TSPWGM 3-270-08.14-03
26 January 2024

# TRI-SERVICE PAVEMENT WORKING GROUP (TSPWG) MANUAL

# PAVEMENT MANAGEMENT PLAN

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**TRI-SERVICE PAVEMENTS WORKING GROUP MANUAL (TSPWG M)**

**PAVEMENT MANAGEMENT PLAN**



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**This TSPWG supersedes TSPWGM 3-270-08.14-03, *Preventative Maintenance Plan (PMP) for Airfield Pavements*, dated 15 October 2019.**

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# FOREWORD

This Tri-Service Pavements Working Group (TSPWG) Manual supplements guidance found in other Unified Facilities Criteria (UFC), Unified Facility Guide Specifications (UFGS), Defense Logistics Agency Specifications, and Service-specific publications. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and, in some instances, Bilateral Infrastructure Agreements (BIA). Therefore, the acquisition team must ensure compliance with the most stringent of this TSPWG Manual, the SOFA, the HNFA, and the BIA, as applicable. This manual provides guidance on developing an installation's Pavement Management Plan (PMP). The information in this TSPWG Manual are referenced in technical publications found on the Whole Building Design Guide. It is not intended to take the place of Service-specific doctrine, technical orders (T.O.), field manuals, technical manuals, handbooks, Tactics, Techniques or Procedures (TTP) or contract specifications, but should be used along with these to help ensure pavements meet mission requirements.

TSPWG Manuals are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction, maintenance, repair, or operations. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Systems Command (NAVFAC), and the Air Force Civil Engineer Center (AFCEC) are responsible for administration of this document. Technical content of this TSPWG Manual is the responsibility of the Tri-Service Pavements Working Group. Defense agencies should contact the preparing activity for document interpretation. Send recommended changes with supporting rationale to the respective Service TSPWG member.

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- Whole Building Design Guide website: https://www.wbdg.org/

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# CHAPTER 1 INTRODUCTION

## 1-1 BACKGROUND.

Timely repair and preventive/corrective maintenance (PM/CM) can extend pavement life, significantly reduce life-cycle cost, and decrease premature pavement failures. However, the full benefit is not fully realized at most Air Force bases, partially due to inconsistent, inexact, and incomplete identification, planning, and execution of PM/CM and a worst-first funding strategy for major maintenance and repair (M&R). Improving the process will help optimize operations at minimum cost, extend the life of pavements, and provide commanders with a risk assessment for deferred funding. The Pavement Management Plan (PMP) will help bases keep good pavement in good condition at minimal cost.

## 1-2 REISSUES AND CANCELS.

This manual reissues and cancels TSPWGM 3-270-08.14-03, *Preventative Maintenance Plan (PMP) for Airfield Pavements*, dated 15 October 2019.

## 1-3 PURPOSE AND SCOPE.

Base Civil Engineers (BCE) are responsible for the base transportation network and airfield pavements asset management program (AMP). AFMAN 32-1041, *Pavement Evaluation Program*, states that BCEs are responsible for developing and maintaining a PMP in accordance with UFC 3-270-08, *Pavement Maintenance Management*. This TSPWG Manual outlines how to develop an installation's PMP in accordance with UFC 3-270-08.

## 1-4 APPLICABILITY.

This UFC applies to all base engineers responsible for prioritizing the pavements major M&R project list Future Years Defense Program (FYDP+2) and preventive maintenance (PM) list (three to five years). This includes pavement AMP managers, sub-AMP managers, as well as personnel at installations responsible for the development and execution of PMPs.

## 1-5 GENERAL BUILDING REQUIREMENTS.

Comply with UFC 1-200-01, *DoD Building Code*. UFC 1-200-01 provides applicability of model building codes and government-unique criteria for typical design disciplines and building systems, as well as for accessibility, antiterrorism, security, high-performance and sustainability requirements, and safety. Use this TSPWG Manual in addition to UFC 1-200-01 and the UFCs and government criteria referenced therein.

## 1-6 GLOSSARY.

Appendix B contains acronyms, abbreviations, and terms.

## 1-7 REFERENCES.

Appendix C contains a list of references used in this manual. The publication date of the code or standard is not included in this manual. Unless otherwise specified, the most recent edition of the referenced publication applies.

# CHAPTER 2 PAVEMENT MANAGEMENT

## 2-1 DESCRIPTION.

This chapter outlines basic information provided in an Airfield Pavement Evaluation (APE) report, Pavement Condition Index (PCI) survey report, and other guidance. The information provided enables quick access to relevant charts and graphs used to develop a PMP.

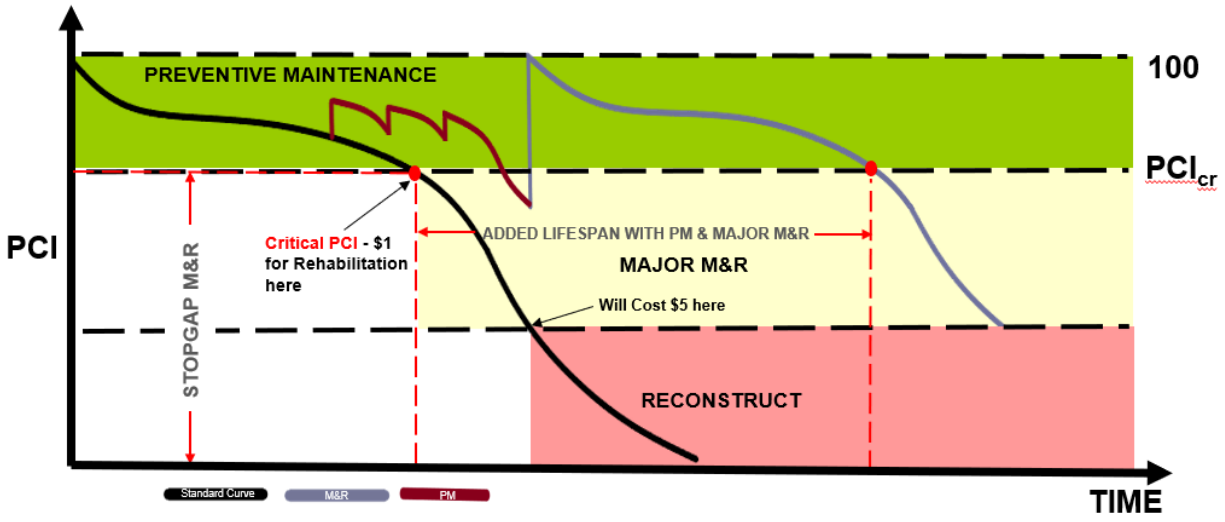
## 2-2 PAVEMENT MANAGEMENT.

Pavement management is a systematic process to prioritize M&R requirements, maintain the safety of operations, and optimize the life-cycle cost (LCC) of paved and unpaved airfield, road, and parking pavement.

Many installations take a reactive approach to pavement maintenance. Faced with a tight budget, the installation may wait until a pavement deteriorates—sometimes to the point of failure—before repairs or rehabilitation/major M&R efforts are conducted. Ironically, efforts to save money often cost much more in the long run. Research shows that every $1 invested now in PM saves $5 or more in rehabilitation and reconstruction costs later.

Pavement deteriorates at a fairly predictable rate. As Figure 2-1 illustrates, deterioration is slow for the first three-quarters of its lifecycle. Then, in the final quarter, the deterioration rapidly accelerates. Targeting preventive maintenance and repair at the proper time is critical to keeping pavements in good to fair condition. There are many pavement structures in use today that were constructed in the mid-twentieth century. Installations with vigorous PM/CM programs have managed to keep these pavements operational. The overarching concept is to manage pavements by creating and implementing a PMP to perform PM/CM and major M&R at the right time with the right repair method that will extend life and optimize LCC rather than just repairing or reconstructing pavement when it fails—known as “worst first.”

**Figure 2-1 Pavement Lifecycle**



## 2-3 PAVEMENT MANAGEMENT PLAN.

The Pavement Management Plan (PMP) is a living document and a vital component of the asset management plan that prioritizes M&R requirements for base pavements. Prioritized lists are based on the most recent APE report or PCI survey report data (condition, deterioration rate, risk and probability of failure, and engineering assessment) as well as other potential requirements identified by base stakeholders during PMP development. The PMP is a living document because projects are re-evaluated and re-prioritized every year. The PMP has subcomponents for both airfields and for roads and parking pavements. The purpose of a PMP for airfields and roads and parking pavements is to establish a prioritized PM/CM program (three to five years) and a prioritized major M&R program (FYDP+2) based on condition and risk for each of these pavement networks. Optimized and timely PM/CM and major M&R will preserve and extend pavement life, significantly reduce LCCs, and decrease premature pavement failures. The PMP can be used to initiate programming and project development that will be defendable when advocating for funding.

PMPs include a prioritized list of projects and in-house work items that define the following:

- When and where M&R actions are needed (assigned fiscal year [FY] and pavement section identifications [ID])
- What M&R activities are to be performed
- How the work is to be accomplished (in-house or contract)
- What is the cost for the work
- What is the impact if the work is not accomplished

At a minimum, the PMP includes a prioritized list of work requirements and projects for execution in-house or by contract with location, quantity, estimated cost, and the benefit and risk associated with performing or not performing the work.

## 2-4 ENGINEERING ASSESSMENT (FOR AIRFIELDS).

An engineering assessment (EA) helps prioritize or rank proposed M&R pavement projects. The components of the EA are also used to compute the probability of failure (PoF), which in turn can be used to prioritize requirements.

There are four key performance indicators (KPI) used to define risk factors. The four factors are PCI, foreign object damage (FOD) potential rating, friction (Mu value), and structural index (SI). These risk factors, in combination with knowledge of the other factors, are used to manage assets and activities and minimize the LCC and mission risk. Engineering judgment is required to develop projects when considering the KPIs and other factors.

### 2-4.1 Pavement Condition Index Survey.

The PCI is a numerical rating based on the type, severity, and quantity of distresses identified during a pavement condition survey. UFC 3-260-16, *O&M Manual: Standard Practice for Airfield Pavement Condition Surveys*, provides instructions for conducting PCI surveys as well as distress definitions and PCI computation details. For the Air Force, AFCEC is responsible for conducting PCI surveys at each installation every four years. The installation's current PCI survey data is in the Tableau pavement management tools, i.e., Airfield Pavements Management Tool or Roads & Parking Pavements Management Tool (https://tableau.afdatalab.af.mil/). The historical hardcopy surveys as well as current and historical PAVER databases are found on the APE Gateway (https://usaf.dps.mil/teams/10758/pavereports/Module/Pavement%20Reports/PRTHome.aspx).

The PCI captures data on the surface condition of the pavement and is used in conjunction with other indexes and considerations to manage pavements. The PCI is a numerical rating (on a scale of 0 to 100) determined by a visual pavement survey based on procedures in ASTM D5340, *Standard Test Method for Airport Pavement Condition Index Surveys*, ASTM D6433, *Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys*, TSPWG 3-260-03.02-19, *Airfield Pavement Evaluation Standards and Procedures*, and UFC 3-260-16. Figure 2-2 shows the condition, PCI rating, and corresponding definitions. **These ratings are a qualitative assessment of the pavement surface condition and not to be confused with the structural capacity of a pavement**. If the engineer determines a section requires an updated PCI, use UFC 3-260-16 as a guide for this inspection. Refer also to the most current version of the ASTM publications for guidance.

**Figure 2-2 Definition of PCI Ratings**

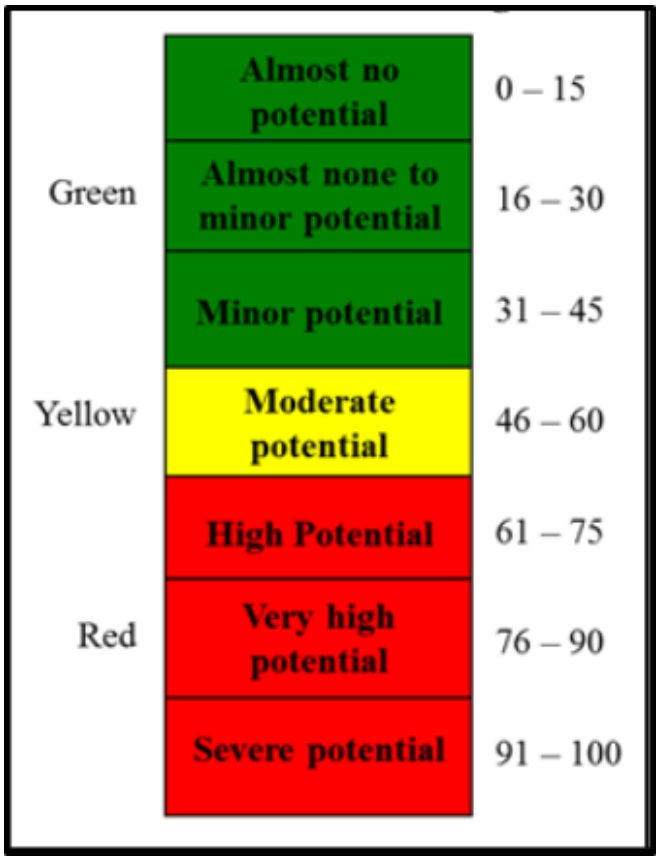
| Pavement Condition Index (PCI) Rating Scale | | | |
|---|---|---|---|
| **Condition** | | **Rating** | **Definition** |
| Good | | 86–100 | Pavement has minor or no distresses and will require only routinemaintenance. |
| Satisfactory | | 71–85 | Pavement has scattered low-severity distresses that should need onlyroutine maintenance. |
| Fair | | 56–70 | Pavement has a combination of generally low- and medium-severity distresses. Maintenance and repair needs should be routine to major inthe near term. |
| Poor | | 41–55 | Pavement has low-, medium-, and high-severity distresses that probablycause some operational problems. Maintenance and repair needs should range from routine to reconstruction in the near term. |
| Very Poor | | 26–40 | Pavement has predominantly medium- and high-severity distresses causing considerable maintenance and operational problems. Near-termmaintenance and repair needs will be intensive. |
| Serious | | 11–25 | Pavement has mainly high-severity distresses that cause operationalrestrictions. Repair needs are immediate. |
| Failed | | 0–10 | Pavement deterioration has progressed to the point that safe aircraft operations are no longer possible. Complete reconstruction is required. |

### 2-4.2 Foreign Object Damage (FOD) Potential Rating.

The FOD index is determined using PCI survey data but is calculated by considering only the distresses/severity levels capable of producing FOD. UFC 3-270-08 provides information for all FOD-producing distresses and severities for asphalt concrete (AC) and portland cement concrete (PCC) pavement. Figure 2-3 shows the numerical FOD potential scale and corresponding descriptive categories.

The FOD potential depends on the type of aircraft using the pavement, the type of pavement surface (asphalt or concrete), and the FOD index. The FOD index and the FOD potential rating are determined from the most current PCI survey.

**Figure 2-3 FOD Potential Scale**




### 2-4.3 Friction (Mu Value) – Runways Only.

Mu (μ) numbers (friction values) measured by continuous friction measuring equipment (CFME) operated at 40- and 60-mph (65 and 95 km/h) test speeds can be used as guidelines to evaluate the surface friction deterioration of runway pavements, identifying the appropriate corrective actions necessary for safe aircraft operations, and prioritizing M&R requirements when developing a PMP. These values are a snapshot in time and are best evaluated immediately after performing the test. Friction values, along with groove and slope profiles, can also be used to evaluate and prioritize drainage projects.

### 2-4.4 Structural Index (ACN/PCN Ratio).

The DoD pavement community adapted the structural index as a pavement management metric, which is a ratio of the aircraft classification number (ACN) and the pavement classification number (PCN). Table 2-1 lists the metric limits. This metric uses the ACN of the critical aircraft at a specified load for each section and compares it to the published PCN for that section's structural index.

**Equation 2-1. Structural Index**

$$SI = ACN/PCN$$

**Table 2-1 Structural Index Ratios**

| Structural Index (SI) | Description |
|---|---|
| SI ≤ 1.1 | The pavement structure for the section is adequate to support the mission traffic for the defined design life. |
| 1.1 < SI ≤ 1.4 | The pavement structure for the section will not support the mission traffic for the defined design life. Aircraft loads or the number of passes may be limited to extend the life of the pavement. |
| SI > 1.4 | The pavement structure for the section will not support the mission traffic for the defined design life. Aircraft traffic must be closely monitored. Overlay or reconstruction must be performed if the pavement is required to support mission traffic for the defined design life. |

## 2-5 AIRFIELD STRUCTURAL PAVEMENT EVALUATION.

The purpose of a structural pavement evaluation is to determine the capability of the airfield to support aircraft. Structural evaluation teams perform detailed testing using non-destructive equipment as well as an automated or manual dynamic cone penetrometer (DCP). The airfield pavement is segmented into branches and sections in accordance with UFC 3-270-08 and listed in the condition survey report. The findings of the field testing and inspection are analyzed and documented in the pavement evaluation report. Structural deficiencies and load-related problems are discussed and recommendations for M&R are included.

## 2-6 SECTION RANK DEFINITIONS.

Familiarize the PMP team with the pavement ranks before starting the PMP process. Table 2-2 has rank, code, and a description for airfields and Table 2-3 has rank, code, and a description for roads and parking. Pavement ranks are used in conjunction with mission use to prioritize M&R requirements at the pavement section level when developing PMPs.

**Table 2-2 Airfield Section Rank**

| Airfield Section Rank | | |
|---|---|---|
| **Rank** | **Code** | **Description** |
| Primary | P | Primary pavements are mission-essential pavements such as runways, parallel taxiways, main parking aprons, arm-disarm pads, alert aircraft pavements, and overruns (when used as a taxiway or for takeoff). In general, only pavements that have aircraft use on a daily basis or frequently used transient taxiways and parking areas are considered primary. |
| Secondary | S | Secondary pavements are mission-essential but occasional-use airfield pavements, including ladder taxiways, infrequently used transient taxiway and parking areas, overflow parking areas, and overruns (when there is an aircraft arresting system present). In general, any pavements that do not have daily use by aircraft are secondary. |
| Tertiary | T | Tertiary pavements include pavements used by towed or light aircraft, such as maintenance hangar access aprons, aero club parking, wash racks, and overruns (when not used as a taxiway or to test aircraft arresting gear). Paved shoulders are classified as tertiary. In general, any pavement that does not support aircraft taxiing under their own power or is used only intermittently is considered a tertiary pavement. |
| Unused | U | Unused pavements include any pavements that are abandoned (not maintained) or scheduled for demolition. |

**Table 2-3 Roads and Parking Section Rank**

| Road and Parking Section Rank | | |
|---|---|---|
| **Rank** | **Code** | **Description** |
| Primary | P | Primary pavements include installation roads and streets that serve as the main distributing arteries (arterials) for traffic originating outside or within an installation. These pavements have high traffic volumes and speeds of 35 to 55 mph but may include collector or local streets that service mission-critical facilities. Restrict classification of vehicle parking areas as primary pavements to those areas associated with access to mission-essential facilities, such as alert facilities, munitions facilities, and medical facilities. |
| Secondary | S | Secondary pavements include collector streets that gather and disperse traffic between arterials and local streets. They will have lower traffic volumes than primary pavements and speeds of 25 to 40 mph. Most parking areas that support daily traffic on a base are considered secondary pavements unless a specific mission dictates otherwise. |
| Tertiary | T | Tertiary pavements include local streets that provide access from collector roads to individual facilities. Unsurfaced roads are also typically classified as tertiary. Any parking area that is not used on a daily basis or is excess to the standard facilities requirements is considered a tertiary pavement. |
| Unused | U | Unused pavements include any pavements that are abandoned (not maintained) or scheduled for demolition. |
| Patrol Road | PR | Patrol roads are planned and designed for surveillance or patrolling areas for security purposes of light traffic. |

## 2-7 PARAMETRIC COST ESTIMATING SYSTEM (PACES).

PACES is a parametric cost estimating system used primarily to develop programming or budgetary cost estimates in support of the military construction (MILCON) program. It is produced by AECOM and used extensively by the Air Force, Navy, and Army. The PACES system uses parametric methodology adjusting cost models for estimating project costs. The cost models are based on generic engineering solutions for building and site work projects, technologies, and processes. The generic engineering solutions are derived from historical project information, government laboratories, construction management agencies, vendors, contractors, and engineering analyses. When the user creates an estimate in PACES, they can tailor the generic engineering solutions to reflect specific quantities of work and information is priced using current cost data. Costs are automatically adjusted for the project location along with markups and escalation. PACES is not a design program but can be used to estimate the cost to construct new or reconstruct existing airfield pavements. The program will estimate a theoretical cross-section (e.g., surface, base, subbase) for rigid and flexible pavements or a variety of overlays. It can estimate the required thickness of each layer in the pavement structure or be manually assigned. Quantities of materials are computed for each layer.

## 2-8 OTHER REPORTS.

Other reports such as Airfield Operations Certification Inspection (AOCI) reports and Airfield Operations Board (AOB) minutes, signed by a responsible base official, also provide additional information that should be used to develop an airfield PMP.

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# CHAPTER 3 APRON SPACE ANALYSIS

## 3-1 DESCRIPTION.

A proper apron allowance is the amount required to afford maximum operational efficiency with a minimum amount of paving. This analysis is conducted by AFCEC during PMP development assistance visits. Aprons are paved areas provided for aircraft parking, servicing/fueling, loading/unloading, and boarding/deplaning. The area includes parking lanes, taxi lanes, exits and entrances. Apron space is necessary for operational aircraft; alert aircraft; transient aircraft; the loading and unloading of cargo aircraft; mission support aircraft (Base Flight); aircraft undergoing depot maintenance; and aircraft access to hangars, docks, and shelters.

As outlined in the Installation Infrastructure Strategy (I2S), the Air Force must right-size installations to reduce footprints and sustainment costs. As part of the PMP effort, the process looks at right-sizing opportunities associated with airfield pavements, with an emphasis on ramp space.

### 3-1.1 Team Composition.

When conducting apron space analysis, the following personnel are highly recommended for the analysis team.

- Airfield Management
- Wing Exercise and Plans
- Aircraft Maintenance Group or Squadron representatives
- Community Planner
- Requirements and Optimization Pavement Engineer
- Transportation AMP Manager
- Airfield Pavements sub-AMP Manager

### 3-1.2 Analysis Tools.

The following tools are recommended for the apron space analysis.

- Maps of the airfield: overall and parking plan (label number of parking for each apron by airframe)
- List of assigned aircraft: airframe and number assigned to each squadron
- Logs of transient aircraft: airframe

## 3-2 DEVELOPING THE APRON SPACE ANALYSIS.

The available ramp area for aircraft parking is identified by querying airfield surface data for ramps/aprons. Remove areas not suitable for parking based on configuration, taxilane access for ramp parking, access ramps to hangars, wingtip clearances

(determined from UFC 3-260-01, *Airfield and Heliport Planning and Design*), and ramps that have a PCI less than 40.

PAVER supplies the geographic information for the pavement condition data using the latest installation PCI survey. In accordance with DAFMAN 32-1084, *Standard Facility Requirements*, Facility Class 1 – Operation and Training, Category Group 11 Airfield Pavements Overview, CC 113321 Apron (see Appendix B for Whole Building Design Guide link), the required ramp area and spaces were identified by taking total aircraft inventory (TAI) and excluding authorized docked aircraft spaces (primary assigned aircraft [PAA] times the dock factor). Transient (i.e., transient and distinguished visitor [DV]) parking spaces were excluded when identifying excess parking spaces. The authorized ramp area is the amount of space required to park assigned PAA under ideal conditions. The actual required ramp space will depend on the design and geometry of the parking apron, which affects the overall footprint of the parked PAA, with ~20 percent added for transient requirements. Additional ramp space requirements are driven by operational/mobility plans, host-tenant agreements, or non-PAA major command (MAJCOM) mission requirements.

Identify the following:

- PAA
- Tenant parking requirements
- Transient parking
- Contingency support requirements
- Memorandums of Agreement (MOA) that pertain to aircraft parking

## 3-3 COMPILE DATA.

Consolidate all analysis information into a single database/workbook. This database/workbook serves as a source document for the Air Force Installation and Mission Support Center (AFIMSC), AFCEC, and installations when determining funding prioritization for repairs, reconstruction, and aircraft beddown options.

# CHAPTER 4 AIRFIELD PMP

## 4-1 DESCRIPTION.

The pavement management process uses the PCI to define the surface condition of the pavement. While the PCI is a key index in pavement management for both airfield pavements and roads and parking pavements, other indices such as FOD index/FOD potential rating (based on PCI survey distresses and mission aircraft), structural index, and friction index (developed in other types of evaluations) are also used for airfield pavements to get a more holistic assessment of the pavement condition, capability, and performance. These indices, along with the established Air Force pavement PM/CM and M&R policies, are key to developing a PMP and feasible M&R alternatives.

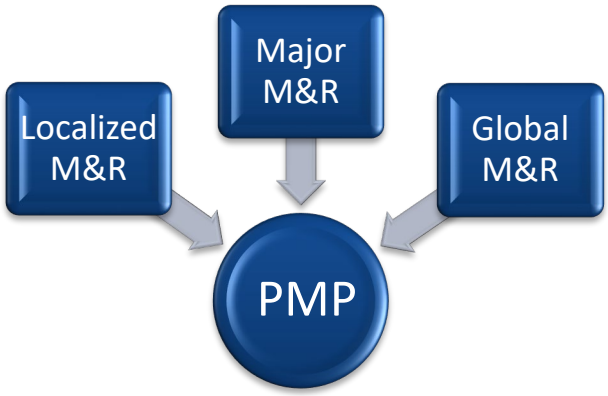
Prior to beginning a PMP, download and review the PMP guide and template (see Appendix A for links). Use the template throughout the PMP development process.

## 4-2 AIRFIELD PMP DEVELOPMENT.

The comprehensive/structural evaluation and PCI surveys collect the bulk of the data that BCEs need to develop PMPs. The PMP starts with a list of PM/CM requirements and a list of major M&R requirements from the most recent PCI survey report and/or APE report. The PAVER PCI and the EA data from the report are the core elements that base engineers use to identify and prioritize requirements. Bases use these data in conjunction with established Air Force pavement PM/CM and M&R policies as well as construction history data to translate these prioritized requirements into properly scoped in-house work plans or projects for contract execution to implement the PMP.

Figure 4-1 illustrates the components of a PMP. The link to download an example of an installation PMP is in Appendix A. Use the example template to produce the PMP for submittal.

**Figure 4-1 Pavement Maintenance Plan**



### 4-2.1 Team Composition.

There are many considerations that go into developing a PMP. Finding effective solutions to these considerations requires knowledge of the mission and knowledge of pavement management, design, and construction. The best approach to develop a PMP is for the installation Pavement Engineer to establish a team that brings the necessary skillsets and knowledge to the table. Engineers will collaborate with key installation stakeholders to develop and implement an effective PMP. The following are recommended participants in the PMP process for airfield pavements.

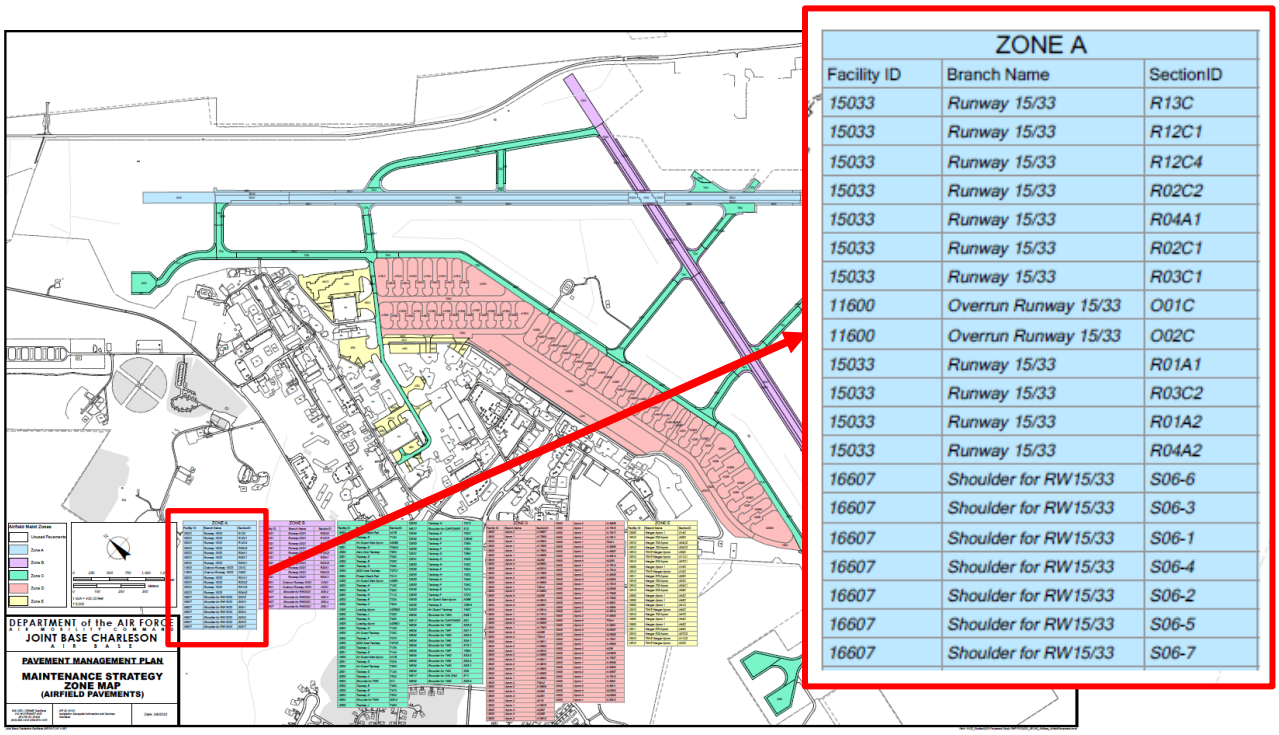
- Engineering Flight, Chief
- Portfolio Optimization, Chief
- Community/Base Planner
- GeoBase/Geographic Information System (GIS) Manager
- Operations Flight, Chief
- Requirements and Optimization Pavement Engineer
- Transportation AMP Manager
- Airfield Pavements sub-AMP Manager
- Heavy Repair Superintendent
- NCOIC Pavements and Equipment Shop (7-level who has completed the mobile pavements repair course or equivalent)
- Airfield Manager
- Wing Airfield Planning representative

### 4-2.2 Analysis Tools.

- Most recent PCI survey or structural report
- FOD index
- Friction index
- Most recent list of approved/proposed projects
- Section-level map of entire airfield pavement
- PAVER-produced prioritized list of major M&R projects (from PCI report)
- PAVER-produced prioritized list of localized M&R projects, including global repair projects (from PCI report)
- Helpful support equipment (e.g., projector, screen, large whiteboard, or paper)
- Zoned airfield map (dissected into manageable maintenance zones); see Figure 4-2 for an example

- Access to mapping software (e.g., Tableau's Airfield Pavements Management Tool, ArcGIS)

**Figure 4-2 Airfield Zone Map Example**



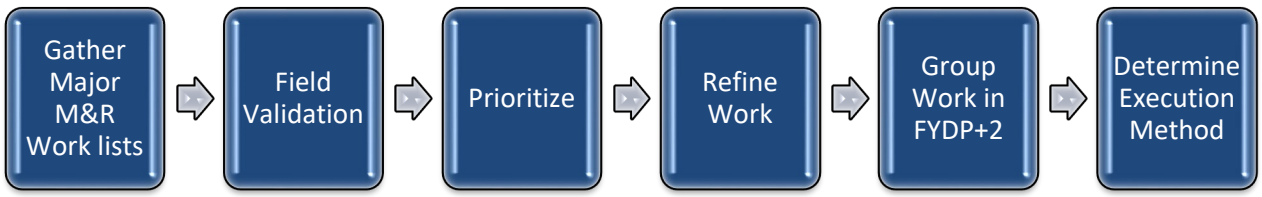

| ZONE A | | |
|---|---|---|
| Facility ID | Branch Name | SectionID |
| 15033 | Runway 15/33 | R13C |
| 15033 | Runway 15/33 | R12C1 |
| 15033 | Runway 15/33 | R12C4 |
| 15033 | Runway 15/33 | R02C2 |
| 15033 | Runway 15/33 | R04A1 |
| 15033 | Runway 15/33 | R02C1 |
| 15033 | Runway 15/33 | R03C1 |
| 11600 | Overrun Runway 15/33 | O01C |
| 11600 | Overrun Runway 15/33 | O02C |
| 15033 | Runway 15/33 | R01A1 |
| 15033 | Runway 15/33 | R03C2 |
| 15033 | Runway 15/33 | R01A2 |
| 15033 | Runway 15/33 | R04A2 |
| 16607 | Shoulder for RW15/33 | S06-6 |
| 16607 | Shoulder for RW15/33 | S06-3 |
| 16607 | Shoulder for RW15/33 | S06-1 |
| 16607 | Shoulder for RW15/33 | S06-4 |
| 16607 | Shoulder for RW15/33 | S06-2 |
| 16607 | Shoulder for RW15/33 | S06-5 |
| 16607 | Shoulder for RW15/33 | S06-7 |

## 4-3 MAJOR M&R REQUIREMENTS.

Experience has revealed that separating major M&R from localized PM/CM requirements helps develop a more organized PMP.

Major M&R is defined as activities applied to the entire pavement section to correct or improve existing surface or structural conditions to meet functional requirements. Major M&R includes work such as mill and overlay, structural overlays, selective slab replacement, and reconstruction. Use the process in Figure 4-3 to develop the major M&R projects list for the airfield PMP.

**Figure 4-3 Major M&R Process**



### 4-3.2 Gather Major M&R Requirements.

Obtain an electronic copy of the “Recommended Major M&R by Year” table in the PCI report. If a soft copy of the PCI report is not available, fill in the template (see paragraph 4-1) by copying and pasting the data from the PCI survey (located on the online APE Gateway; see paragraph 2-4.1).

Review and verify the status of all major M&R requirements and recommendations provided in the most recent PCI survey report and/or APE report. Collect and combine any new requirements identified post-PCI survey report. To ensure all recommended and programmed projects are accounted for during PMP development, provide the team a list of all existing major M&R programmed projects.

#### 4-3.2.1 Generate PoF and Adjusted Mission Dependency Index (MDI) Table.

This table will list the PoF and adjusted MDI for each section. The PCI survey report data and documents may have a PoF and adjusted MDI table. If a soft copy of the PoF and adjusted MDI table is not available, open another Excel workbook and create a PoF table by copying and pasting the data from the EA table in the report, as shown in Table 4-1, then create the PoF and adjusted MDI columns using Equations 4-1 and 4-2. Finally, sort the newly created table by PoF and adjusted MDI to show the sections that have the highest risk on top.

For projects identified by the installation and not included in PCI reports, engineers can use PoF and MDI to prioritize. The PoF is determined based on the PCI in the year of execution with downward adjustments based on the FOD potential rating, structural index, and friction index. If the PCI is less than 50 then the PoF is equal to 100. If the PCI is greater than 50 then the PoF is determined by the following equation:

**Equation 4-1. PoF**

$$PoF = (100 - PCI) \times 2$$

MDI is assigned to a section based on the category code (CATCODE) of a section. The adjusted MDI is calculated using the assigned MDI and a factor based on the pavement rank (P, S, T).

**Equation 4-2. Adjusted MDI**

$$Adj.MDI_p = MDI \times 1.0$$
$$Adj.MDI_s = MDI \times 0.9$$
$$Adj.MDI_t = MDI \times 0.7$$

**Table 4-1 Example Probability of Failure Summary**

| Branch Name | Section ID | Surface | Rank | Critical PCI | PCI Deterioration Rate | FOD Potential Deduction ($D_{FOD}$) | Structural Index Deduction ($D_{SI}$) | Friction Index Deduction ($D_{SKID}$) | 2022 Adjusted PCI | 2022 POF | Adjusted MDI | 2022 PCI BEFORE M&R | 2023 PCI BEFORE M&R | 2024 PCI BEFORE M&R | 2025 PCI BEFORE M&R | 2026 PCI BEFORE M&R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Runway 03R/21L | R06C2 | PCC | P | 70 | 0.47 | 2.3 | 0.0 | 0.0 | 71 | 59 | 99 | 72 | 72 | 71 | 71 | 70 |
| Runway 03R/21L | R06C1 | PCC | P | 70 | 0.47 | 1.1 | 0.0 | 0.0 | 86 | 28 | 99 | 86 | 86 | 85 | 85 | 84 |
| Runway 03L/21R | R04A2 | PCC | P | 70 | 0.47 | 1.6 | 0.0 | 0.0 | 89 | 21 | 99 | 90 | 90 | 89 | 89 | 88 |
| Runway 03L/21R | R01A1 | PCC | P | 70 | 0.47 | 0.7 | 0.0 | 0.0 | 92 | 15 | 99 | 92 | 92 | 91 | 91 | 90 |
| Runway 03L/21R | R01A2 | PCC | P | 70 | 0.47 | 0.7 | 0.0 | 0.0 | 92 | 15 | 99 | 92 | 92 | 91 | 91 | 90 |
| Runway 03L/21R | R04A1 | PCC | P | 70 | 0.47 | 1.3 | 0.0 | 0.0 | 93 | 15 | 99 | 93 | 93 | 92 | 92 | 91 |
| Runway 03L/21R | R09C2 | PCC | P | 70 | 0.47 | 0.9 | 0.0 | 0.0 | 96 | 8 | 99 | 96 | 96 | 95 | 95 | 94 |
| Runway 03L/21R | R09C1 | PCC | P | 70 | 0.47 | 0.1 | 0.0 | 0.0 | 99 | 2 | 99 | 98 | 98 | 97 | 97 | 96 |
| Runway 03R/21L | R05A1 | PCC | P | 70 | 0.47 | 0.1 | 0.0 | 0.0 | 99 | 2 | 99 | 98 | 98 | 97 | 97 | 96 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

### 4-3.3 Field Validation.

The objective is for the base pavements team to validate and identify requirements, determine cost-effective engineering solutions, and organize the requirements into manageable and executable projects to be accomplished in-house or by contract. Some factors for developing the projects include type of distress, recommended maintenance procedure, location, and quantity. Conduct the visual assessments by walking the candidate sections. Accomplish this type of assessment at least once per year or before PMP revalidation. Field validation does not imply a full PCI is conducted by the PMP team, but rather a review of the distresses and validation of the quantities. If there are significant differences identified, update the distresses and quantities. If an updated PCI is required, conduct a project-level PCI on the sections using UFC 3-260-16 as a guide.

Perform a cursory review of proposed pavement distressed sections to validate requirements and identify any new requirements. PCI surveys are conducted at a 95 percent confidence level. This means that a specified percentage of sample units are inspected to ensure the reported PCI is plus or minus five points of the actual PCI. Quantities are based on samples and will not reflect the exact quantities (e.g., eleven corner breaks for a section were estimated by sampling and not by an actual field count). Although developing the PMP is not a scoping drill, there is value in quantifying work requirements when prioritizing and grouping repairs.

Other items assessed during visual validation are:

- Condition of pavement markings (e.g., faded, thickness, chipping)
- Rubber deposit buildup on airfield pavements (e.g., friction issue, obscured markings)
- Surface drainage (e.g., ponding, reverse drainage to pavements)
- Subsurface drainage (edge drainage systems)
- Shoulder erosion
- Waivers
- Geometric issues
- Slope issues
- Frangibility issues (related to airfield pavements)
- Best time of year for the action
- Ongoing airfield operations (mission impact)
- Availability of work force (contract/in-house)

- Environmental considerations
- Economic or financial constraints

### 4-3.4 Prioritize.

Prioritizing projects requires balancing the cost, mission impact, and risks to create a sustainable airfield over time. PMP teams must consider all such factors when prioritizing projects. PCI reports include a list of major M&R requirements by section with a recommended year of execution based on the critical PCI, branch use, rank, and established Air Force pavement PM and M&R policies. This list of requirements is already prioritized using the PoF and adjusted MDI. (All APE reports and PCI survey reports accomplished between 2015 and 2021 include a table summarizing the PoF and adjusted MDI by pavement section.) Determining each installation's mission requirements are critical when prioritizing.

#### 4-3.4.1 Risk Analysis.

An additional component of the PMP is the risk analysis that calculates the loss of service life and cost of deferred rehabilitation. Although not a requirement for the PMP, risk analysis is another tool the PMP teams use to prioritize projects and effectively communicate risk to mission. The methodology in UFC 3-270-08 shows the impact of deferring maintenance and establishes a starting point for project prioritization. If the PCI for a section is below the critical PCI, a risk analysis for that section does not need to be performed; at that stage only undertake operational maintenance actions needed to keep the pavement active. The critical PCI is currently set in PAVER at 70 for primary pavements and 55 for secondary and tertiary pavements.

### 4-3.5 Refine Work Requirements.

At this point, engineering judgment is required to develop projects, considering several other factors. These factors include the time of year planned for the action, ongoing airfield operations (mission impact), availability of work force (contract/in-house), environmental considerations, and economic or financial constraints.

#### 4-3.5.1 Assign ROM Cost.

Review or assign a rough order of magnitude (ROM) cost to each section repair. The PCI report provides estimated costs to each section repair identified in the "Major M&R Recommended by Year" table. These costs are determined using R.S. Means price book data that are annually updated in PAVER. Project costs for individual installations may differ slightly from the estimated cost provided by PAVER. When adding or refining work requirements, include an estimated ROM cost for projects based on historical or current cost information.

### 4-3.6 Group Requirements in Fiscal Years.

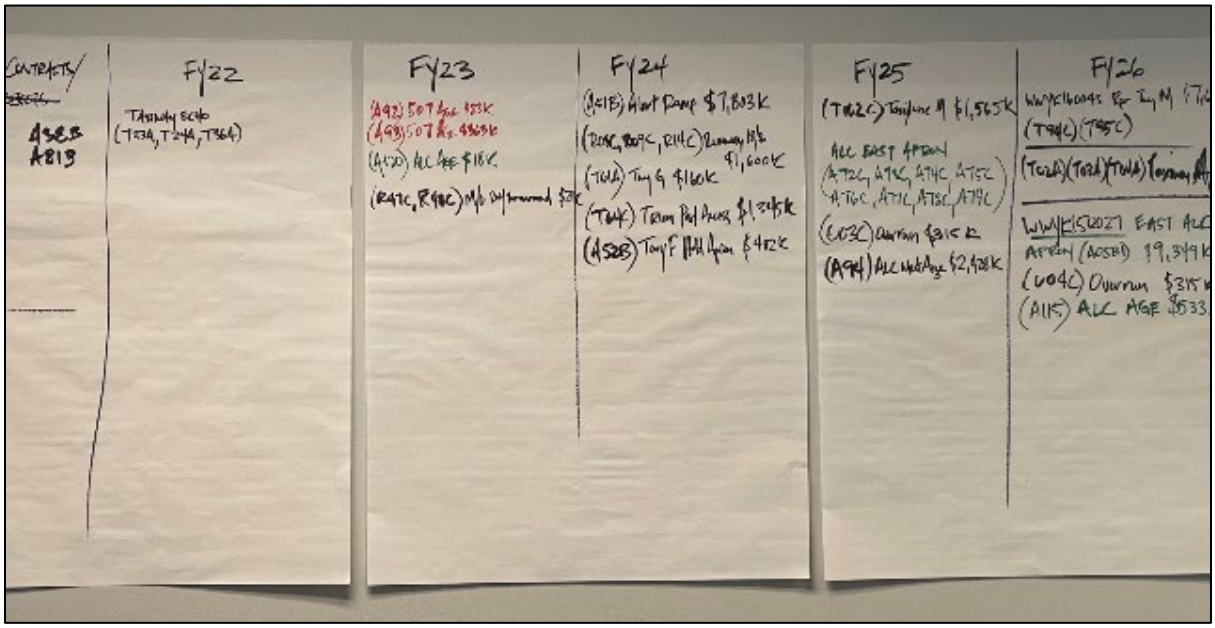
Within the PCI report, PAVER makes recommendations on the year of execution of specific work requirements based on the projected condition, critical PCI, branch use, and rank. The engineer must apply judgment to determine how best to group these

requirements. For instance, a base would most likely not want to conduct a mill and overlay project on a small portion of their runway every year for three years. These requirements would be grouped in a single project executed in one year.
**Note:** Engineering judgment is required when choosing to disregard the recommended first year for major M&R in the early years of the analysis period.

Use the recommended process below for grouping projects into FYDP+2:

1. Acquire a large dry-erase board, large sheets of easel paper, or an Excel document projected on a screen. This allows all team members to view the process. See example in Figure 4-4.
2. Pull up the assigned maintenance zones and group each pavement section requiring work into these zones for programming and execution.
3. Assign projects with the highest determined priority to early FYs. Keep in mind that not all projects are executable in the earliest FYs. Understanding project funding cycles will help the team assign FYs.
4. Determine any limiting factors and associated impacts.
5. Discuss mission impacts of groupings and FY assignments with Airfield Management and other stakeholders.
6. Once the entire FYDP+2 list is complete, review and correct any conflicts.

**Figure 4-4 FYDP+2 Organization Example**




## 4-3.7 Determine Execution Method.

The final phase in PMP development is to determine and document the method of execution: what is executed in-house and what is executed by contract (project). Once defined, the base uses a PMP with requirements prioritized and grouped for a specific

method of execution, such as in-house work and smaller contract (e.g., indefinite delivery indefinite quantity [IDIQ], multiple award contract [MAC]) requirements for PM, and larger contracts (e.g., centralized Facilities Sustainment, Restoration and Modernization (cFSRM), or decentralized Facilities Sustainment, Restoration and Modernization (dFSRM)) for major M&R. If executed by project, the base should integrate requirements with those of other asset types when appropriate (e.g., drainage, lighting) to ensure projects are properly scoped. Understanding funding cycles is also critical when selecting a method for executing major M&R projects. A snip of a completed major M&R project listing is shown in Table 4-2.

**Table 4-2 Major M&R PMP**

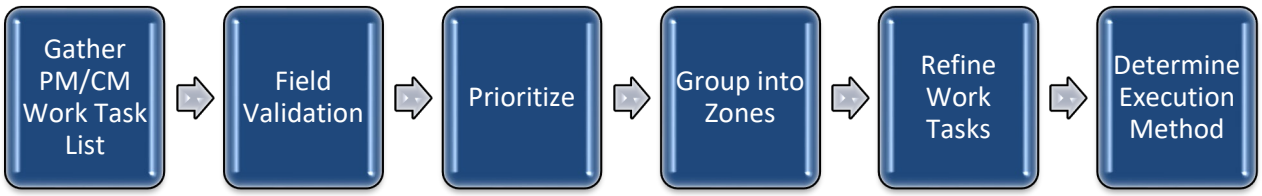
| Rqmt FY | Assign FY | Opportunity/ Project No. | Execution Method | PMP Zone | Installation/ Network | Branch-Section | Branch Name | Branch ID | Section | Rank | PCI | Surf Type | Section Area ($ft^2$) | Distress | Severity | Work Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2023 | 2029 | ASHE151004 | Central | 2 | Aviano | TWA-T10A | Taxiway A | TWA | T10A | P | 70 | AC | 124788 | | | Mill and AC Overlay |
| 2023 | 2029 | ASHE151004 | Central | 2 | Aviano | TWA-T40A | Taxiway A | TWA | T40A | P | 64 | AC | 8190 | | | Mill and AC Overlay |
| 2023 | 2023 | ASHE181007 | ExPlan | 2 | Aviano | TWB1-T47A | Taxiway B1 | TWB1 | T47A | P | 61 | PCC | 6757 | | | Selective Slab Replacement |
| 2022 | 2027 | ASHEXXXA1 | ExPlan | 4 | Aviano | APS759-A58B | Sierra Apron 759 | APS759 | A58B | T | 51 | APC | 2229 | | | Mill and AC Overlay |

## 4-4 LOCALIZED PM/CM (3- TO 5-YEAR STRATEGY).

Localized preventative M&R is used on pavements above the critical PCI to either maintain or improve pavement condition. Localized PM/CM consists of maintenance actions performed on pavement at the location of individual distresses to slow down the rate of pavement deterioration. There are numerous types of M&R methods for asphalt and concrete pavements to tackle both localized and operational maintenance requirements, including but not limited to patching, crack sealing, and surface treatments. It differs from global PM in that it typically is not applied to pavement outside of the location of the distress, whereas global PM is applied to areas of the pavement that may not be distressed. The PMP is designed to be a predictive strategy, not reactive. Localized PM/CM is not to be confused with safety maintenance or stop-gap maintenance, which is performed to mitigate distresses on pavements below the critical PCI to keep them operationally safe for use. Emergency or stop-gap repairs frequently occur on airfields. Having a well-developed PM plan reduces the possibility of reactive repairs.

When developing a PM/CM strategy, communication between Operations Flight, Engineering Flight, and Airfield Management is crucial. A key element when developing a PM strategy is having a Pavements and Equipment Shop representative who is a 7-level Craftsman, has completed the mobile pavement repair course, has experience in airfield pavement repair, and has extensive knowledge of in-house repair capabilities. Developing a PMP preventive maintenance strategy differs slightly from the major M&R process. AFCEC highly recommends approaching PM by zones. Use the process in Figure 4-5 when developing a PM/CM strategy.

**Figure 4-5 PM/CM Strategy Process**




### 4-4.2 Generate Localized M&R List.

Start the process by pulling and reviewing the "Summary Extrapolated Distress Report and Localized M&R" requirements and recommendations provided in the most recent PCI survey report and/or APE report. If a copy is not on hand, the data is also located in the online Tableau pavement tool (see paragraph 2-4.1). This is typically an extremely large list of all distresses recommended for repair the first year after the PCI report is completed. Use the list as a foundation for the three- to five-year PM/CM. This table is added into the same downloaded PMP workbook template that holds the major M&R requirements, but as a separate PM/CM tab. Annotate any tasks that were identified in the major M&R list.

### 4-4.3 Field Validation.

Field validation does not imply that a full PCI for the sections in each project is conducted by the PMP team, but rather a review of the distresses and validation of the quantities is required. If there are significant differences identified, update the distresses and quantities in the required projects at a minimum and, if needed to justify the updated project, conduct a project-level PCI on the sections. For time efficiency, this step can be conducted during the major M&R review. Be cognizant of all items identified in paragraph 4-3.2 when conducting field validation.

### 4-4.4 Prioritize.

Prioritize each work task by pavement location, rank, and/or distress level. While pavement condition is a factor, PM projects should not typically be prioritized by a "worst condition first" approach. However, conducting PM/CM with the most severe distresses first will aid in pavement life expectancy. Ideally, projects are prioritized based on LCC, with the goal of keeping the good pavements good at a minimal cost. For example, the pavement with the highest PCI may be the top priority because of the gain in service life for the minimal cost invested. Localized M&R requirements are based on the specific type, severity, and quantity of distresses at the time of the last PCI and are defined in the "Consequence of Localized Distress Maintenance" work plan. The report does not prioritize the localized M&R requirements but rather is a list of all the requirements.

When funding for maintenance repairs is limited, organizations prioritize repairs. UFC 3-270-08 outlines an approach using a similar method as major M&R; see Table 4-3 for details. Insert a column labeled Priority into the downloaded PMP workbook and place the corresponding priority number next to each localized M&R requirement. Then, sort

the document by pavement rank and the lowest corresponding priority number. **Note:** In the downloaded PMP workbook, place the new Priority column at the end to avoid breaking the automation of the workbook. See Appendix A for a link to the template.

**Table 4-3 Airfield M&R Priority Table Example**

| Airfield M&R Priority Table Example | | | |
|---|---|---|---|
| Use Priority | High Priority Rank | Medium Priority Rank | Low Priority Rank |
| High | 1<br>Main Runway | 3<br>Crosswind Runway | 6<br>Auxiliary Runway |
| Medium | 2<br>Parallel Taxiway | 5<br>Ladder Taxiway | 8<br>Occasional Use Helipad |
| Low | 4<br>Primary Apron | 7<br>Transient Apron | 9<br>Wash Rack |

### 4-4.4.1 Risk Analysis.

As with major M&R, an additional component of the PMP is the risk analysis that calculates the loss of service life and cost of deferred rehabilitation. Although not a requirement for the PMP, risk analysis is another tool the PMP teams use to prioritize projects and effectively communicate risk to mission. The methodology in UFC 3-270-08 shows the impact of deferring maintenance and establishes a starting point for project prioritization. If the PCI for a section is below the critical PCI, a risk analysis for that section does not need to be performed; at that stage only undertake operational maintenance actions needed to keep the pavement active. The critical PCI is currently set in PAVER at 70 for primary pavements and 55 for secondary and tertiary pavements.

### 4-4.5 Group Localized M&R by Zone.

A logical method for tackling airfield PM is to group work requirements into manageable zones. A maintenance strategy airfield zone map (see Figure 4-2) dissects the airdrome into zones for targeted maintenance operations. There are several different methods to establish zones. The team is responsible for establishing the maintenance zones before PMP development. The Tableau pavement tool (see paragraph 2-4.1) or other mapping programs can be used to visually identify the pavement sections and place them into the desired zone. Maintenance zones are designed so the team can rotate maintenance efforts annually. For example, conduct all identified PM/CM requirements in zone 1 in FY 25 then zone 2 in FY 26. This methodology enables planning for both in-house and contracted work. Ensure pavement markings and rubber build-up removal are incorporated into the rotational zonal plan.

### 4-4.6 Refine Work Tasks.

At this point, engineering judgment is required to consider several other factors. These factors include the time of year planned for the action, ongoing airfield operations (mission impact), availability of work force (contract/in-house), environmental considerations, and economic or financial constraints. For example, a PCC apron section has joint seal damage that equates to 15 percent of the total linear feet of joints having a high distress density and 40 percent of the total linear feet of joints having a medium distress density. Rather than replacing only the high distress joint sealant, it would be more cost-effective and practical to replace all the joint sealant in the section. The key is to develop projects that are executable within the physical and financial constraints at the location on the airfield.

In addition, consider major M&R requirements scheduled in future years when looking at timing. For example, do not plan a joint seal repair project in the year or two before a section is scheduled for reconstruction.

#### 4-4.6.1 Assign ROM Cost.

PCI reports provide estimated costs to each section repair identified in the “Localized M&R Recommended by Year” table. The table provides estimated work quantity, work unit, unit cost, and work cost. These costs are determined using R.S. Means price book data that are updated annually in PAVER. Project costs for individual installations may differ slightly than the estimated cost provided by PAVER. Teams are encouraged to use current data from historical contracts or an IDIQ contract.

### 4-4.7 Determine Execution Method.

The final phase to develop the PM element of a PMP is to determine and document the method of execution: what is executed in-house and what is executed by contract (project). Once defined, the base uses a PMP with requirements prioritized and grouped for a specific method of execution, such as in-house work and smaller contract (e.g., IDIQ, MAC) requirements for PM/CM. The team’s in-depth knowledge of the in-house work capability is paramount to determine execution methods. Although each squadron’s capabilities differ, typically in-house work is limited to localized M&R.

## 4-5 GLOBAL PREVENTIVE MAINTENANCE.

Global PM is used to slow or delay large-scale pavement deterioration. Currently, global PM for the Air Force is limited to applying surface treatments to asphalt surfaces (see UFC 3-270-01, *O&M Manual: Asphalt and Concrete Pavement Maintenance and Repair*). Surface treatments are divided into two general applications: fog seals/rejuvenators and slurry seals/microsurfacing. The recommended sealer process, once non-structural cracking and/or raveling is first observed, is a fog seal (except for runways).

To determine the frequency of global PM, the pavement’s condition serves as the primary determining factor. Generally, global PM is effective at the beginning of pavement life and/or when the distress severity is low. Fog seal applications are

recommended on an approximately three-year cycle. When used correctly, global PM prolongs pavement service life but the increase is difficult to quantify because of the need for repeated treatments on a routine cycle. Consider global PM as a routine PM alternative to extend pavement service life.

### 4-5.1 Develop Global PM Requirements.

Using the same procedures in paragraph 4-4, use the spreadsheet tab labeled Global PM in the PMP workbook template. Follow the zonal concept and coordinate with localized PM/CM timelines. This will help consolidate all PM/CM into manageable areas, making it easier to coordinate with airfield users.

## 4-6 MAINTAIN AND UPDATE PMP.

After completion of the airfield PMP, execute the plan as designed. Reassemble the PMP team annually to conduct a review and update. The preferable time frame for PMP updates and reviews is April to July. When a new PCI report is provided, it is recommended to start the process from the beginning to incorporate the newly identified requirements.

# CHAPTER 5 ROADS AND PARKING

## 5-1 DESCRIPTION.

This chapter outlines key principles to develop an installation's roads and parking PMP. This chapter provides a step-by-step process for base pavement teams to create and update PMPs for roads and parking.

Before beginning a PMP, review and download the PMP template and guide from the links provided in Appendix A. Use the template throughout the PMP development process.

## 5-2 ROADS AND PARKING PMP DEVELOPMENT.

Assessing roads and parking for the PMP is based on similar principles as the airfield. However, depending on installation size, there are significantly more projects identified for roads and parking than the airfield. Therefore, developing a methodical maintenance strategy is key to successfully maintaining installation pavements in a budget-constrained environment. The analysis conducted for a PMP is used to develop a customized FYDP+2 and/or three- to five-year plan and budget for needs road by road, pavement by pavement. The PMP provides a comprehensive review of all road and parking pavements, a site-by-site maintenance plan of action, and a year-by-year budget for an entire system on an annual basis. While based on strategic compilations of data from pavement assessments and pavement evaluations, the roads and parking PMP is easy to understand and use.

Figure 4-1 illustrates the components of a PMP. An example of an installation PMP is available for download from the link in Appendix A. Use the example template to produce the PMP for submittal.

### 5-2.1 Team Composition.

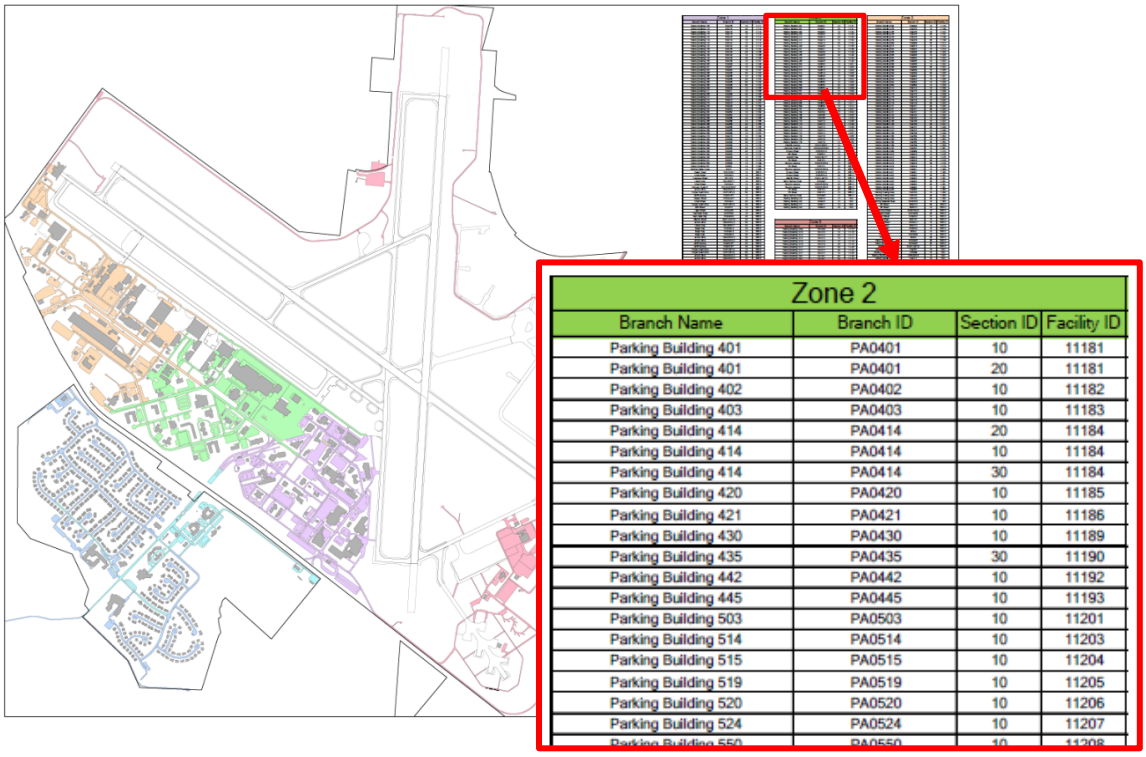
- Engineering Flight, Chief
- Portfolio Optimization, Chief
- Community/Base Planner
- GeoBase/GIS Manager
- Operations Flight, Chief
- Requirements and Optimization Pavement Engineer
- Transportation AMP Manager
- Roads and Parking sub-AMP Manager
- Heavy Repair Superintendent
- NCOIC Pavements and Equipment Shop (7-level who has completed the mobile pavements repair course or equivalent)

- Other individuals that significantly contribute to installation pavements

**5-2.2 Analysis Tools.**

- Latest roads and parking PCI survey report
- Most recent list of approved/proposed projects
- Zonal map of all installation roads and parking (dissected into manageable maintenance zones); see Figure 5-1 for an example
- PAVER-produced prioritized list of major M&R projects (from PCI report)
- PAVER-produced prioritized list of localized M&R projects, including global repair projects (obtained from PCI report)
- Helpful support equipment (e.g., projector, screen, large whiteboard, or paper)
- Access to mapping software (e.g., Tableau Roads & Parking Pavements Management Tool, ArcGIS)

**Figure 5-1 Roads & Parking Zone Map Example**



| Zone 2 | | | |
|---|---|---|---|
| Branch Name | Branch ID | Section ID | Facility ID |
| Parking Building 401 | PA0401 | 10 | 11181 |
| Parking Building 401 | PA0401 | 20 | 11181 |
| Parking Building 402 | PA0402 | 10 | 11182 |
| Parking Building 403 | PA0403 | 10 | 11183 |
| Parking Building 414 | PA0414 | 20 | 11184 |
| Parking Building 414 | PA0414 | 10 | 11184 |
| Parking Building 414 | PA0414 | 30 | 11184 |
| Parking Building 420 | PA0420 | 10 | 11185 |
| Parking Building 421 | PA0421 | 10 | 11186 |
| Parking Building 430 | PA0430 | 10 | 11189 |
| Parking Building 435 | PA0435 | 30 | 11190 |
| Parking Building 442 | PA0442 | 10 | 11192 |
| Parking Building 445 | PA0445 | 10 | 11193 |
| Parking Building 503 | PA0503 | 10 | 11201 |
| Parking Building 514 | PA0514 | 10 | 11203 |
| Parking Building 515 | PA0515 | 10 | 11204 |
| Parking Building 519 | PA0519 | 10 | 11205 |
| Parking Building 520 | PA0520 | 10 | 11206 |
| Parking Building 524 | PA0524 | 10 | 11207 |

## 5-3 MAJOR M&R REQUIREMENTS.

Developing a PMP for major M&R for roads and parking is similar to the airfield PMP, with the exception of prioritization. Use the process outlined in paragraph 4-3.

### 5-3.1 Prioritize.

Use the prioritization process outlined in paragraph 4-3.3. Table 5-1 provides priority numbers to assign to each section ID for roads and parking. If required to further prioritize for specific projects for justification purposes, use the risk analysis process in UFC 3-270-08.

**Table 5-1 Section Use Priority Table**

| Road and Parking M&R Priority Table Example | | | |
|---|---|---|---|
| Use Priority | High Priority Rank | Medium Priority Rank | Low Priority Rank |
| High | 1<br>Primary Road (Arterial) | 3<br>Collector Streets | 6<br>Local Streets |
| Medium | 2<br>Roundabout | 5<br>Motor Pool | 8<br>Other Pavement |
| Low | 4<br>Hospital Parking Area | 7<br>Facility Parking | 9<br>Driveway |

## 5-4 LOCALIZED PM/CM (3- TO 5-YEAR STRATEGY).

Developing a roads and parking PM portion of the PMP is similar to the airfield. Use the same methodology in paragraph 4-4 for guidance.

## 5-5 GLOBAL PREVENTIVE MAINTENANCE.

Developing a roads and parking global PM portion of the PMP is similar to the airfield. Use the same methodology in paragraph 4-5 for guidance.

## 5-6 MAINTAIN AND UPDATE PMP.

After completing the roads and parking PMP, execute the plan as designed. Reassemble the PMP team annually to conduct a review and update. The preferable timeframe for PMP updates and reviews is April to July. When a new PCI report is provided, it is recommended to start the process from the beginning to incorporate the newly identified requirements.

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# APPENDIX A PAVEMENT MANAGEMENT PLAN EXAMPLE AND TEMPLATE

## A-1 EXAMPLE PMP FOR AIRFIELD PAVEMENTS AND ROADS & PARKING PAVEMENTS

https://www.wbdg.org/FFC/DOD/STC/Example_PMP.pdf

## A-2 PMP APPENDIX INSTRUCTIONS

https://www.wbdg.org/FFC/DOD/STC/PMP_Appendix_Instructions.pdf

## A-3 PMP APPENDIX TEMPLATE

https://www.wbdg.org/FFC/DOD/STC/PMP_Appendix_Template.xltx

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# APPENDIX B GLOSSARY

## B-1 ACRONYMS

| | |
|---|---|
| AC | Asphalt Concrete |
| ACN | Aircraft Classification Number |
| AFCEC | Air Force Civil Engineering Center |
| AFMAN | Air Force Manual |
| AMP | Asset Management Program |
| APE | Airfield Pavement Evaluation |
| BCE | Base Civil Engineers |
| CM | Corrective Maintenance |
| DAFMAN | Department of the Air Force Manual |
| DoD | Department of Defense |
| EA | Engineering Assessment |
| FOD | Foreign Object Damage |
| FY | Fiscal Year |
| FYDP | Future Years Defense Program |
| GIS | Geographic Information System |
| ID | Identification |
| IDIQ | Indefinite Delivery Indefinite Quantity |
| km/h | Kilometers per Hour |
| LCC | Life-Cycle-Cost |
| M&R | Maintenance And Repair |
| MAC | Multiple Award Contract |
| MDI | Mission Dependency Index |
| mph | Miles per Hour |
| P | Primary |

| | |
|---|---|
| PAA | Primary Assigned Aircraft |
| PACES | Parametric Cost Estimating System |
| PCC | Portland Cement Concrete |
| PCI | Pavement Condition Index |
| PCN | Pavement Classification Number |
| PM | Preventative Maintenance |
| PMP | Pavements Management Plan |
| PoF | Probability Of Failure |
| ROM | Rough Order of Magnitude |
| S | Secondary |
| SI | Structural Index |
| T | Tertiary |
| TSPWG | Tri-Service Pavement Working Group |
| UFC | Unified Facilities Criteria |

## B-2 DEFINITION OF TERMS

**Critical PCI:** The PCI value of a section at which the rate of deterioration significantly increases and return on investment of PM/CM decreases. The critical PCI is an economic breakpoint that triggers major M&R actions (see **Policy PCI** for further definition). Critical PCI will depend on the pavement type, pavement use, and traffic level. The policy PCI of 70 set within PAVER will be the default critical PCI for primary pavements and 55 for secondary and tertiary pavements.

**Global Preventive/Corrective Maintenance (Global PM/CM): Global** PM/CM is a type of minor M&R and is used to retard or slow pavement deterioration. Generally, global PM/CM is effective at the beginning of pavement life and/or when climate-caused distresses have not started or, in some cases, the severity is low or medium. Global PM, like localized PM/CM, may be performed in response to the appearance or progression of distress, but is more commonly performed on a recurring schedule (i.e., at set time intervals) without regard for the distresses present.

**Localized Operational Maintenance and Repair (Operational M&R):** Operational M&R is also referred to as safety maintenance, stop-gap maintenance, and breakdown maintenance, and is intended to maintain the safety of operations. Operational maintenance is performed to mitigate distresses on pavements below the critical PCI to keep them operationally safe for use. Operational M&R uses the same work types as

localized PM/CM (e.g., spalls, linear cracking, or alligator cracking at specific locations), focusing on medium- and high-severity distresses that pose a risk to operations.

**Localized Preventive/Corrective Maintenance (Localized PM/CM):** Localized PM/CM is a type of minor M&R and consists of M&R actions performed on pavement at the location of individual distresses to slow down the rate of pavement deterioration. It differs from global PM in that it typically is not applied to pavement outside the location of the distress, whereas global PM is applied to areas of the pavement that may not be distressed.

**Maintenance and Repair (M&R):** M&R is also known as rehabilitation and consists of four categories. Each M&R category has a different focus for the type, scope, and timing of work performed. M&R categories include localized operational maintenance, localized PM/CM, global PM/CM, and major M&R.

- Typical maintenance on asphalt and concrete pavements consists principally of the care of joints, sealing cracks, surface treatments, replacing random broken slab panels, full-depth and partial-depth repairs, dowel bar restoration, diamond grinding, slab-jacking, sub-sealing, petroleum, oil, and lubricant (POL) contamination removal, and the correction of minor settlement and drainage faults.
- Repair consists of the work required to restore a distressed pavement so it may be used at its original designed capacity and/or accommodate the current mission as provided for by applicable Service instructions.

**Major Maintenance and Repair (Major M&R):** Major M&R consists of activities applied to the entire pavement section to correct or improve existing surface or structural deficiencies to meet functional requirements, including deteriorated pavement surfaces that pose a risk to aircraft or ground vehicles. Major M&R includes mill and overlay, structural overlay, or reconstruction of asphalt pavements, and selective slab replacement or reconstruction for PCC pavement. The distinguishing feature is that any of these treatments bring the PCI value back to 100.

**Pavement Condition Index (PCI):** PCI is a numerical indicator between 0 and 100 that reflects the surface condition of the pavement.

**Policy PCI:** PCI values established as PAVER cutoff points by which certain M&R actions, as defined by distress and severity, should be taken, e.g., a project should be programmed before the pavement reaches these conditions:

- Section PCI greater than or equal to 71 (primary) or 56 (secondary/tertiary) generally requires minor M&R
- Section PCI of 56 to 70 (primary) or 41 to 55 (secondary/tertiary) generally requires major and/or minor M&R
- Section PCI of 41 to 55 (primary) or 26 to 41 (secondary/tertiary) generally requires major and/or minor M&R or reconstruction

- Section PCI of 26 to 40 (primary) generally requires major M&R or reconstruction
- Section PCI less than 25 generally requires reconstruction

**Pavement Management Plan (PMP):** PMP is a plan for sustainment funds, i.e., a document that informs base leadership of the following:

- When and where M&R actions are needed (assigned FY and pavement section IDs)
- What M&R activities are to be performed
- How the work is to be accomplished (in-house or contract)
- What is the cost for the work
- What is the impact if the work is not accomplished

**Preventive/Corrective Maintenance (PM/CM) and Major M&R:** PM/CM and major M&R is a program of activities that preserves the investment in pavements, reduces the rate of degradation due to specific distresses, extends pavement life, enhances pavement performance, and reduces mission impact.

**Primary Airfield Pavements:** Primary pavements are mission-essential pavements. In general, only pavements used by aircraft on a daily basis or frequently used transient taxiways and parking areas are considered primary pavements.

**Primary Road and Parking Lot Pavements:** Primary pavements include arterials, which are defined as a class of street serving a major movement of traffic not served by a freeway. This includes installation roads and streets that serve as the main distributing arteries for traffic originating outside and within an installation and that provide access to, through, and between the various functional areas or collector or local streets that service mission-critical facilities. Classification of vehicle parking areas as primary pavements should be restricted to those areas associated with access to mission-essential facilities, such as alert facilities, munitions facilities, and medical facilities.

**Rate of Pavement Deterioration:** This is the rate at which a specific pavement at a specific location deteriorates over time. This rate is dependent on climatic conditions, pavement use, and traffic level.

**Reconstruction:** Complete replacement of the pavement, base course, and subgrade.

**Secondary Airfield Pavements:** Secondary pavements are mission-essential but occasional-use airfield pavements. In general, any pavements that are not in daily use by aircraft are secondary pavements.

**Secondary Road and Parking Lot Pavements:** Secondary pavements include collector streets that gather and disperse traffic between the larger arterial highways and less important streets, that have intersections at grade, and that are equally important in providing traffic movement and access to abutting properties. In addition,

most parking areas that support daily traffic on a base are considered secondary pavements unless a specific mission dictates otherwise.

**Tertiary Airfield Pavements:** Tertiary pavements include pavements used by towed or light aircraft. In general, any pavement that does not support aircraft taxiing under their own power or is used only intermittently is considered a tertiary pavement.

**Tertiary Road and Parking Lot Pavements:** Tertiary pavements include local streets that are streets or roads primarily for access to residences, businesses, or other abutting property. Installation roads and streets that provide access from other collector roads and streets to individual units of facilities of a functional area are included in this category. Unsurfaced roads and abandoned in-place but usable roads are classified as tertiary. Any parking area that is not used on a daily basis or is excess to the standard facilities requirements is considered a tertiary pavement.

**Unused Pavements:** Unused pavements include any pavements that are inactive, abandoned, or scheduled for demolition.

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# APPENDIX C REFERENCES

## AIR FORCE

AFI 32-1041, *Pavement Evaluation Program*, https://www.e-publishing.af.mil/

DAFMAN 32-1084, *Standard Facility Requirements*, https://www.wbdg.org/ffc/af-afcec/manuals-afm/afman-32-1084

## ASTM INTERNATIONAL

https://www.astm.org/

ASTM D5340, *Standard Test Method for Airport Pavement Condition Index Surveys*

ASTM D6433, *Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys*

## UNIFIED FACILITIES CRITERIA

https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc

UFC 1-200-01, *DoD Building Code*

UFC 3-260-01, *Airfield and Heliport Planning and Design*

UFC 3-260-16, *O&M Manual: Standard Practice for Airfield Pavement Condition Surveys*

UFC 3-270-01, *O&M Manual: Asphalt and Concrete Pavement Maintenance and Repair*

UFC 3-270-08, *Pavement Maintenance Management*

## TRI-SERVICE PAVEMENT WORKING GROUP

https://www.wbdg.org/ffc/dod/supplemental-technical-documents

TSPWGM 3-260-03.02-19, *Airfield Pavement Evaluation Standards and Procedures*