TWIN BRIDGES AIRPORT

Branch: 51A **APRON** **A-1**

Length: 0 LF **Width:** 0 LF **Area:** 90,000 SF **Last Const:** 2000 **Family:** ACAM
From: ENTIRE APRON **To:** **Surface:** ST

Inspections

Samples Surveyed: 5 **Total Samples:** 18 **Last Inspection Date:** 9/5/2012 **PCI: 38**

Sample # 2 **Area:** 5,250 SF

Distress Description	Severity	Quantity
ALLIGATOR CRACKING	L	1,440 LF
BLOCK CRACKING	L	1,440 LF
LONGITUDINAL/TRANSVERSE CRACKING	L	200 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	60 LF
OIL SPILLAGE	N	24 LF
PATCHING	L	4 LF
RAVELING	L	525 LF
RAVELING	H	45 LF
WEATHERING	L	2,880 LF
WEATHERING	M	2,362 LF

Sample # 6 **Area:** 5,250 SF

Distress Description	Severity	Quantity
BLOCK CRACKING	L	3,900 LF
LONGITUDINAL/TRANSVERSE CRACKING	L	131 LF
PATCHING	L	1 LF
RAVELING	L	1,920 LF
WEATHERING	L	4,462 LF
WEATHERING	M	788 LF

Sample # 10 **Area:** 5,250 SF

Distress Description	Severity	Quantity
BLEEDING	N	2 LF
BLOCK CRACKING	L	1,440 LF
LONGITUDINAL/TRANSVERSE CRACKING	L	400 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	145 LF
PATCHING	L	2 LF
RAVELING	L	2,160 LF
RAVELING	M	20 LF
RAVELING	H	2 LF
WEATHERING	L	4,620 LF
WEATHERING	M	630 LF

Sample # 14 **Area:** 5,250 SF

Distress Description	Severity	Quantity
ALLIGATOR CRACKING	L	400 LF
BLEEDING	N	35 LF
LONGITUDINAL/TRANSVERSE CRACKING	L	385 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	25 LF
RAVELING	L	1,070 LF
RAVELING	M	10 LF
WEATHERING	L	3,150 LF
WEATHERING	M	2,100 LF

Sample # 18 **Area:** 4,000 SF

Distress Description	Severity	Quantity
BLEEDING	N	50 LF
LONGITUDINAL/TRANSVERSE CRACKING	L	380 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	47 LF
RAVELING	L	880 LF
WEATHERING	L	2,920 LF
WEATHERING	M	1,080 LF

TWIN BRIDGES AIRPORT

Branch: 51A **APRON** **A-1**

Extrapolated Distress Quantities*

Distress Description	Severity	Quantity	Density	Deduct
ALLIGATOR CRACKING	L	6,624 SF	89.86%	40.08
BLEEDING	N	313 SF	8.97%	2.40
BLOCK CRACKING	L	24,408 SF	0.07%	23.41
LONGITUDINAL/TRANSVERSE CRACKING	L	5,386 SF	5.11%	16.77
LONGITUDINAL/TRANSVERSE CRACKING	M	997 SF	0.14%	11.77
OIL SPILLAGE	N	86.4 LF	0.72%	2
PATCHING	L	25.2 SF	0.0049	2
RAVELING	L	23598 SF	0.5956	15.47
RAVELING	M	108 SF	0.0827	4.14
RAVELING	H	169.2 SF	0.7537	7.82
WEATHERING	L	64915.2 LF	0.0069	5.54
WEATHERING	M	25056 SF	0.0004	10.88

* Multiple deduct values are scaled down from their algebraic sum to keep the model consistent with experimental data.

Percent of Deduct Values Based on Distress Mechanism

28.0 **% Load** 69.0 **% Climate/Durability** 3.0 **% Other**

TWIN BRIDGES AIRPORT

Branch: 51R **RUNWAY** **R-1**

Length: 4,300 LF **Width:** 60 LF **Area:** 258,000 SF **Last Const:** 2000 **Family:** ACRML
From: RWY 16-34 STA 0+00 **To:** RWY 16-34 STA 38+00 **Surface:** AC

Inspections

Samples Surveyed: 7 **Total Samples:** 54 **Last Inspection Date:** 9/5/2012 **PCI: 54**

Sample # 2 **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLEEDING	N	80 SF
BLOCK CRACKING	L	1,390 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	279 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	92 LF
RAVELING	L	960 SF
WEATHERING	L	3,840 SF
WEATHERING	M	960 SF

Sample # 10 **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLEEDING	N	10 SF
BLOCK CRACKING	L	240 SF
BLOCK CRACKING	M	240 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	204 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	25 LF
LONGITUDINAL/TRANSVERSE CRACKING	H	30 LF
RAVELING	L	410 SF
RAVELING	M	10 SF
WEATHERING	L	4,350 SF
WEATHERING	M	450 SF

Sample # 18 **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLOCK CRACKING	L	2,400 SF
BLOCK CRACKING	M	120 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	205 LF
WEATHERING	L	4,080 SF
WEATHERING	M	720 SF

Sample # 26 **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLEEDING	N	25 SF
BLOCK CRACKING	L	2,000 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	182 LF
WEATHERING	L	4,800 SF

Sample # 34 **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLEEDING	N	6 SF
BLOCK CRACKING	L	2,000 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	158 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	15 LF
WEATHERING	L	4,800 SF

Sample # 42 **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLOCK CRACKING	L	1,200 F
LONGITUDINAL/TRANSVERSE CRACKING	L	227 LF
WEATHERING	L	3,600 SF
WEATHERING	M	1,200 SF

TWIN BRIDGES AIRPORT

Branch: 51R **RUNWAY** **R-1**

Sample # **50** **Area:** 4,800 SF

Distress Description	Severity	Quantity
BLEEDING	N	10 SF
BLOCK CRACKING	L	1,200 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	126 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	80 LF
WEATHERING	L	3,600 SF
WEATHERING	M	1,200 SF

Extrapolated Distress Quantities*

Distress Description	Severity	Quantity	Density	Deduct
BLEEDING	N	1,006 SF	0.14%	2.63
BLOCK CRACKING	L	80,088 SF	0.24%	24.45
BLOCK CRACKING	M	2,764 SF	0.34%	12.17
LONGITUDINAL/TRANSVERSE CRACKING	L	10,604 LF	0.50%	12.78
LONGITUDINAL/TRANSVERSE CRACKING	M	1,628 LF	2.14%	9.19
LONGITUDINAL/TRANSVERSE CRACKING	H	230 LF	0.01%	7.50
RAVELING	L	10,520 SF	0.01%	6.07
RAVELING	M	76.79 SF	0.011	4
WEATHERING	L	223216 SF	0.0003	5.82
WEATHERING	M	34783.9 SF	0.0489	6.67

* Multiple deduct values are scaled down from their algebraic sum to keep the model consistent with experimental data.

Percent of Deduct Values Based on Distress Mechanism

0.0 **% Load** 97.0 **% Climate/Durability** 3.0 **% Other**

TWIN BRIDGES AIRPORT

Branch: 51T **TAXIWAY** **T-1**

Length: 2,700 LF **Width:** 25 LF **Area:** 67,500 SF **Last Const:** 2000 **Family:** ACRML
From: RWY 16-34 17+00 **To:** APRON **Surface:** AC

Inspections

Samples Surveyed: 5 **Total Samples:** 14 **Last Inspection Date:** 9/5/2012 **PCI: 60**

Sample # 1 **Area:** 5,000 SF

Distress Description	Severity	Quantity
BLEEDING	N	20 SF
BLOCK CRACKING	L	250 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	229 LF
WEATHERING	L	4,990 SF
WEATHERING	M	10 SF

Sample # 4 **Area:** 5,000 SF

Distress Description	Severity	Quantity
BLEEDING	N	100 SF
BLOCK CRACKING	L	400 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	206 LF
PATCHING	L	1 SF
WEATHERING	L	5,000 SF

Sample # 7 **Area:** 5,000 SF

Distress Description	Severity	Quantity
BLEEDING	N	9 SF
BLOCK CRACKING	L	1,320 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	216 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	33 LF
WEATHERING	L	5,000 SF

Sample # 10 **Area:** 5,000 SF

Distress Description	Severity	Quantity
BLEEDING	N	12 SF
BLOCK CRACKING	L	2,000 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	212 LF
LONGITUDINAL/TRANSVERSE CRACKING	M	18 LF
WEATHERING	L	5,000 SF

Sample # 13 **Area:** 5,000 SF

Distress Description	Severity	Quantity
BLOCK CRACKING	L	5,000 SF
DEPRESSION	L	25 SF
LONGITUDINAL/TRANSVERSE CRACKING	L	122 LF
LONGITUDINAL/TRANSVERSE CRACKING	L	103 LF
RAVELING	L	400 SF
RAVELING	M	50 SF
WEATHERING	L	5,000 SF

TWIN BRIDGES AIRPORT

Branch: 51T TAXIWAY **T-1**

Extrapolated Distress Quantities*

Distress Description	Severity	Quantity	Density	Deduct
BLEEDING	N	381 SF	0.19%	3.40
BLOCK CRACKING	L	24,219 SF	0.08%	25.61
DEPRESSION	L	68 SF	0.08%	0.30
LONGITUDINAL/TRANSVERSE CRACKING	L	2,938 LF	2.02%	13.34
LONGITUDINAL/TRANSVERSE CRACKING	M	138 LF	5.69%	5.21
PATCHING	L	3 SF	0.57%	2.00
RAVELING	L	1,080 SF	5.28%	3.48
RAVELING	M	135 SF	0.365	4.66
WEATHERING	L	67473 SF	0.0728	5.96
WEATHERING	M	27 SF	0.2572	1.2

* Multiple deduct values are scaled down from their algebraic sum to keep the model consistent with experimental data.

Percent of Deduct Values Based on Distress Mechanism

0.0 % Load 94.0 % Climate/Durability 6.0 % Other

TWIN BRIDGES AIRPORT

FIRST YEAR LOCAL: 2013 **LOCAL REPAIR COST: $3,960**

Section	Distress Description	Severity	Quantity	Work Description	Quantity	Cost	Policy
A-1	RAVELING	H	169 SF	Patching - AC Shallow	169 SF	$3,384	SAFETY
R-1	L & T CR	H	230 LF	Crack Sealing - AC	230 LF	$576	SAFETY

FIFTEEN YEAR PROJECTIONS **ESTIMATED AVERAGE ANNUAL COST: $157,127**

Plan Year: 2013 — Estimated Cost: $2,110,981

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Major Below Critical	$0	$0	$633,195	$0	$633,195	36	100
R-1	Major Below Critical	$0	$0	$1,226,145	$0	$1,226,145	52	100
T-1	Major Below Critical	$0	$0	$251,640	$0	$251,640	58	100

Plan Year: 2014 — Estimated Cost: $0

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After

Plan Year: 2015 — Estimated Cost: $0

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After

Plan Year: 2016 — Estimated Cost: $964

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$207	$0	$0	$0	$207	88	88
R-1	Preventive	$600	$0	$0	$0	$600	88	88
T-1	Preventive	$157	$0	$0	$0	$157	88	88

Plan Year: 2017 — Estimated Cost: $2,488

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$545	$0	$0	$0	$545	85	85
R-1	Preventive	$1,540	$0	$0	$0	$1,540	85	85
T-1	Preventive	$403	$0	$0	$0	$403	85	85

Plan Year: 2018 — Estimated Cost: $3,959

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$877	$0	$0	$0	$877	82	82
R-1	Preventive	$2,442	$0	$0	$0	$2,442	82	82
T-1	Preventive	$639	$0	$0	$0	$639	82	82

Plan Year: 2019 — Estimated Cost: $6,583

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$1,607	$0	$0	$0	$1,607	79	79
R-1	Preventive	$3,944	$0	$0	$0	$3,944	79	79
T-1	Preventive	$1,032	$0	$0	$0	$1,032	79	79

Plan Year: 2020 — Estimated Cost: $11,509

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$2,829	$0	$0	$0	$2,829	76	76
R-1	Preventive	$6,880	$0	$0	$0	$6,880	77	77
T-1	Preventive	$1,800	$0	$0	$0	$1,800	77	77

Plan Year: 2021 — Estimated Cost: $16,125

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$4,035	$0	$0	$0	$4,035	74	74
R-1	Preventive	$9,583	$0	$0	$0	$9,583	75	75
T-1	Preventive	$2,507	$0	$0	$0	$2,507	75	75

Plan Year: 2022 — Estimated Cost: $20,460

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$5,238	$0	$0	$0	$5,238	71	71
R-1	Preventive	$12,066	$0	$0	$0	$12,066	74	74
T-1	Preventive	$3,157	$0	$0	$0	$3,157	74	74

Plan Year: 2023 — Estimated Cost: $25,115

Section	Maintenance	Local	Global	Major<Crit	Major>Crit	Total	PCI Before	PCI After
A-1	Preventive	$7,039	$0	$0	$0	$7,039	69	69
R-1	Preventive	$14,328	$0	$0	$0	$14,328	72	72
T-1	Preventive	$3,749	$0	$0	$0	$3,749	72	72

TWIN BRIDGES AIRPORT

Plan Year: 2024					Estimated Cost: $30,474		PCI	
Section	**Maintenance**	**Local**	**Global**	**Major<Crit**	**Major>Crit**	**Total**	**Before**	**After**
A-1	Preventive	$9,804	$0	$0	$0	$9,804	67	67
R-1	Preventive	$16,384	$0	$0	$0	$16,384	71	71
T-1	Preventive	$4,286	$0	$0	$0	$4,286	71	71

Plan Year: 2025					Estimated Cost: $35,659		PCI	
Section	**Maintenance**	**Local**	**Global**	**Major<Crit**	**Major>Crit**	**Total**	**Before**	**After**
A-1	Preventive	$12,601	$0	$0	$0	$12,601	65	65
R-1	Preventive	$18,276	$0	$0	$0	$18,276	70	70
T-1	Preventive	$4,782	$0	$0	$0	$4,782	70	70

Plan Year: 2026					Estimated Cost: $42,730		PCI	
Section	**Maintenance**	**Local**	**Global**	**Major<Crit**	**Major>Crit**	**Total**	**Before**	**After**
A-1	Preventive	$15,437	$0	$0	$0	$15,437	63	63
R-1	Preventive	$21,633	$0	$0	$0	$21,633	69	69
T-1	Preventive	$5,660	$0	$0	$0	$5,660	69	69

Plan Year: 2027					Estimated Cost: $49,862		PCI	
Section	**Maintenance**	**Local**	**Global**	**Major<Crit**	**Major>Crit**	**Total**	**Before**	**After**
A-1	Preventive	$18,351	$0	$0	$0	$18,351	62	62
R-1	Preventive	$24,976	$0	$0	$0	$24,976	69	69
T-1	Preventive	$6,534	$0	$0	$0	$6,534	69	69

TWIN BRIDGES AIRPORT

9/21/2012

A-1, Overview

A-1, Surface detail with bleeding

A-1, Surface detail with cracks

A-1, Surface detail with raveling

TWIN BRIDGES AIRPORT

9/21/2012

R-1, Overview

R-1, Surface detail with bleeding

R-1, Surface detail with cracks

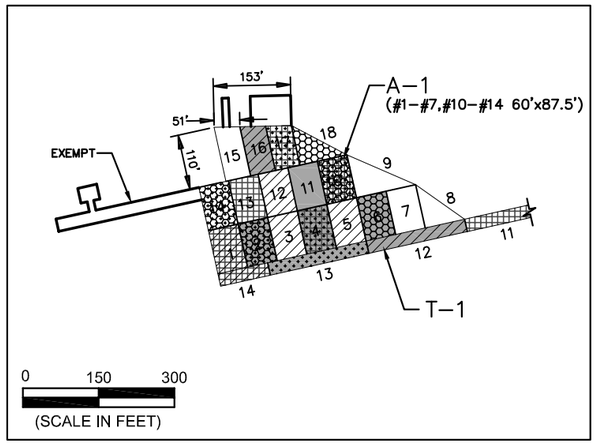
R-1, Surface detail with raveling

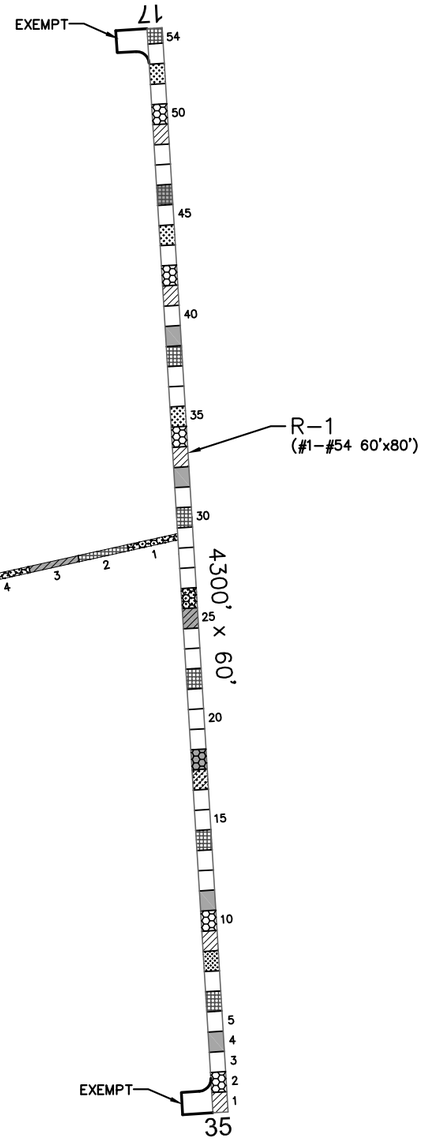
T-1, Overview

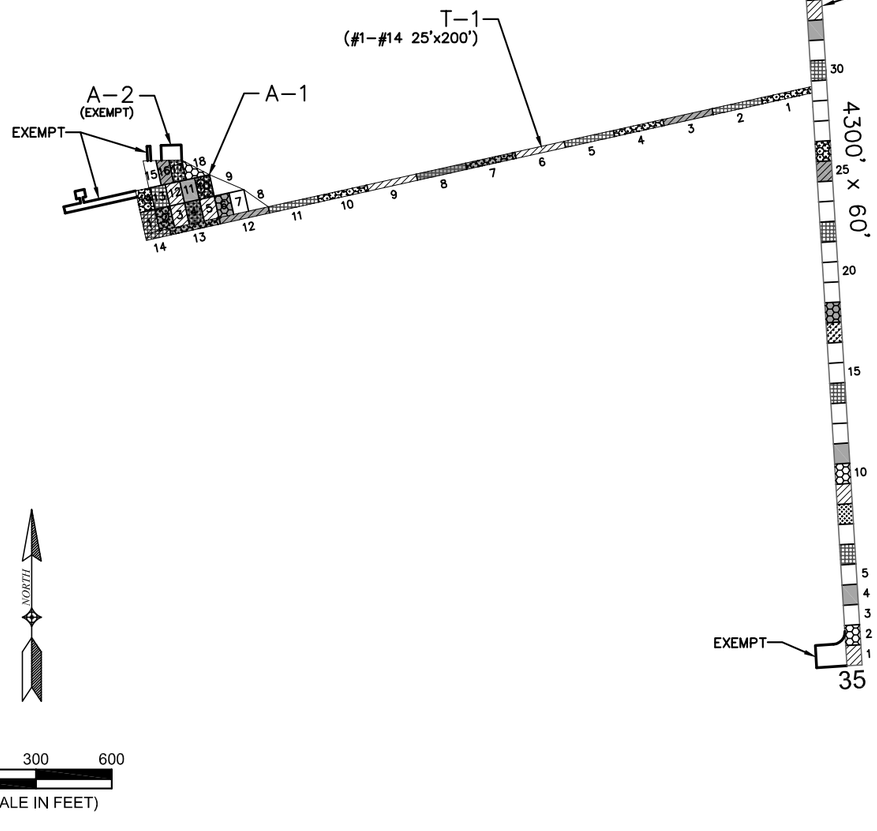
T-1, Surface detail with crack

T-1, Surface detail with depression and cracks

TWIN BRIDGES







PAVEMENT STRENGTH SURVEY/PAVEMENT CONDITION SURVEY

PAVE. IDENT.	SOIL CLASS	SUB GRADE CLASS	SUBBASE COURSE	BASE COURSE	SURFACE COURSE	OVERLAY	PAVEMENT STRENGTH MAX. GROSS LOAD (LBS) SINGLE	DUAL	DUAL TAN.	REMARKS
RUNWAYS										
R–1	CBR=5			11" P–208	P609	1.8" P–401	12,500			1 2
TAXIWAYS										
T–1	CBR=5			11" P–208	P609	1.8" P–401	12,500			1 2
APRONS										
A–1	CBR=5			11" P–208	P609	1.8" P–401	12,500			1 2
A–2				UNKNOWN	PCC		UNKNOWN			

REMARKS:

1 AIP–003, 1988, ALL NEW PAVEMENTS.

2 AIP–004, 2000, OVERLAY EXISTING BITUMINOUS RUNWAY, TAXIWAY, APRON, AND TURNAROUNDS.

LEGEND

- 1997 SURVEY AREA
- 2000 SURVEY AREA (NOT SURVEYED)
- 2003 SURVEY AREA
- 2006 SURVEY AREA
- 2009 SURVEY AREA
- 2012 SURVEY AREA

DATE OF PAVEMENT STRENGTH SURVEY:	
EVALUATED BY:	
DATE OF MOST RECENT PAVEMENT CONDITION SURVEY:	SEPT. 21, 2012
EVALUATED BY:	J. WALLA

MONTANA AVIATION SYSTEM PLAN
2012 UPDATE - PAVEMENT CONDITION INDEXES

TWIN BRIDGES AIRPORT

PREPARED FOR: MONTANA AERONAUTICS DIVISION

TWIN BRIDGES MONTANA

DATE: DEC. 2012

PREPARED BY: SE Engineering Planning Consulting

TWIN BRIDGES