural Section** – For “technical evaluation method” purposes, the existing pavement section under consideration must be converted to a standard equivalent pavement section. The standard section, which corresponds to the total thickness requirement calculated by the COMFAA program, assumes a defined layer of asphalt surface, a defined layer thickness of aggregate base material with a California Bearing Ratio (CBR) 80 or higher, and a variable thickness subbase layer with a CBR 20 or higher.

The existing pavement structural sections were obtained from a geotechnical report. The total equivalent pavement sections were established using the FAA Flexible Pavement Layer Equivalency Factor Range Table, Table B-1 of Advisory Circular 150/5335-5C. Since the fleet mix does not include any aircraft with four or more wheels per gear, the FAA recommends a reference section assuming 3 inches of Hot Mix Asphalt (HMA) and 6 inches of crushed aggregate for equivalent thickness calculations.

The airfield consists primarily of asphalt concrete (AC). Three pavement section models were used for the three areas where pavement information was available. The models consisted of: 1) Runway 15-33, 2) Taxiway Connector C, 3) Taxiway Connector E. Available geotechnical data was analyzed and consolidated to develop one representative pavement section for each model. A tabulated version of all pavement data is included in the APMS report as *Appendix B*. The graphics and tables below indicate the pavement sections data that were used in this study.

Runway 15-33



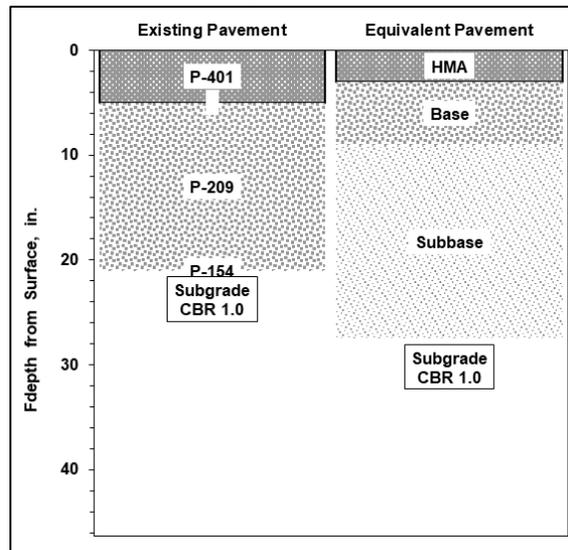
Existing Pavement Section

8 inch asphalt surface layer
7 inch aggregate base layer
Subgrade CBR 1

Equivalent Pavement Section

3 inch asphalt surface layer
6 inch aggregate base layer
12.6 inch subbase layer
Subgrade CBR 1

Taxiway Connector C



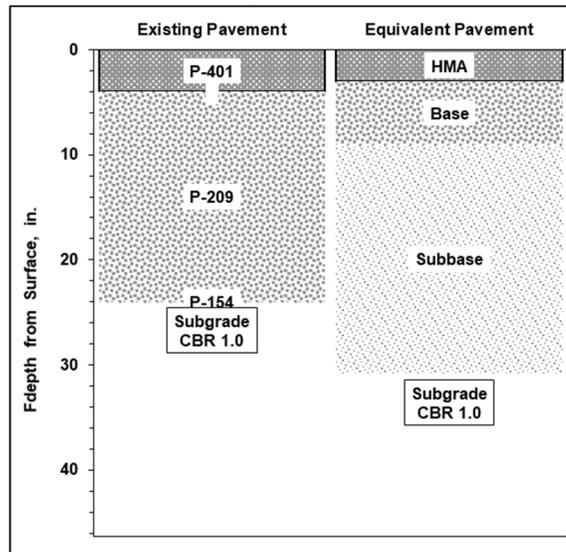
Existing Pavement Section

5 inch asphalt surface layer
16 inch aggregate base layer
Subgrade CBR 1

Equivalent Pavement Section

3 inch asphalt surface layer
6 inch aggregate base layer
18.5 inch subbase layer
Subgrade CBR 1

Taxiway Connector E



Existing Pavement Section

4 inch asphalt surface layer
20 inch aggregate base layer
Subgrade CBR 1

Equivalent Pavement Section

3 inch asphalt surface layer
6 inch aggregate base layer
21.8 inch subbase layer
Subgrade CBR 1

4. **Subgrade Bearing Strength** – The subgrade bearing capacity, expressed as a CBR value, has been established based on the available geotechnical report.

PCN Analysis

PCN values were calculated using the methodology established in FAA Advisory Circular 150/5335-5C and COMFAA 3.0 software program. The COMFAA program results are presented in *Attachment 3*.

Advisory Circular 150/5335-5C contains detailed guidance for interpreting PCN values in different scenarios, as illustrated in the various example within Appendix C. The COMFAA program uses a Cumulative Damage Factor (CDF) to indicate the damage done to the pavement by the associated fleet mix. In the scenario that was encountered analyzing the three pavement models, the CDF is greater than 1.0 and the calculated PCN values are less than their respective ACN values. A CDF higher than 1.0 determines that the pavement sections evaluated are inadequate to support the forecasted traffic. However, further considerations shall be made. Although the Lockheed 130 is the heaviest aircraft that operates the Airport, the number of operations is not enough for that to be considered as the critical aircraft. In fact, the Advisory Circular 150/5335-5C indicates to select the highest PCN value among aircraft that regularly use the Airport. For PCN values calculated through the “using aircraft method” the FAA suggests using as a critical aircraft the one that provides a minimum of 1,000 coverages over a 20-year period. The first aircraft in the fleet mix that meets this requirement is the Super King 200. For this reason, the Super King 200 was considered the critical aircraft for the PCN evaluation. For the sections on Runway 15-33 and Taxiway Connector C evaluated through the “technical method”, the pavement structure resulted not adequate to support the current and forecasted traffic mix. For Runway 15-33 it is recommended to improve the pavement section as it is feasible to do so. The pavement section on Taxiway Connector E was also

considered inadequate for the current fleet mix. However, it has to be noted that the biggest contribution to the total CDF is given by the Lockheed 130, which has only one departure per year.

Since no further pavement structure related information was available for the other areas of the Airport, the PCN was evaluated through the “using aircraft method”. For the reason stated above, the Super King 200 was considered the critical aircraft for Parallel Taxiway A, Taxiway Connectors B and D, Tie-down Apron 1 and Tie-down Apron 2. The Beech King Air 200 was considered the critical aircraft also for the Helipad Apron, Tie-Down Apron 3, Taxilanes 1, 3, 7 and Hangar Area 2 Taxilane, due to number of operations, hangar dimensions, wingtip clearance issues, and turning radiuses allowed in these areas. For Taxilanes 2, 4, 5 and 6 the critical aircraft was determined to be the Malibu Meridian due to the limited clearances on the Taxilanes.

Recommendations

The table below is a summary of all the PCN values and allowable gross weights, as reported in the recommended Form 5010 (note that all single-wheel aircraft under 12,500 pounds are shown in COMFAA as “<min” and all dual-wheel aircraft under 37,500 pounds are shown in COMFAA as “<min”):

Airport LOC-ID	Pavement ID	#35 S GW	#36 D GW	#37 DT GW	#38 DDT GW	#39 PCN
UKI	Runway 15-33	<min	<min			3/F/D/X/T
UKI	Taxiway Connector C	<min	<min			4/F/D/X/T
UKI	Taxiway Connector E	<min	<min			4/F/D/X/T
UKI	Parallel Taxiway A, Taxiway Connectors B and D, Tie-down Apron 1, AC Sections on Tie-down Apron 2	<min	<min			4/F/D/X/U
UKI	PCC Sections on Tie-down Apron 2	13.5	<min			4/R/D/X/U
UKI	Helipad Apron, Hangar Apron, Tie-down Apron 3, Taxilanes 1, 3, 7 and Hangar Area 2 Taxilane	<min	<min			4/F/D/X/U
UKI	Taxilanes 2, 4, 5 and 6	<min	<min			2/F/D/X/U

In the table, column #35 lists the allowable gross weight for single-wheel configuration (in thousands of pounds), column #36 lists the allowable gross weight for dual-wheel configuration, and column #39 lists the recommended PCN value. The letters following the PCN value indicate type of pavement (flexible or rigid), subgrade strength category (A-D), allowable tire pressure (X for 254 psi, Y for 145 psi), and PCN determination method (technical evaluation or using aircraft). The complete Form 5010 is included as *Attachment 4*.

The table below shows a list of ACN values for some of the aircraft in the fleet mix for flexible and rigid pavements. The ACN values shown are based on maximum gross weight of the aircraft and can be reduced if the weight is lowered.

Aircraft	MTOW (lbs)	Wingspan (ft)	ACN (Class "D")	
			Flexible	Rigid
Lockheed 130	155,000	132.48	37.6	37.5
C-27J Spartan	67,241	94.17	14.4	14.7
Falcon 900	45,500	63.42	15.1	15.5
Challenger 300	38,850	63.85	12.1	12.0
Citation Sovereign	30,250	63.16	10.0	10.5
Citation III/VI/VII	23,200	53.51	7.7	8.2
Phenom 300	17,968	52.2	7.5	7.1
Super King Air 350	15,100	57.91	4.6	4.3
Super King Air 200	12,590	54.50	3.7	3.5
Citation Mustang	10,700	42.19	4.4	3.8
208 Caravan	8,750	52.09	3.4	2.9
Cessna 401/402	6,850	44.1	2.7	2.2
Malibu Meridian	4,118	43.01	1.6	1.1
Beech Bonanza 35	3,663	33.5	1.3	0.9
Skylane 182	3,110	35.99	1.2	0.8
Skyhawk 172	2,558	36.09	1.0	0.6

The PCN analysis conducted through the "technical method", has shown that the pavement structure on Runway 15-33 is not strong enough to support the airport traffic that most regularly utilizes the Airport. A reconstruction of Runway 15-33 or an overlay is strongly recommended to restore an adequate pavement structure. Although the pavement sections on Taxiway Connectors C and E were also found to need structural improvements, priority should be given to Runway 15-33.

The reported PCN values that were determined through the "using aircraft method" are considered less accurate than the "technical method". Although the reported PCN values of the Parallel Taxiway A, Taxiway Connectors B and D, and Tie-down Aprons 1 and 2 were determined in accordance with the Advisory Circular, the pavement condition ranges from fair to very poor in these areas, as detailed in the APMS report. Pavement reconstructions or rehabilitations are recommended, regardless of the reported PCN values.

In addition, considering the assumptions that were made for the PCN evaluation, we recommend the Airport monitors the existing airfield pavements and operations on a routine basis to check for stress or damage to the pavement, caused by regular or occasional aircraft operations.

If you have any questions, please feel free to contact us at 707-526-5010.

Sincerely,

MEAD & HUNT, Inc.



Edoardo Barber
Project Engineer

References: *2017 Geotechnical Report, performed by LACO*

Attachments: *Attachment 1 – Ukiah Municipal Airport Fleet Mix*
Attachment 2 – Fleet Mix Distribution
Attachment 3 – PCN Calculation Sheets
Attachment 4 – Recommended Form 5010

Aircraft	Weight (lbs)	Annual Operations	Annual Departures		
			Runway 15-33, Taxiway A, Taxiway Connectors, Tie- down Aprons 1, 2	Helipad Apron, Hangar Apron, Tie-Down Apron 3, Taxilanes 1, 3, 7, and Hangar Area 2 Taxilane	Taxilanes 2, 4, 5 and 6
Lockeed 130 Hercules	155,000	2	1	-	-
Alenia C-27J Spartan	67,241	4	2	-	-
Falcon 900	45,500	2	1	-	-
Bombardier (Canadair) Challenger 300	38,850	8	4	-	-
Citation Sovereign	30,250	87	44	-	-
Cessna III/VI/VII	23,200	87	44	-	-
Phenom 300	17,968	327	163	-	-
Super King Air 350	15,100	436	218	87	-
Super King 200	12,590	2,658	1,329	532	-
Citation Mustang	10,700	697	349	105	-
Cessna 208 Caravan	8,750	2,190	1,095	1,095	-
Cessna 401/402	6,850	7,737	3,868	3,868	-
Malibu Meridian	4,118	3,920	1,960	1,960	588
Bonanza 35	3,663	6,602	3,301	3,301	2641
Skylane 182	3,110	5,364	2,682	2,682	2146
Skyhawk 172/Cutlass	2,558	11,450	5,725	5,725	4580
Total		41,571	20,786	19,355	9,955

LEGEND

- BUILDING
- TWY TAXIWAY
- RWY RUNWAY
- PAVEMENT SECTION ID. NO.



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COMFAA Equivalent AC Pavement Sections

Airport Loc_ID	UKI	UKI	UKI
Pavement ID	Runway 15-33	Twy Connector C	Twy Connector E
P-401/3 P 403	8.0 (P-209 1.6)	5.0 (P-209 1.6)	4.0 (P-209 1.6)
P-306 ECONOCRTE			
P-304 CEM. TRTD			
P-209 Cr AGG	7.0 (P-154 1.4)	16.0 (P-154 1.4)	20.0 (P-154 1.4)
P-208 Agg, P-211			
P-301 SOIL-CEM.			
P-154 Subbase	FALSE	FALSE	FALSE
Units	English	English	English
COMFAA CBR	1.0	1.0	1.0
COMFAA Thickness	21.6 in.	27.5 in.	30.8 in.

RWY 15-33

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Library file name = X:\2112200\160244.01\TECH\dsgn\PCN Analysis\COMFAA\Fleet Mix Files\Rwy and Twys.Ext

Units = English

Evaluation pavement type is flexible and design procedure is CBR.

Alpha Values are those approved by the ICAO in 2007.

CBR = 1.00 (Subgrade Category is D(3))

Evaluation pavement thickness = 21.60 in

Pass to Traffic Cycle (PtoTC) Ratio = 1.00

Maximum number of wheels per gear = 2

Maximum number of gears per aircraft = 2

No aircraft have 4 or more wheels per gear. The FAA recommends a reference section assuming 3 inches of HMA and 6 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	C-130	155,000	95.00	105.0	1	9	27.51
2	C-27J Spartan	67,241	96.40	104.4	2	12	18.99
3	Falcon-900	45,500	95.00	145.0	1	4	13.34
4	Challenger 300	38,850	95.00	145.0	4	14	18.08
5	Citation Sovereign	30,250	95.00	189.0	44	124	25.19
6	Citation-III/VI/VII	23,200	95.00	168.0	44	116	21.95
7	Phenom 300	17,968	95.00	130.0	163	308	23.24
8	SuperKingAir-350	15,100	95.00	92.0	218	624	21.02
9	SuperKingAir-B200	12,590	95.00	98.0	1,329	3,368	22.00
10	Citation Mustang	10,700	95.00	98.0	349	587	19.24
11	GrnCaravan-CE-208B	8,750	95.00	75.0	1,095	1,903	19.45
12	Cessna 401/402	6,850	95.00	70.0	3,868	6,157	18.91
13	Malibu Meridian	4,118	95.00	55.0	1,960	2,730	13.68
14	Bonanza 35	3,663	95.00	40.0	3,301	5,084	13.43
15	Skylane-1-82	3,110	95.00	50.0	2,682	3,406	12.08
16	Skyhawk-172	2,558	95.00	50.0	5,725	6,594	11.53

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 D(3)
1	C-130	49	42.92	47,146	20.37	2.0507	9.6
2	C-27J Spartan	219	33.62	30,727	16.25	0.6142	6.1
3	Falcon-900	206	33.05	20,484	16.41	0.2218	6.2
4	Challenger 300	335	31.80	19,325	15.08	0.4967	5.2
5	Citation Sovereign	550	29.98	16,271	14.72	2.6247	5.0
6	Citation-III/VI/VII	1,209	28.26	13,820	13.82	1.1173	4.4
7	Phenom 300	2,039	28.27	10,492	13.82	1.7571	4.4
8	SuperKingAir-350	9,656	25.92	10,694	11.46	0.7516	3.0
9	SuperKingAir-B200	30,554	25.10	9,491	10.65	1.2816	2.6
10	Citation Mustang	22,109	25.92	7,428	11.52	0.3085	3.1
11	GrnCaravan-CE-208B	81,444	25.17	6,445	10.50	0.2716	2.5
12	Cessna 401/402	554,704	24.35	5,388	9.59	0.1290	2.1
13	Malibu Meridian	>5,000,000	22.95	3,648	7.77	0.0001	1.4
14	Bonanza 35	>5,000,000	22.64	3,335	7.29	0.0000	1.2
15	Skylane-1-82	>5,000,000	22.32	2,912	6.90	0.0000	1.1
16	Skyhawk-172	>5,000,000	21.94	2,480	6.37	0.0000	0.9
Total CDF =						11.6249	

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 D(3)
1	C-130	155,000	95.00	105.0	40.41	37.6
2	C-27J Spartan	67,241	96.40	104.4	24.99	14.4
3	Falcon-900	45,500	95.00	145.0	25.58	15.1

RWY 15-33					
4 Challenger 300	38,850	95.00	145.0	22.96	12.1
5 Citation Sovereign	30,250	95.00	189.0	20.82	10.0
6 Citation-III/VI/VII	23,200	95.00	168.0	18.34	7.7
7 Phenom 300	17,968	95.00	130.0	18.09	7.5
8 SuperKingAir-350	15,100	95.00	92.0	14.07	4.6
9 SuperKingAir-B200	12,590	95.00	98.0	12.65	3.7
10 Citation Mustang	10,700	95.00	98.0	13.82	4.4
11 GrnCaravan-CE-208B	8,750	95.00	75.0	12.23	3.4
12 Cessna 401/402	6,850	95.00	70.0	10.82	2.7
13 Malibu Meridian	4,118	95.00	55.0	8.26	1.6
14 Bonanza 35	3,663	95.00	40.0	7.64	1.3
15 Skylane-1-82	3,110	95.00	50.0	7.13	1.2
16 Skyhawk-172	2,558	95.00	50.0	6.47	1.0

Results Table 4. Summary Output for Copy and Paste Into the Support Spread Sheet

Num,Plane,GWin,ACNin,ADout,6Dt,COV20yr,COVtoF,CDft,Gwcdf,PCNcdf,EVALt,SUBcode,KorCBR,PtoTC,FlexOrRig
1,C-130,155000.000,37.6,1,27.51,8.64912E+000,4.21760E+000,42.92,47146.012,9.6,21.6,D,1.00,1.00,F
2,C-27J Spartan,67241.000,14.4,2,18.99,1.15887E+001,1.88665E+001,33.62,30727.290,6.1,21.6,D,1.00,1.00,F
3,Falcon-900,45500.000,15.1,1,13.34,3.92247E+000,1.76845E+001,33.05,20483.724,6.2,21.6,D,1.00,1.00,F
4,Challenger 300,38850.000,12.1,4,18.08,1.42957E+001,2.87822E+001,31.80,19325.401,5.2,21.6,D,1.00,1.00,F
5,Citation Sovereign,30250.000,10.0,44,25.19,1.24179E+002,4.73113E+001,29.98,16271.252,5.0,21.6,D,1.00,1.00,F
6,Citation-III/VI/VII,23200.000,7.7,44,21.95,1.16222E+002,1.04023E+002,28.26,13819.792,4.4,21.6,D,1.00,1.00,F
7,Phenom 300,17968.000,7.5,163,23.24,3.08145E+002,1.75368E+002,28.27,10492.292,4.4,21.6,D,1.00,1.00,F
8,SuperKingAir-350,15100.000,4.6,218,21.02,6.24327E+002,8.30638E+002,25.92,10694.224,3.0,21.6,D,1.00,1.00,F
9,SuperKingAir-B200,12590.000,3.7,1329,22.00,3.36831E+003,2.62828E+003,25.10,9490.565,2.6,21.6,D,1.00,1.00,F
10,Citation Mustang,10700.000,4.4,349,19.24,5.86688E+002,1.90183E+003,25.92,7428.004,3.1,21.6,D,1.00,1.00,F
11,GrnCaravan-CE-208B,8750.000,3.4,1095,19.45,1.90255E+003,7.00599E+003,25.17,6444.878,2.5,21.6,D,1.00,1.00,F
12,Cessna 401/402,6850.000,2.7,3868,18.91,6.15700E+003,4.77168E+004,24.35,5388.293,2.1,21.6,D,1.00,1.00,F
13,Malibu Meridian,4118.000,1.6,1960,13.68,2.73007E+003,3.20456E+007,22.95,3647.633,1.4,21.6,D,1.00,1.00,F
14,Bonanza 35,3663.000,1.3,3301,13.43,5.08355E+003,5.22344E+008,22.64,3334.905,1.2,21.6,D,1.00,1.00,F
15,Skylane-1-82,3110.000,1.2,2682,12.08,3.40568E+003,3.37761E+010,22.32,2911.998,1.1,21.6,D,1.00,1.00,F
16,Skyhawk-172,2558.000,1.0,5725,11.53,6.59435E+003,4.28658E+014,21.94,2479.566,0.9,21.6,D,1.00,1.00,F

TWY C

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Library file name = X:\2112200\160244.01\TECH\dsgn\PCN Analysis\COMFAA\Fleet Mix Files\Rwy and Twys.Ext

Units = English

Evaluation pavement type is flexible and design procedure is CBR.

Alpha Values are those approved by the ICAO in 2007.

CBR = 1.00 (Subgrade Category is D(3))

Evaluation pavement thickness = 27.50 in

Pass to Traffic Cycle (PtoTC) Ratio = 1.00

Maximum number of wheels per gear = 2

Maximum number of gears per aircraft = 2

No aircraft have 4 or more wheels per gear. The FAA recommends a reference section assuming 3 inches of HMA and 6 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	C-130	155,000	95.00	105.0	1	9	27.51
2	C-27J Spartan	67,241	96.40	104.4	2	12	18.99
3	Falcon-900	45,500	95.00	145.0	1	4	13.34
4	Challenger 300	38,850	95.00	145.0	4	14	18.08
5	Citation Sovereign	30,250	95.00	189.0	44	124	25.19
6	Citation-III/VI/VII	23,200	95.00	168.0	44	116	21.95
7	Phenom 300	17,968	95.00	130.0	163	308	23.24
8	SuperKingAir-350	15,100	95.00	92.0	218	624	21.02
9	SuperKingAir-B200	12,590	95.00	98.0	1,329	3,368	22.00
10	Citation Mustang	10,700	95.00	98.0	349	587	19.24
11	GrnCaravan-CE-208B	8,750	95.00	75.0	1,095	1,903	19.45
12	Cessna 401/402	6,850	95.00	70.0	3,868	6,157	18.91
13	Malibu Meridian	4,118	95.00	55.0	1,960	2,730	13.68
14	Bonanza 35	3,663	95.00	40.0	3,301	5,084	13.43
15	Skylane-1-82	3,110	95.00	50.0	2,682	3,406	12.08
16	Skyhawk-172	2,558	95.00	50.0	5,725	6,594	11.53

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	PCN on D(3)
1	C-130	20	34.89	102,762	31.60	23.0
2	C-27J Spartan	136	31.46	53,140	21.91	11.1
3	Falcon-900	131	31.19	35,833	22.49	11.6
4	Challenger 300	248	30.71	31,699	20.42	9.6
5	Citation Sovereign	564	30.06	25,516	18.97	8.3
6	Citation-III/VI/VII	2,012	29.44	20,316	17.08	6.7
7	Phenom 300	3,433	29.53	15,581	16.85	6.5
8	SuperKingAir-350	65,366	28.57	14,031	13.48	4.2
9	SuperKingAir-B200	623,042	28.27	11,944	12.26	3.5
10	Citation Mustang	137,443	28.71	9,815	13.24	4.0
11	GrnCaravan-CE-208B	1,205,865	28.44	8,183	11.83	3.2
12	Cessna 401/402	>5,000,000	28.15	6,537	10.57	2.6
13	Malibu Meridian	>5,000,000	27.65	4,073	8.21	1.6
14	Bonanza 35	>5,000,000	27.54	3,652	7.63	1.3
15	Skylane-1-82	>5,000,000	26.21	3,424	7.48	1.3
16	Skyhawk-172	>5,000,000	23.77	3,424	7.48	1.3
					Total CDF =	2.2844

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 D(3)
1	C-130	155,000	95.00	105.0	40.41	37.6
2	C-27J Spartan	67,241	96.40	104.4	24.99	14.4
3	Falcon-900	45,500	95.00	145.0	25.58	15.1

				TWY C	
4 Challenger 300	38,850	95.00	145.0	22.96	12.1
5 Citation Sovereign	30,250	95.00	189.0	20.82	10.0
6 Citation-III/VI/VII	23,200	95.00	168.0	18.34	7.7
7 Phenom 300	17,968	95.00	130.0	18.09	7.5
8 SuperKingAir-350	15,100	95.00	92.0	14.07	4.6
9 SuperKingAir-B200	12,590	95.00	98.0	12.65	3.7
10 Citation Mustang	10,700	95.00	98.0	13.82	4.4
11 GrnCaravan-CE-208B	8,750	95.00	75.0	12.23	3.4
12 Cessna 401/402	6,850	95.00	70.0	10.82	2.7
13 Malibu Meridian	4,118	95.00	55.0	8.26	1.6
14 Bonanza 35	3,663	95.00	40.0	7.64	1.3
15 Skylane-1-82	3,110	95.00	50.0	7.13	1.2
16 Skyhawk-172	2,558	95.00	50.0	6.47	1.0

Results Table 4. Summary Output for Copy and Paste Into the Support Spread Sheet

Num,Plane,GWin,ACNin,ADout,6Dt,COV20yr,COVtoF,CDft,Gwcdf,PCncdf,EVALt,SUBcode,KorCBR,PtoTC,FlexOrRig
1,C-130,155000.000,37.6,1,27.51,8.64912E+000,8.63453E+000,34.89,102761.791,23.0,27.5,D,1.00,1.00,F
2,C-27J Spartan,67241.000,14.4,2,18.99,1.15887E+001,5.96174E+001,31.46,53140.248,11.1,27.5,D,1.00,1.00,F
3,Falcon-900,45500.000,15.1,1,13.34,3.92247E+000,5.72947E+001,31.19,35833.335,11.6,27.5,D,1.00,1.00,F
4,Challenger 300,38850.000,12.1,4,18.08,1.42957E+001,1.08508E+002,30.71,31699.347,9.6,27.5,D,1.00,1.00,F
5,Citation Sovereign,30250.000,10.0,44,25.19,1.24179E+002,2.46758E+002,30.06,25515.737,8.3,27.5,D,1.00,1.00,F
6,Citation-III/VI/VII,23200.000,7.7,44,21.95,1.16222E+002,8.80713E+002,29.44,20315.933,6.7,27.5,D,1.00,1.00,F
7,Phenom 300,17968.000,7.5,163,23.24,3.08145E+002,1.50284E+003,29.53,15580.513,6.5,27.5,D,1.00,1.00,F
8,SuperKingAir-350,15100.000,4.6,218,21.02,6.24327E+002,2.86137E+004,28.57,14030.964,4.2,27.5,D,1.00,1.00,F
9,SuperKingAir-B200,12590.000,3.7,1329,22.00,3.36831E+003,2.72736E+005,28.27,11943.706,3.5,27.5,D,1.00,1.00,F
10,Citation Mustang,10700.000,4.4,349,19.24,5.86688E+002,6.01654E+004,28.71,9815.134,4.0,27.5,D,1.00,1.00,F
11,GrnCaravan-CE-208B,8750.000,3.4,1095,19.45,1.90255E+003,5.27866E+005,28.44,8183.352,3.2,27.5,D,1.00,1.00,F
12,Cessna 401/402,6850.000,2.7,3868,18.91,6.15700E+003,1.69885E+007,28.15,6536.539,2.6,27.5,D,1.00,1.00,F
13,Malibu Meridian,4118.000,1.6,1960,13.68,2.73007E+003,5.05641E+014,27.65,4072.875,1.6,27.5,D,1.00,1.00,F
14,Bonanza 35,3663.000,1.3,3301,13.43,5.08355E+003,2.70817E+022,27.54,3652.081,1.3,27.5,D,1.00,1.00,F
15,Skylane-1-82,3110.000,1.2,2682,12.08,3.40568E+003,1.01423E+304,26.21,3423.521,1.3,27.5,D,1.00,1.00,F
16,Skyhawk-172,2558.000,1.0,5725,11.53,6.59435E+003,1.01423E+304,23.77,3423.509,1.3,27.5,D,1.00,1.00,F

TWY E

This file name = PCN Results Flexible 2-21-2018 17:06;26.txt

Library file name = X:\2112200\160244.01\TECH\dsgn\PCN Analysis\COMFAA\Fleet Mix Files\Rwy and Twys.Ext

Units = English

Evaluation pavement type is flexible and design procedure is CBR.

Alpha Values are those approved by the ICAO in 2007.

CBR = 1.00 (Subgrade Category is D(3))

Evaluation pavement thickness = 30.80 in

Pass to Traffic Cycle (PtoTC) Ratio = 1.00

Maximum number of wheels per gear = 2

Maximum number of gears per aircraft = 2

No aircraft have 4 or more wheels per gear. The FAA recommends a reference section assuming 3 inches of HMA and 6 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	C-130	155,000	95.00	105.0	1	9	27.51
2	C-27J Spartan	67,241	96.40	104.4	2	12	18.99
3	Falcon-900	45,500	95.00	145.0	1	4	13.34
4	Challenger 300	38,850	95.00	145.0	4	14	18.08
5	Citation Sovereign	30,250	95.00	189.0	44	124	25.19
6	Citation-III/VI/VII	23,200	95.00	168.0	44	116	21.95
7	Phenom 300	17,968	95.00	130.0	163	308	23.24
8	SuperKingAir-350	15,100	95.00	92.0	218	624	21.02
9	SuperKingAir-B200	12,590	95.00	98.0	1,329	3,368	22.00
10	Citation Mustang	10,700	95.00	98.0	349	587	19.24
11	GrnCaravan-CE-208B	8,750	95.00	75.0	1,095	1,903	19.45
12	Cessna 401/402	6,850	95.00	70.0	3,868	6,157	18.91
13	Malibu Meridian	4,118	95.00	55.0	1,960	2,730	13.68
14	Bonanza 35	3,663	95.00	40.0	3,301	5,084	13.43
15	Skylane-1-82	3,110	95.00	50.0	2,682	3,406	12.08
16	Skyhawk-172	2,558	95.00	50.0	5,725	6,594	11.53

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	PCN on D(3)
1	C-130	14	31.95	145,530	38.88	0.6911
2	C-27J Spartan	134	31.39	65,043	24.52	0.0979
3	Falcon-900	136	31.33	44,031	25.14	0.0328
4	Challenger 300	288	31.26	37,782	22.59	0.0563
5	Citation Sovereign	827	31.16	29,588	20.57	0.1704
6	Citation-III/VI/VII	4,283	31.06	22,821	18.18	0.0308
7	Phenom 300	6,670	31.09	17,634	17.92	0.0524
8	SuperKingAir-350	550,922	30.92	14,983	14.00	0.0013
9	SuperKingAir-B200	>5,000,000	30.88	12,530	12.62	0.0002
10	Citation Mustang	731,571	30.96	10,590	13.75	0.0009
11	GrnCaravan-CE-208B	>5,000,000	30.92	8,683	12.18	0.0002
12	Cessna 401/402	>5,000,000	30.87	6,818	10.79	0.0000
13	Malibu Meridian	>5,000,000	30.23	4,275	8.41	0.0000
14	Bonanza 35	>5,000,000	28.24	4,358	8.33	0.0000
15	Skylane-1-82	>5,000,000	26.21	4,294	8.38	0.0000
16	Skyhawk-172	>5,000,000	23.77	4,294	8.38	0.0000
					Total CDF =	1.1343

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 D(3)
1	C-130	155,000	95.00	105.0	40.41	37.6
2	C-27J Spartan	67,241	96.40	104.4	24.99	14.4
3	Falcon-900	45,500	95.00	145.0	25.58	15.1

				TWY E	
4 Challenger 300	38,850	95.00	145.0	22.96	12.1
5 Citation Sovereign	30,250	95.00	189.0	20.82	10.0
6 Citation-III/VI/VII	23,200	95.00	168.0	18.34	7.7
7 Phenom 300	17,968	95.00	130.0	18.09	7.5
8 SuperKingAir-350	15,100	95.00	92.0	14.07	4.6
9 SuperKingAir-B200	12,590	95.00	98.0	12.65	3.7
10 Citation Mustang	10,700	95.00	98.0	13.82	4.4
11 GrnCaravan-CE-208B	8,750	95.00	75.0	12.23	3.4
12 Cessna 401/402	6,850	95.00	70.0	10.82	2.7
13 Malibu Meridian	4,118	95.00	55.0	8.26	1.6
14 Bonanza 35	3,663	95.00	40.0	7.64	1.3
15 Skylane-1-82	3,110	95.00	50.0	7.13	1.2
16 Skyhawk-172	2,558	95.00	50.0	6.47	1.0

Results Table 4. Summary Output for Copy and Paste Into the Support Spread Sheet

Num,Plane,GWin,ACNin,ADout,6Dt,COV20yr,COVtoF,CDFt,Gwcdf,PCNcdf,EVALt,SUBcode,KorCBR,PtoTC,FlexOrRig
1,C-130,155000.000,37.6,1,27.51,8.64912E+000,1.25142E+001,31.95,145529.554,34.8,30.8,D,1.00,1.00,F
2,C-27J Spartan,67241.000,14.4,2,18.99,1.15887E+001,1.18327E+002,31.39,65042.899,13.8,30.8,D,1.00,1.00,F
3,Falcon-900,45500.000,15.1,1,13.34,3.92247E+000,1.19528E+002,31.33,44031.099,14.6,30.8,D,1.00,1.00,F
4,Challenger 300,38850.000,12.1,4,18.08,1.42957E+001,2.53970E+002,31.26,37782.241,11.8,30.8,D,1.00,1.00,F
5,Citation Sovereign,30250.000,10.0,44,25.19,1.24179E+002,7.28736E+002,31.16,29588.103,9.7,30.8,D,1.00,1.00,F
6,Citation-III/VI/VII,23200.000,7.7,44,21.95,1.16222E+002,3.77548E+003,31.06,22821.248,7.6,30.8,D,1.00,1.00,F
7,Phenom 300,17968.000,7.5,163,23.24,3.08145E+002,5.88044E+003,31.09,17634.004,7.4,30.8,D,1.00,1.00,F
8,SuperKingAir-350,15100.000,4.6,218,21.02,6.24327E+002,4.85689E+005,30.92,14982.905,4.5,30.8,D,1.00,1.00,F
9,SuperKingAir-B200,12590.000,3.7,1329,22.00,3.36831E+003,1.88625E+007,30.88,12529.837,3.7,30.8,D,1.00,1.00,F
10,Citation Mustang,10700.000,4.4,349,19.24,5.86688E+002,6.44948E+005,30.96,10589.546,4.4,30.8,D,1.00,1.00,F
11,GrnCaravan-CE-208B,8750.000,3.4,1095,19.45,1.90255E+003,1.20702E+007,30.92,8683.323,3.4,30.8,D,1.00,1.00,F
12,Cessna 401/402,6850.000,2.7,3868,18.91,6.15700E+003,2.02164E+009,30.87,6817.535,2.7,30.8,D,1.00,1.00,F
13,Malibu Meridian,4118.000,1.6,1960,13.68,2.73007E+003,1.01423E+304,30.23,4275.412,1.6,30.8,D,1.00,1.00,F
14,Bonanza 35,3663.000,1.3,3301,13.43,5.08355E+003,1.01423E+304,28.24,4358.048,1.6,30.8,D,1.00,1.00,F
15,Skylane-1-82,3110.000,1.2,2682,12.08,3.40568E+003,1.01423E+304,26.21,4294.450,1.6,30.8,D,1.00,1.00,F
16,Skyhawk-172,2558.000,1.0,5725,11.53,6.59435E+003,1.01423E+304,23.77,4294.453,1.6,30.8,D,1.00,1.00,F

ACN Fleet Mix-Flexible

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	C-130	155,000	95.00	105.0	26.7	30.2	32.3	37.6
2	C-27J Spartan	67,241	96.40	104.4	10.7	12.3	13.0	14.4
3	Falcon-900	45,500	95.00	145.0	12.2	13.0	14.3	15.1
4	Challenger 300	38,850	95.00	145.0	9.0	9.4	10.7	12.1
5	Citation Sovereign	30,250	95.00	189.0	8.0	8.6	9.4	10.0
6	Citation-III/VI/VII	23,200	95.00	168.0	6.3	6.8	7.4	7.7
7	Phenom 300	17,968	95.00	130.0	6.9	7.3	7.3	7.5
8	SuperKingAir-350	15,100	95.00	92.0	2.8	3.4	3.8	4.6
9	SuperKingAir-B200	12,590	95.00	98.0	2.3	2.7	3.0	3.7
10	Citation Mustang	10,700	95.00	98.0	3.6	3.9	4.2	4.4
11	GrnCaravan-CE-208B	8,750	95.00	75.0	2.3	2.8	3.3	3.4
12	Cessna 401/402	6,850	95.00	70.0	1.7	2.1	2.5	2.7
13	Malibu Meridian	4,118	95.00	55.0	0.8	1.1	1.4	1.6
14	Bonanza 35	3,663	95.00	40.0	0.5	0.7	1.0	1.3
15	Skylane-1-82	3,110	95.00	50.0	0.6	0.8	1.0	1.2
16	Skyhawk-172	2,558	95.00	50.0	0.5	0.6	0.8	1.0

ACN Fleet Mix-Rigid
and Strength. Units = English.

Rigid ACN at Indicated Gross Weight

No.	Aircraft Name	Gross Weight	% GW on Main Gear	Tire Pressure	ACN at Indicated Code			
					A(552)	B(295)	C(147)	D(74)
1	C-130	155,000	95.00	105.0	29.7	32.2	34.9	37.5
2	C-27J Spartan	67,241	96.40	104.4	12.3	13.0	13.8	14.7
3	Falcon-900	45,500	95.00	145.0	14.0	14.6	15.1	15.5
4	Challenger 300	38,850	95.00	145.0	10.4	11.0	11.6	12.0
5	Citation Sovereign	30,250	95.00	189.0	9.7	10.0	10.3	10.5
6	Citation-III/VI/VII	23,200	95.00	168.0	7.6	7.9	8.1	8.2
7	Phenom 300	17,968	95.00	130.0	7.0	7.0	7.1	7.1
8	SuperKingAir-350	15,100	95.00	92.0	3.7	3.9	4.2	4.3
9	SuperKingAir-B200	12,590	95.00	98.0	3.0	3.2	3.4	3.5
10	Citation Mustang	10,700	95.00	98.0	3.8	3.9	3.9	3.8
11	GrnCaravan-CE-208B	8,750	95.00	75.0	2.8	2.9	3.0	2.9
12	Cessna 401/402	6,850	95.00	70.0	2.2	2.2	2.3	2.2
13	Malibu Meridian	4,118	95.00	55.0	1.2	1.2	1.3	1.1
14	Bonanza 35	3,663	95.00	40.0	0.9	1.0	1.0	0.9
15	Skylane-1-82	3,110	95.00	50.0	0.9	0.9	1.0	0.8
16	Skyhawk-172	2,558	95.00	50.0	0.7	0.8	0.8	0.6

- A Flexible Category (CBR 15)
- B Flexible Category (CBR 10)
- C Flexible Category (CBR 6)
- D Flexible Category (CBR 3)

- TIRE PRESSURE**
- W Unlimited
 - X 254 psi
 - Y 145 psi
 - Z 73 psi

- METHOD USED**
- Using Aircraft
 - Technical

Project info
Ukiah Municipal Airport

- A Rigid Category (k 552 pci)
- B Rigid Category (k 295 pci)
- C Rigid Category (k 147 pci)
- D Rigid Category (k 74 pci)

- AIRCRAFT GEAR TYPE IN TRAFFIC MIX**
- S (single wheel gear)
 - D (dual wheel gear)
 - 2D (dual tandem wheel gear)
 - 3D (triple tandem wheel gear) e.g. B-777
 - DDT or W/B (tandem gear under wing AND tandem gear under body) e.g. B-747, A-340-600, A-380

Enter PCN 2

Airport LOC-ID UKI
Pavement ID Taxilanes 2, 4, 5 and 6

Form 5010

IF 3D or W/B Gear Checked, #38 = PCN Please Add Data Element #38 Remark

Data Element Gross Weight and PCN

#35 S gear	<min
#36 D gear	<min
#37 DT gear	
#38 DDT gear	
#39 PCN	2/F/D/X/U

3D	
2D/2D2	
2D/3D2W	
2D/3D2B	

} Report Minimum Gross Weight

Airport LOC-ID	Pavement ID	#35 S GW	#36 D GW	#37 DT GW	#38 DDT GW	#39 PCN
UKI	Runway 15-33	<min	<min			3/F/D/X/T
UKI	Taxiway Connector C	<min	<min			4/F/D/X/T
UKI	Taxiway Connector E	<min	<min			4/F/D/X/T
UKI	Parallel Taxiway A, Taxiway Connectors B and D, Tie-down Apron 1, AC Sections on Tie-down Apron 2	<min	<min			4/F/D/X/U
UKI	PCC Sections on Tie-down Apron 2	13.5	<min			4/R/D/X/U
UKI	Helipad Apron, Hangar Apron, Tie-down Apron 3, Taxilanes 1, 3, 7 and Hangar Area 2 Taxilane	<min	<min			4/F/D/X/U
UKI	Taxilanes 2, 4, 5 and 6	<min	<min			2/F/D/X/U

