

CRATER LAKE – KLAMATH REGIONAL AIRPORT

This report describes how your Pavement Maintenance Management Program (PMMP) was developed. Your Program was developed as part of the Oregon Continuous Aviation System Plan sponsored in part by the Oregon Department of Aviation and the Federal Aviation Administration (FAA). The information and data contained in this report ensures you are in compliance with the requirements of FAA Grant Assurance Number 11 which states that any airport requesting federal funds for pavement improvement projects must have implemented a pavement maintenance management program.

DATA COLLECTION

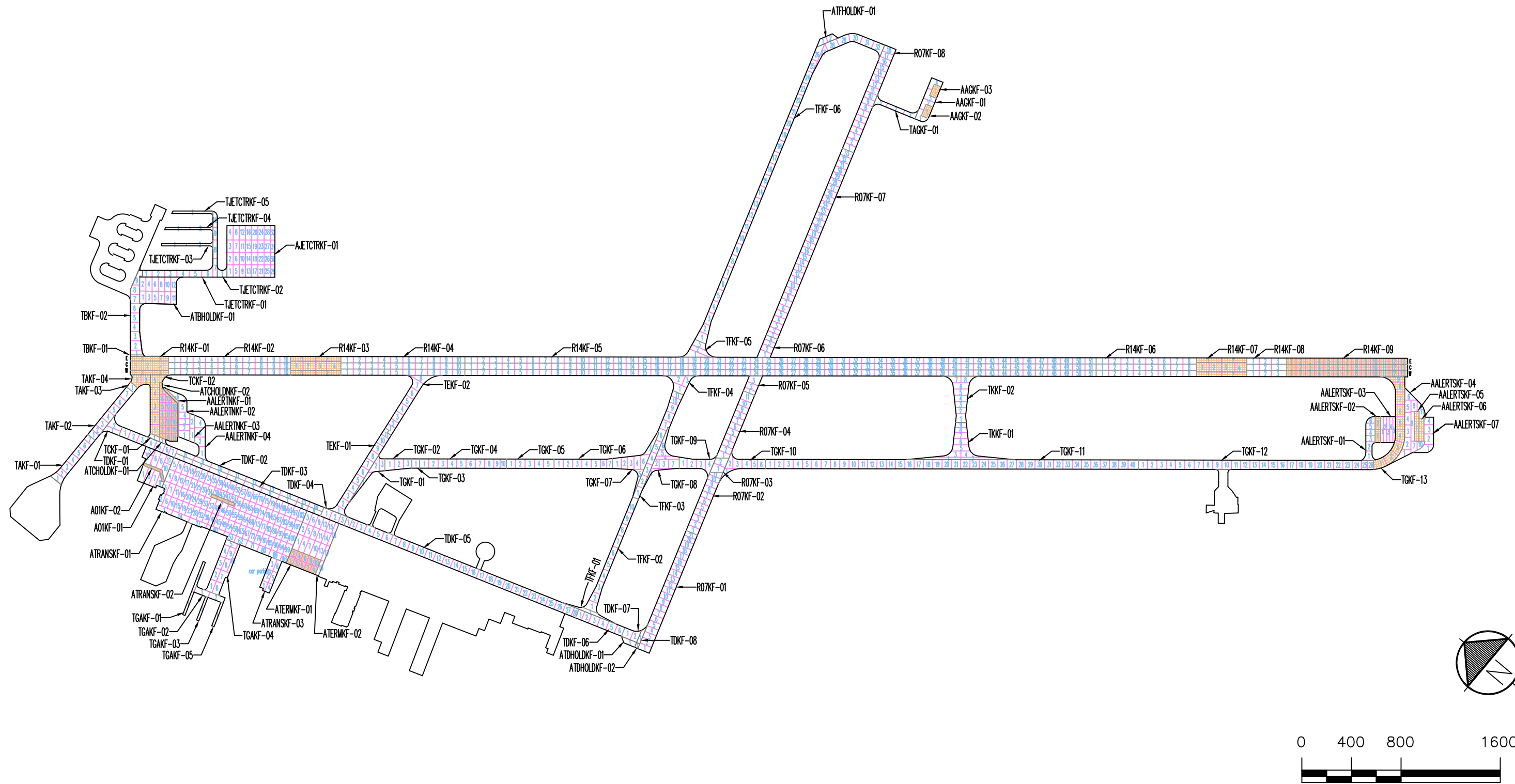
To determine how your pavements were constructed and their age, a records review was conducted. The work history compiled for Crater Lake – Klamath Regional Airport (pavement layer types, thicknesses and dates of construction), as well as pavement dimensions, are provided in Appendix 5. The pavement boundaries are shown in Figure 1. The most recent construction date for each pavement can also be found in the Section Condition Report in Appendix 2. Figure KF-1 and the information contained in Appendices 2, 4 and 5 ensure that your airport complies with the “pavement inventory” requirement of FAA’s PMMP guidelines.

The pavements at your airport were divided into branches, sections and sample units in accordance with the methodology outlined in the current edition of ASTM D5430, *Standard Test Method for Airport Condition Index Surveys*. The branches, sections and sample units established at your airport are shown in Figure KF-1. A Branch Condition Report showing all branches, their associated areas, and their area-weighted average condition is provided in Appendix 1. Additionally, the Appendix 2 Section Condition Report provides information used to define each branch and section in the Micro PAVER database.

Using the branch, section and sample unit divisions established, a visual condition survey was conducted at Crater Lake - Klamath Regional Airport in July 2016. During the inspection, pavement defects were identified and measured in accordance with the methodology outlined in ASTM D5430. This inspection ensures your airport complies with the “detailed inspection” requirement of FAA’s PMMP guidelines. After collection, the data were entered into the Micro PAVER software for analysis. These data are reproduced in the Re-Inspection Report attached as Appendix 4.

The Micro PAVER database updated during this project ensures your airport complies with the “record keeping and information retrieval” requirements of FAA’s PMMP guidelines.

Figure KF-1. Pavement Boundaries and Branch, Section and Sample Unit Layout.
 Crater Lake – Klamath Regional Airport



RESULTS

Using the data collected during the visual inspection, the Micro PAVER software was used to calculate an area-weighted average Pavement Condition Index (PCI) for each pavement section inspected using the sample units evaluated. Using each section’s PCI, a Pavement Condition Rating (PCR) was assigned. The PCIs measured during this inspection are shown in Table 1. The table also contains projected PCIs for 2021 and 2026. The projections were based on pavement deterioration models developed by Micro PAVER using the inspection data from other pavements in the same airport category as your airport, located in the same climatic region, and with the same surface type and use.

The Branch Condition Report in Appendix 1 summarizes current pavement condition by branch while the Section Condition Report in Appendix 2 lists pavement condition by section. The current Pavement Condition Rating (PCR) is shown graphically in Figure KF-2.

Table 1. Present and Future Pavement Condition Indices.

Branch	Section	Inspection	Forecast	
		2016	2021	2026
A01KF	01	85	71	59
A01KF	02	77	75	73
AAGKF	01	68	57	50
AAGKF	02	79	76	74
AAGKF	03	74	73	72
AALERTNKF	01	93	87	82
AALERTNKF	02	100	88	74
AALERTNKF	03	91	85	81
AALERTNKF	04	74	62	53
AALERTSKF	01	97	84	70
AALERTSKF	02	90	84	80
AALERTSKF	03	88	74	62
AALERTSKF	04	91	68	56
AALERTSKF	05	91	85	81
AALERTSKF	06	99	92	86
AALERTSKF	07	98	85	71
AHOLDTBKF	01	55	49	47
AJETCNTKF	01	73	61	52
ATCHOLDKF	01	99	99	99
ATCHOLDKF	02	89	84	79
ATDHOLDKF	01	38	23	7
ATDHOLDKF	02	77	59	54

Table 1. Present and Future Pavement Condition Indices.

Branch	Section	Inspection	Forecast	
		2016	2021	2026
ATERM	01	97	90	84
ATERM	02	60	52	48
ATFHOLDKF	01	61	52	48
ATRANSKF	01	65	55	49
ATRANSKF	02	83	79	76
ATRANSKF	03	64	54	49
R07KF	01	77	64	63
R07KF	02	78	64	63
R07KF	03	100	83	65
R07KF	04	69	64	63
R07KF	05	93	71	64
R07KF	06	94	72	64
R07KF	07	60	59	58
R07KF	08	60	59	58
R14KF	01C	96	94	91
R14KF	01E	99	97	94
R14KF	01W	99	97	94
R14KF	02C	91	70	64
R14KF	02E	98	76	64
R14KF	02W	99	78	64
R14KF	03C	91	89	86
R14KF	03E	85	83	80
R14KF	03W	91	89	86
R14KF	04C	84	66	63
R14KF	04E	88	68	64
R14KF	04W	90	69	64
R14KF	05C	80	65	63
R14KF	05E	85	66	64
R14KF	05W	89	68	64
R14KF	06C	85	66	64
R14KF	06E	88	68	64
R14KF	06W	89	68	64
R14KF	07C	95	93	90
R14KF	07E	91	89	86
R14KF	07W	91	89	86
R14KF	08C	95	73	64
R14KF	08E	98	76	64
R14KF	08W	94	72	64

Table 1. Present and Future Pavement Condition Indices.

Branch	Section	Inspection	Forecast	
		2016	2021	2026
R14KF	09C	96	94	91
R14KF	09E	98	96	93
R14KF	09W	97	95	92
TAGKL	01	70	57	51
TAKF	01	38	27	20
TAKF	02	31	22	16
TAKF	03	100	90	71
TAKF	04	99	97	93
TBKF	01	100	90	71
TBKF	02	58	51	50
TCKF	01	89	86	84
TCKF	02	91	86	79
TDKF	01	37	26	19
TDKF	02	22	15	9
TDKF	03	65	54	50
TDKF	04	89	71	57
TDKF	05	99	79	57
TDKF	06	42	31	22
TDKF	07	23	17	10
TDKF	08	68	51	45
TEKF	01	93	75	60
TEKF	02	88	64	49
TFKF	01	38	27	20
TFKF	02	36	25	19
TFKF	03	55	50	50
TFKF	04	89	65	49
TFKF	05	91	67	50
TFKF	06	64	54	50
TGAKF	01	67	55	50
TGAKF	02	68	56	50
TGAKF	03	69	56	51
TGAKF	04	69	56	51
TGAKF	05	62	53	50
TGKF	01	97	81	64
TGKF	02	43	32	23
TGKF	03	99	79	57
TGKF	04	52	50	50
TGKF	05	99	79	57

Table 1. Present and Future Pavement Condition Indices.

Branch	Section	Inspection	Forecast	
		2016	2021	2026
TGKF	06	33	23	17
TGKF	07	51	50	49
TGKF	08	46	37	25
TGKF	09	97	75	54
TGKF	10	98	77	55
TGKF	11	33	23	17
TGKF	12	35	24	18
TGKF	13	93	88	82
TJETCTRFK	01	69	56	51
TJETCTRFK	02	85	67	55
TJETCTRFK	03	78	62	52
TJETCTRFK	04	57	51	50
TJETCTRFK	05	51	50	49
TKKF	01	88	70	56
TKKF	02	94	76	60
A01KF	01	85	71	59
A01KF	02	77	75	73
AAGKF	01	68	57	50
AAGKF	02	79	76	74
AAGKF	03	74	73	72
AALERTNKF	01	93	87	82
AALERTNKF	02	100	88	74
AALERTNKF	03	91	85	81
AALERTNKF	04	74	62	53
AALERTSKF	01	97	84	70
AALERTSKF	02	90	84	80
AALERTSKF	03	88	74	62
AALERTSKF	04	91	68	56
AALERTSKF	05	91	85	81
AALERTSKF	06	99	92	86
AALERTSKF	07	98	85	71
AHOLDTBKF	01	55	49	47
AJETCNTKF	01	73	61	52
ATCHOLDKF	01	99	99	99
ATCHOLDKF	02	89	84	79
ATDHOLDKF	01	38	23	7
ATDHOLDKF	02	77	59	54
ATERM	01	97	90	84

Table 1. Present and Future Pavement Condition Indices.

Branch	Section	Inspection	Forecast	
		2016	2021	2026
ATERM	02	60	52	48
ATFHOLDKF	01	61	52	48
ATRANSKF	01	65	55	49
ATRANSKF	02	83	79	76
ATRANSKF	03	64	54	49
R07KF	01	77	64	63
R07KF	02	78	64	63
R07KF	03	100	83	65
R07KF	04	69	64	63
R07KF	05	93	71	64
R07KF	06	94	72	64
R07KF	07	60	59	58
R07KF	08	60	59	58
R14KF	01C	96	94	91
R14KF	01E	99	97	94
R14KF	01W	99	97	94
R14KF	02C	91	70	64
R14KF	02E	98	76	64
R14KF	02W	99	78	64
R14KF	03C	91	89	86
R14KF	03E	85	83	80
R14KF	03W	91	89	86
R14KF	04C	84	66	63
R14KF	04E	88	68	64
R14KF	04W	90	69	64
R14KF	05C	80	65	63
R14KF	05E	85	66	64
R14KF	05W	89	68	64
R14KF	06C	85	66	64
R14KF	06E	88	68	64
R14KF	06W	89	68	64
R14KF	07C	95	93	90
R14KF	07E	91	89	86
R14KF	07W	91	89	86
R14KF	08C	95	73	64
R14KF	08E	98	76	64
R14KF	08W	94	72	64
R14KF	09C	96	94	91

Table 1. Present and Future Pavement Condition Indices.

Branch	Section	Inspection	Forecast	
		2016	2021	2026
R14KF	09E	98	96	93
R14KF	09W	97	95	92
TAGKL	01	70	57	51
TAKF	01	38	27	20
TAKF	02	31	22	16
TAKF	03	100	90	71
TAKF	04	99	97	93
TBKF	01	100	90	71
TBKF	02	58	51	50
TCKF	01	89	86	84
TCKF	02	91	86	79
TDKF	01	37	26	19
TDKF	02	22	15	9
TDKF	03	65	54	50
TDKF	04	89	71	57
TDKF	05	99	79	57
TDKF	06	42	31	22
TDKF	07	23	17	10
TDKF	08	68	51	45
TEKF	01	93	75	60
TEKF	02	88	64	49
TFKF	01	38	27	20
TFKF	02	36	25	19
TFKF	03	55	50	50
TFKF	04	89	65	49
TFKF	05	91	67	50
TFKF	06	64	54	50
TGAKF	01	67	55	50
TGAKF	02	68	56	50
TGAKF	03	69	56	51
TGAKF	04	69	56	51
TGAKF	05	62	53	50
TGKF	01	97	81	64
TGKF	02	43	32	23
TGKF	03	99	79	57
TGKF	04	52	50	50
TGKF	05	99	79	57
TGKF	06	33	23	17

Table 1. Present and Future Pavement Condition Indices.

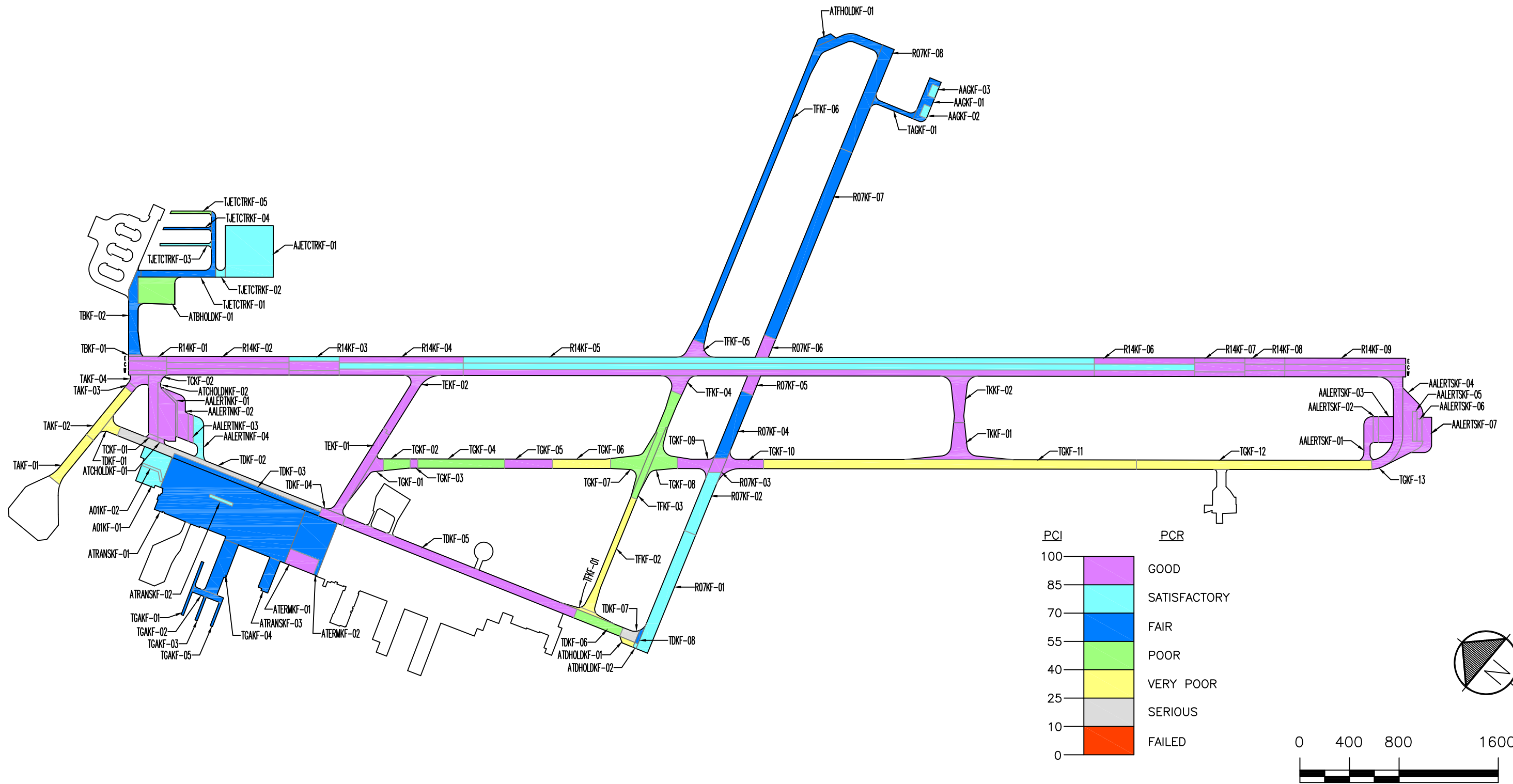
Branch	Section	Inspection	Forecast	
		2016	2021	2026
TGKF	07	51	50	49
TGKF	08	46	37	25
TGKF	09	97	75	54
TGKF	10	98	77	55
TGKF	11	33	23	17
TGKF	12	35	24	18
TGKF	13	93	88	82
TJETCTRKF	01	69	56	51
TJETCTRKF	02	85	67	55
TJETCTRKF	03	78	62	52
TJETCTRKF	04	57	51	50
TJETCTRKF	05	51	50	49
TKKF	01	88	70	56
TKKF	02	94	76	60

Section PCIs at Crater Lake - Klamath Regional Airport range from a low of 22 (a PCR of “Serious”) to a high of 100 (a PCR of “Good”). The area-weighted average PCI for all airport pavements is 74, corresponding to an overall PCR of “Satisfactory”. Figure KF-3 shows how much pavement area is associated with each Pavement Condition Rating category.

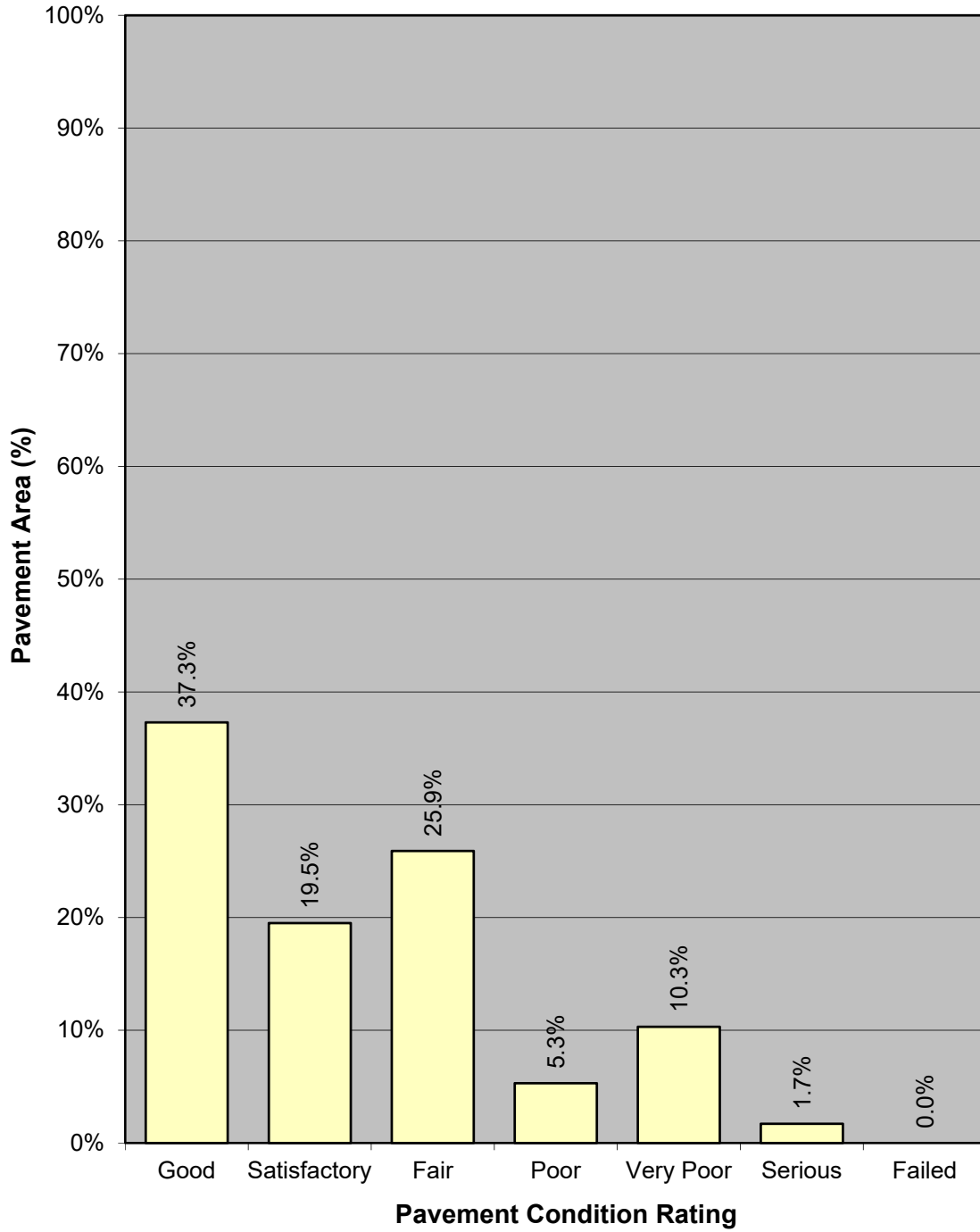
The primary distresses observed in the asphalt pavements during the inspection were: longitudinal and transverse cracking, weathering, block cracking, patching, raveling, alligator cracking, rutting and oil spills with isolated occurrences of bleeding and depressions. The primary distresses observed in the portland cement concrete pavements were: shrinkage cracks, joint spalls, small patches, corner spalls, linear cracking, large patches, corner breaks, and scaling.

A graphical representation of the projected PCIs listed in Table 1 is shown in Figure KF-4.

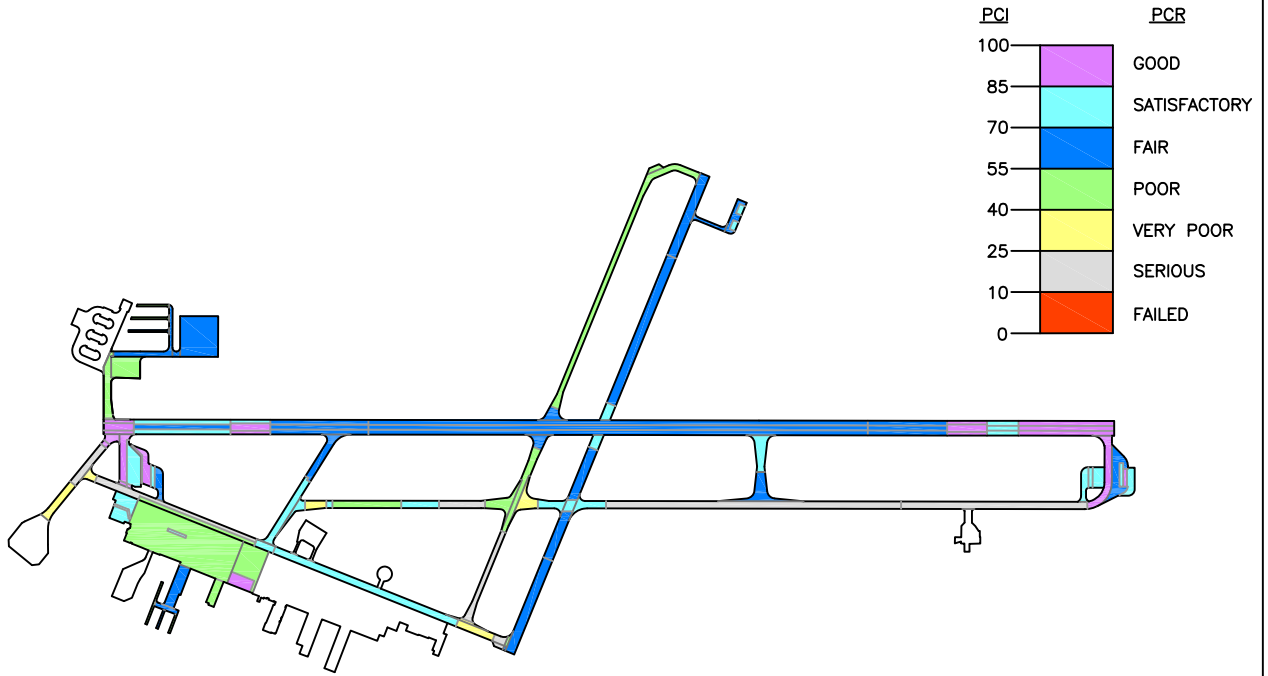
Figure KF-2. Pavement Condition in July 2016.
 Crater Lake – Klamath Regional Airport



**Figure KF-3. Pavement Condition Distribution in 2016
Crater Lake - Klamath Regional Airport**



Predicted Condition in 2021.



Predicted Condition in 2026.

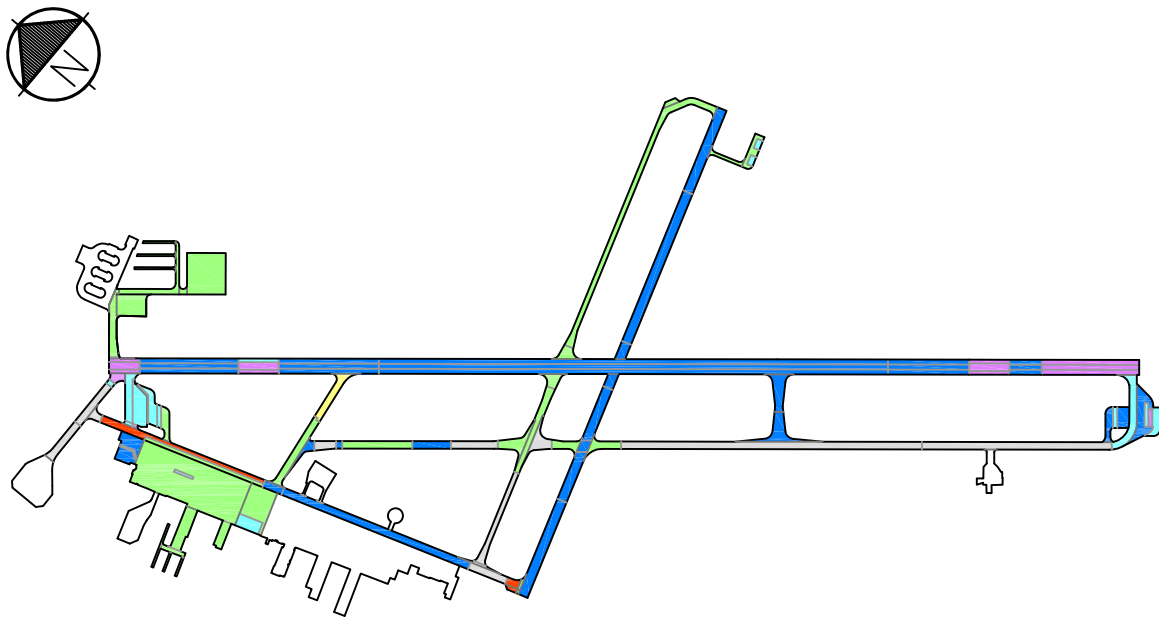


Figure KF-4. Future Pavement Condition.

RECOMMENDATIONS

Data collected during the visual condition survey were used by the Micro PAVER software to generate the Network Maintenance Report contained in Appendix 3. This report identifies, for each pavement section, the recommended localized maintenance activities (i.e.-crack sealing, patching) that should be completed to repair the defects observed during the visual inspection. The repair quantities identified in the report were extrapolated to cover the entire pavement section, based on the distresses measured in the inspected sample units. If the repair activities identified are completed, the pavement deterioration rate will be slowed.

The recommended localized maintenance activities to be applied are selected by the Micro PAVER software based on a Distress Maintenance Policy established for the Oregon airport system. The report results indicate that, over your entire airport, the following quantities of localized maintenance are needed:

- 150,784 linear feet of asphalt concrete crack sealing
- 19,658 linear feet of wide crack sealing/repair
- 39,406 square feet of asphalt concrete deep patching
- 27 square feet of asphalt concrete shallow patching
- 4 square feet of PCC partial depth patching

The Micro PAVER software can also identify and schedule recommended global (applied over an entire section) maintenance activities such as fog seals, slurry seals and other surface treatments, as well as major rehabilitation activities such as asphalt concrete overlays and complete reconstruction. Micro PAVER schedules global maintenance on a user-defined interval. To schedule major rehabilitation Micro PAVER uses pavement deterioration models developed during this project. These models are used to estimate future pavement condition and to schedule rehabilitation based on a trigger PCI.

During this project a 5-year program outlining recommended global maintenance and rehabilitation was developed. The program begins in the year 2017 to allow time for project development. These recommendations are presented in Table 2, which identifies the pavement section requiring rehabilitation, the year the action should be completed, the type of action, and an associated cost. This information is also presented graphically in Figure KF-5.

Table 2. Five-Year Global Maintenance and Rehabilitation Plan.

Year	Branch	Section	Action	Area (sf)	Unit Cost (\$/sf)	Total Cost (\$)
2017	A01KF	01	Slurry Seal	58,656	\$0.31	\$17,949
2017	AAGKF	01	Slurry Seal	22,860	\$0.31	\$6,995
2017	AHOLDTBKF	01	Slurry Seal	64,453	\$0.31	\$19,723
2017	AJETCNTKF	01	Slurry Seal	160,605	\$0.31	\$49,145
2017	ATCHOLDKF	01	Slurry Seal	1,994	\$0.31	\$387
2017	ATDHOLDKF	01	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	4,722	\$14.10	\$66,580
2017	ATDHOLDKF	02	Slurry Seal	1,176	\$0.31	\$360
2017	ATERM	02	Slurry Seal	95,474	\$0.31	\$29,215
2017	ATFHOLDKF	01	Slurry Seal	7,276	\$0.31	\$2,226
2017	ATRANSKF	01	Slurry Seal	507,642	\$0.31	\$155,338
2017	ATRANSKF	03	Slurry Seal	24,750	\$0.31	\$7,574
2017	R07KF	01	Slurry Seal	102,900	\$0.31	\$31,487
2017	R07KF	02	Slurry Seal	51,715	\$0.31	\$15,825
2017	R07KF	04	Slurry Seal	55,818	\$0.31	\$17,080
2017	R07KF	07	Overlay	160,266	\$2.50	\$400,665
2017	R07KF	08	Overlay	88,665	\$2.50	\$221,663
2017	TAGKL	01	Slurry Seal	13,484	\$0.31	\$4,126
2017	TAKF	01	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	35,054	\$14.10	\$494,261
2017	TAKF	02	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	36,257	\$14.10	\$511,224
2017	TAKF	03	Slurry Seal	3,725	\$0.31	\$723
2017	TBKF	01	Slurry Seal	1,230	\$0.31	\$239
2017	TBKF	02	Overlay	50,566	\$2.50	\$126,415
2017	TCKF	01	Slurry Seal	3,138	\$0.31	\$960
2017	TDKF	01	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	11,229	\$14.10	\$158,329
2017	TDKF	02	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	83,619	\$14.10	\$1,179,028
2017	TDKF	03	Overlay	47,625	\$2.50	\$119,063
2017	TDKF	04	Slurry Seal	15,300	\$0.31	\$4,682

Table 2. Five-Year Global Maintenance and Rehabilitation Plan.

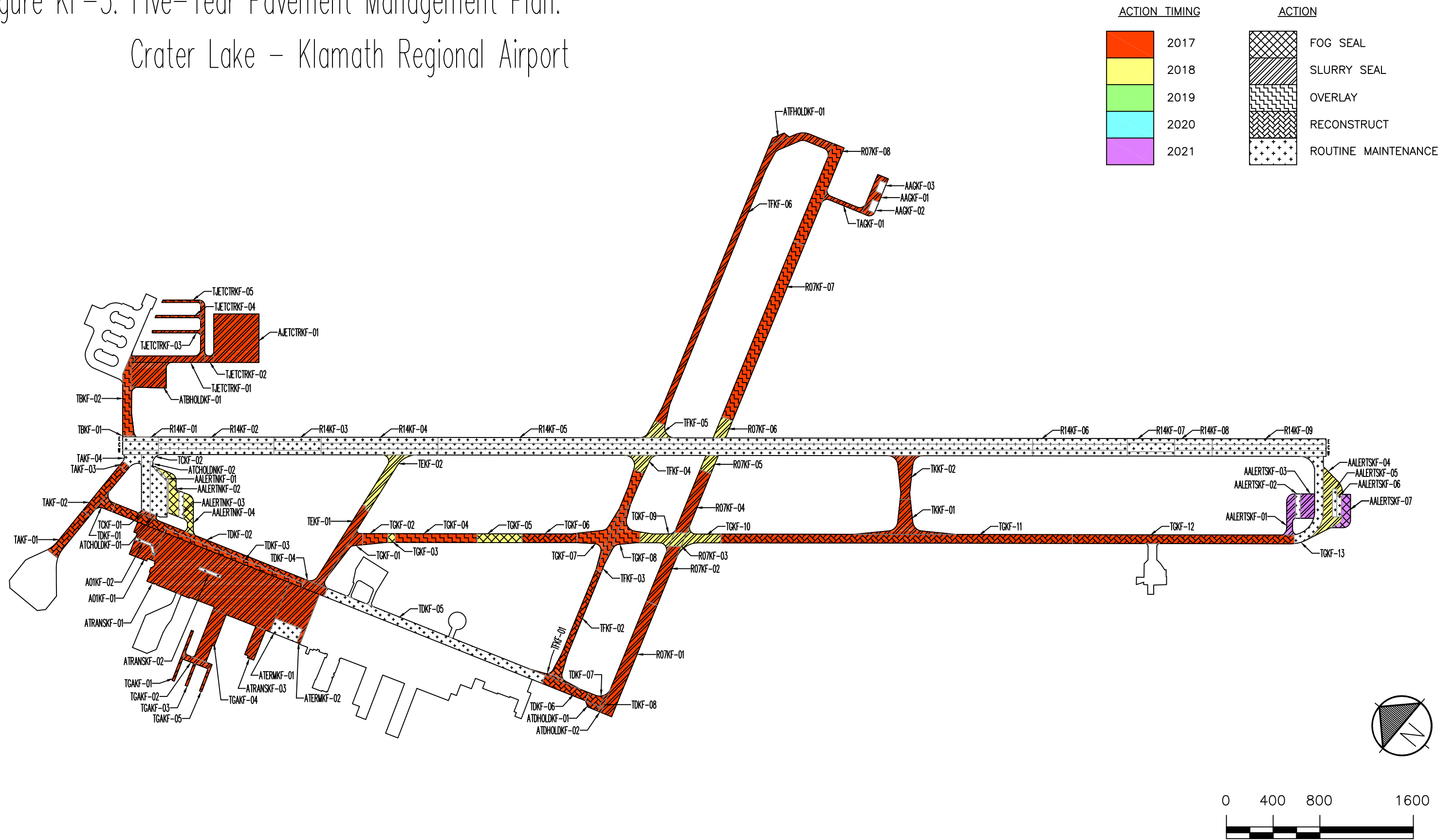
Year	Branch	Section	Action	Area (sf)	Unit Cost (\$/sf)	Total Cost (\$)
2017	TDKF	06	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	30,040	\$14.10	\$423,564
2017	TDKF	07	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	10,642	\$14.10	\$150,052
2017	TDKF	08	Slurry Seal	3,580	\$0.31	\$1,095
2017	TEKF	01	Slurry Seal	57,221	\$0.31	\$17,510
2017	TFKF	01	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	6,498	\$14.10	\$91,622
2017	TFKF	02	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	53,632	\$14.10	\$756,211
2017	TFKF	03	Overlay	55,162	\$2.50	\$137,905
2017	TFKF	06	Slurry Seal	169,570	\$0.31	\$51,888
2017	TGAKF	01	Slurry Seal	9,180	\$0.31	\$2,809
2017	TGAKF	02	Slurry Seal	11,840	\$0.31	\$3,623
2017	TGAKF	03	Slurry Seal	4,047	\$0.31	\$1,238
2017	TGAKF	04	Slurry Seal	51,617	\$0.31	\$15,795
2017	TGAKF	05	Overlay	4,040	\$2.50	\$10,100
2017	TGKF	01	Slurry Seal	15,590	\$0.31	\$4,771
2017	TGKF	02	Overlay	18,375	\$2.50	\$45,938
2017	TGKF	04	Overlay	52,575	\$2.50	\$131,438
2017	TGKF	06	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	35,345	\$14.10	\$498,365
2017	TGKF	07	Overlay	39,053	\$2.50	\$97,633
2017	TGKF	08	Overlay	15,900	\$2.50	\$39,750
2017	TGKF	11	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	225,562	\$14.10	\$3,180,424
2017	TGKF	12	4" AC over 8" Crushed Aggregate Base over 18" Aggregate Subbase	142,337	\$14.10	\$2,006,952
2017	TJETCTRKF	01	Slurry Seal	49,847	\$0.31	\$15,253
2017	TJETCTRKF	02	Slurry Seal	4,864	\$0.31	\$1,488
2017	TJETCTRKF	03	Slurry Seal	8,538	\$0.31	\$2,613

Table 2. Five-Year Global Maintenance and Rehabilitation Plan.

Year	Branch	Section	Action	Area (sf)	Unit Cost (\$/sf)	Total Cost (\$)
2017	TJETCTRKF	04	Overlay	7,976	\$2.50	\$19,940
2017	TJETCTRKF	05	Overlay	6,676	\$2.50	\$16,690
2017	TKKF	01	Slurry Seal	50,852	\$0.31	\$15,561
2017	TKKF	02	Slurry Seal	42,150	\$0.31	\$12,898
2017 Total						\$11,394,385
2018	AALERTNKF	02	Fog Seal	31,124	\$0.19	\$6,038
2018	AALERTNKF	04	Fog Seal	24,403	\$0.19	\$4,734
2018	AALERTSKF	04	Slurry Seal	36,960	\$0.31	\$11,310
2018	R07KF	03	Slurry Seal	12,319	\$0.31	\$2,390
2018	R07KF	05	Slurry Seal	147,778	\$0.31	\$45,220
2018	R07KF	06	Slurry Seal	17,263	\$0.31	\$5,282
2018	TEKF	02	Slurry Seal	42,779	\$0.31	\$13,090
2018	TFKF	04	Slurry Seal	18,775	\$0.31	\$5,745
2018	TFKF	05	Slurry Seal	18,475	\$0.31	\$5,653
2018	TGKF	03	Fog Seal	4,650	\$0.19	\$902
2018	TGKF	05	Fog Seal	28,800	\$0.19	\$5,587
2018	TGKF	09	Slurry Seal	23,958	\$0.31	\$7,331
2018	TGKF	10	Slurry Seal	28,198	\$0.31	\$8,629
2018 Total						\$121,912
2021	AALERTSKF	01	Slurry Seal	23,179	\$0.31	\$7,093
2021	AALERTSKF	03	Slurry Seal	25,000	\$0.31	\$7,650
2021	AALERTSKF	07	Fog Seal	23,510	\$0.19	\$4,561
2021	TDKF	08	Overlay	3,580	\$2.50	\$8,950
2021	TFKF	06	Overlay	169,570	\$2.50	\$423,925
2021 Total						\$452,179
5-Year Total						\$11,968,476

If the global maintenance and/or rehabilitation activities recommended in Table 2 are not completed, the localized maintenance activities identified in the Network Maintenance Report (Appendix 4) for that section should be done. Additionally, for those sections not listed in Table 2 as requiring global maintenance or rehabilitation, the localized maintenance activities outlined in the Network Maintenance Report should be completed. By completing the localized maintenance activities, pavement condition is improved, life is extended, deterioration is slowed and the length of time until major repair or rehabilitation is required is increased.

Figure KF-5. Five-Year Pavement Management Plan.
Crater Lake – Klamath Regional Airport



INSPECTION SCHEDULE

To comply with the inspection schedule requirement of FAA Grant Assurance Number 11, a detailed visual inspection should be conducted every 3 years using the methodology described in ASTM D5430. The next scheduled detailed visual inspection should take place in 2019.

In addition, the FAA requires that a drive-by inspection be conducted monthly to detect unforeseen changes in pavement condition. The results of each drive-by inspection should be recorded and kept in a file. At a minimum, the date of the inspection and an indication of any maintenance performed since the last drive-by inspection should be recorded.