Concrete Airfield Pavements

Course No: C01-031
Credit: 1 PDH

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This course was adapted from the Federal Aviation Administration, Publication No, AC 150/5320-17A "Pavement Surface Evaluation and Rating, Paser Manual: Concrete Airfield Manual", which is in the public domain.

Contents

This manual is intended to assist airfield managers in understanding and rating the surface condition of rigid Portland Cement Concrete (PCC) pavements. It describes types and causes of distress and provides a simple system to visually rate pavement condition.

Produced for the Federal Aviation Administration by Engineering Professional Development, College of Engineering, University of Wisconsin-Madison.

Pavement Surface Evaluation and Rating

PASER Manual

Concrete Airfield Pavements

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PASER — Pavement Surface Evaluation and Rating

Concrete Airfield Pavements

An airport manager's goal is to use available funds to provide a safe and economical pavement surface. This is no simple task. It requires balancing priorities and making difficult decisions in order to manage pavements. This manual offers useful information for planning maintenance and managing Portland Cement Concrete (PCC) pavements. It discusses common problems and typical repairs and includes a visual system for evaluating and rating PCC pavements.

General aviation airfield pavements are often managed informally, based on the staff's judgment and experience. While this process is both important and functional, using a slightly more formalized technique can make it easier to manage pavements effectively.

Experience has shown that there are three steps that are especially useful in managing airfield pavements:

1) Inventory all pavements.
2) Periodically evaluate the condition of all pavements.
3) Use the condition evaluations to set priorities for projects and evaluate alternative treatments.

A comprehensive pavement management system involves collecting data and assessing several pavement characteristics: roughness, surface distress (condition), surface skid characteristics, drainage, and structure (pavement strength and deflection). Planners can combine this condition data with economic analysis, to develop short-range and long-range plans for a variety of budget levels. However, general aviation agencies may lack the resources for such a full-scale system.

Since surface condition is the most vital element in any pavement management system, managers may use the simplified rating system presented in this Concrete Airfield Pavements PASER Manual to evaluate their pavements. A PASER Manual for asphalt airfield pavements is also available (see References, page 20).

Evaluating pavement condition

Rigid pavement performance

PCC pavements are either plain (non-reinforced) or reinforced concrete. Reinforcement is usually provided by steel wire mesh placed approximately at mid-slab depth. The reinforcement is intended to limit crack opening and movement in the concrete slab. Most airfield pavements are not reinforced.

Since concrete slabs need to move (expand and contract) with changes in temperature and during initial cure (drying and shrinkage), pavements are constructed with contraction joints. These are usually sawn into the pavement shortly after initial curing. This joint gives the slab a place to crack and makes a straight, well-formed groove to seal. Runways, taxiways and aprons (ramps) are sawn to create square slabs ranging from 15′ to a maximum of 25′.

Isolation joints are occasionally provided. These are wider, full depth, and filled with a material to allow expansion. If used, they are placed adjacent to structures that cannot move with the pavement such as buildings, manholes, and other utility structures. These isolation joints are also used at pavement intersections and allow changes in joint patterns.

Rigid, PCC pavements carry traffic loadings differently than flexible pavements (asphalt). Concrete pavements are designed to act like a beam and use the bending strength of the slabs to carry the load. Therefore, load transfer across cracks and joints is important, especially on pavements with heavy traffic loading. Hairline and narrow cracks still have interlocked concrete aggregate and can effectively transfer loads. Because wide cracks and widely-spaced joints open up, they cannot transfer loads and must take higher edge loads. These higher edge loads can cause further cracking and deterioration along the joint, or crack edges.

Many concrete pavements use joints that have load transfer dowels. These are smooth steel bars placed across the joint. They transfer traffic loads between adjacent concrete slabs while allowing the joint to open and close. These bars can rust and sometimes cause problems. The corrosion causes forces on the concrete which leads to spalling, cracking, and general joint deterioration. Epoxy coated dowels may be used to reduce corrosion.

Unsupported slab edges will deflect or bend under a load. If the supporting soil is saturated it can squirt up through joints or cracks when the slab bends. This is called ***pumping***. Eventually the loss of supporting soil through pumping creates an empty space or void under the slab. The slabs may then crack further under loads and joints will deteriorate more.

Undoweled joints under heavy traffic may ***fault***. This is when one slab edge is lower than the next slab. Faulting is more likely on pavements with most of the traffic in one direction. The downstream traffic slab will be lower than the upstream slab, creating a step. Faulting creates a rough pavement.

You can often detect pumping by the soil stains around pavement joints or cracks. The resulting voids can be grouted full or sub-sealed. Slabs can be leveled by slab jacking or mud jacking. Obviously, sealing cracks and joints and improving subsoil drainage will help reduce pumping, faulting, and joint failures.

PCC pavement conditions and defects

It is helpful to separate various conditions common to PCC pavements. These are described individually in some detail. We include causes for deterioration and common strategies for repair. Some defects are localized while others indicate that problems may develop throughout the pavement. It is important to distinguish between local and widespread defects. Assessing the conditions of actual pavements also involves looking for combinations of these individual defects.

There are four major categories of common PCC pavement surface distress and condition:

Surface defects
Polishing, map cracking, pop-outs, scaling, spalling.

Joints
Longitudinal and transverse joints.

Pavement cracks
Slab cracks, D-cracking, corner cracks, meander cracks, manhole and inlet cracking.

Pavement distortion
Pavement settlement or heave; blow ups; faulting; utility repairs, patches and potholes.

In reviewing the different defects it is important to consider both their severity and extent. Generally, conditions begin slowly and progressively become more serious. Slight defects may grow into moderate and then severe conditions. In addition, defects might initially be indicated only in a few isolated cases. Examples in the rating section will help identify how bad and how extensive a condition is.

SURFACE DEFECTS

Polishing

A worn or polished surface may develop from traffic wearing off the surface mortar and skid-resistant texture. An asphalt overlay or grinding the concrete surface can restore skid resistance.

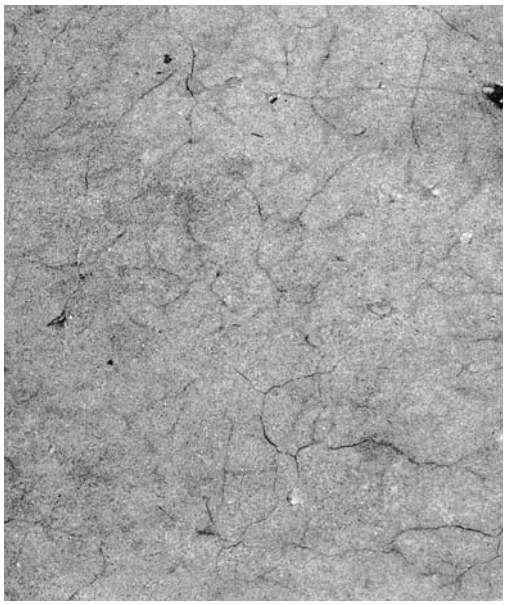
Map cracking

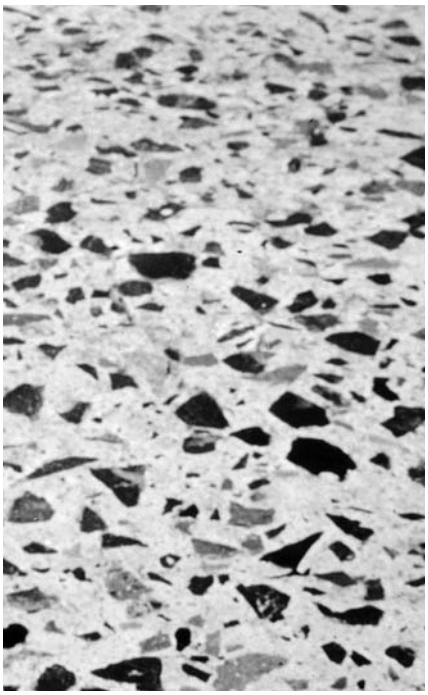
A pattern of fine cracks usually spaced within several inches is called map cracking. It usually develops into square or other geometrical patterns. Map cracking can be caused by improper cure or over-working the surface during finishing. It may also indicate a problem with the quality of the aggregate known as ASR (alkali-silica reactivity). If severe, cracks may spall or the surface may scale. Repair is usually limited to very severe conditions. An asphalt overlay or partial depth patching may then be necessary.

Pop-outs

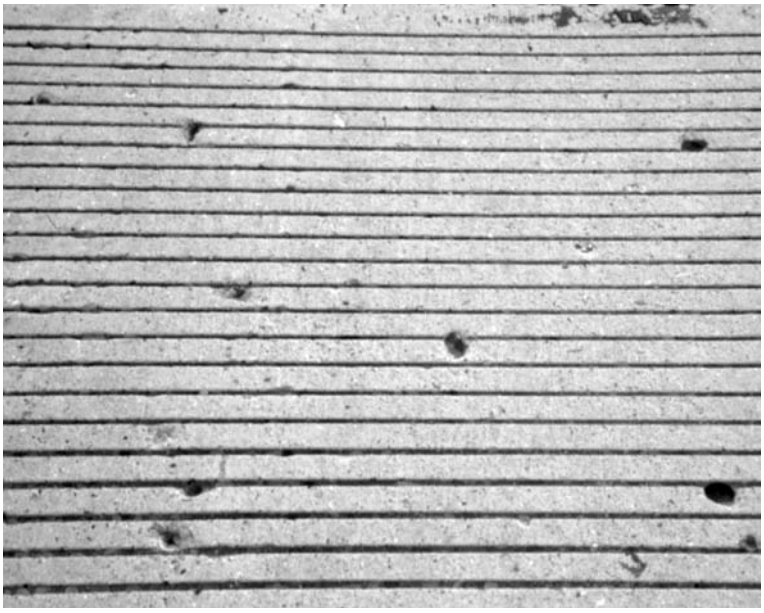
Individual pieces of large aggregate may pop out of the surface. This is often caused by chert or other absorbent aggregates that deteriorate under freeze-thaw conditions. Pop-outs alone do not usually affect pavement serviceability. However, damage to aircraft from the debris may occur. For severe areas, a patch, overlay or slab replacement may be necessary.

► **Close-up of a polished pavement surface.**





▲ **Map cracking has hairline surface cracks, probably shallow in depth. May not cause any long-term performance problems.**



► **Several pop-outs in a new slab.**

► **Extensive pop-outs of large aggregate from surface.**

▲ **Slight scaling. Minor loss of surface mortar.**

► **Moderate surface scaling. Loss of mortar and fines starting to expose larger aggregate.**

Scaling

Scaling is surface deterioration that causes loss of fine aggregate and mortar. More extensive scaling can result in loss of large aggregate. The cause often is using concrete which has not been air-entrained, making the surface susceptible to freeze-thaw damage.

Scaling can occur as a general condition over a large area or be isolated to locations where poor quality concrete or improper finishing techniques caused loss of entrained air. In severe cases, deterioration can extend deep into the concrete. Debris from scaling can damage aircraft.

Grinding may remove poor quality surface concrete. Partial depth patching of isolated areas may also prolong the life of the pavement. Severe scaling may require slab replacement.

◄ **Severe scaling. Some larger aggregate is loose.**

Spalling

Spalling is the loss of a piece of the concrete pavement from the surface or along the edges of cracks and joints. Cracking or freeze-thaw action may break the concrete loose, or spalling may be caused by poor quality materials. Spalling may be limited to small pieces in isolated areas or be quite deep and extensive. Large pieces of loose concrete can cause serious damage to aircraft.

Repair will depend on the cause. Small spalled areas are often patched. Spalling at joints may require full depth joint repair or full slab replacement.

◄ **Spalling along a joint.**

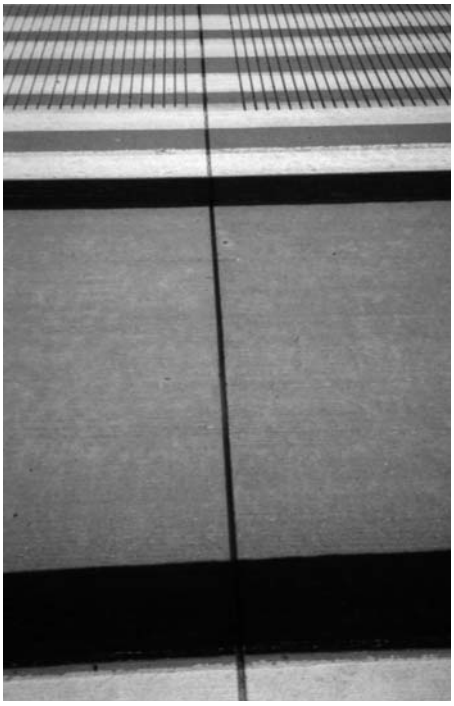
◄ **Small surface spall that has been patched.**

◄ **Spall at crack. Creates dangerous debris.**

JOINTS

Construction joints or sawn joints are narrow and usually well sealed. As pavements age and materials deteriorate, joints may open wider and deteriorate further. Cracks parallel to the initial joint may develop and accelerate into spalling or raveling. Settlement, instability, or pumping of subgrade soil can cause joints to fault. One common cause of cracks parallel to joints is waiting too long after the pour to saw the joint. Then, during initial cure the slab will crack near the sawn joint.

Maintaining a tight joint seal can prevent intrusion of water and debris and reduce freeze-thaw damage and pumping. Debris may accumulate in open joints which prevents normal joint movement. This will greatly accelerate joint deterioration. Severe joint deterioration may require full depth patching and joint replacement.



▲ **New pavement with good joints.**

▲ **Joint sealant deterioration on apron. Slab is in good condition.**

► **Taxiway with spalled joint.**

▲ **Joint sealant in poor condition. Loss of bond to edge allows water into pavement.**

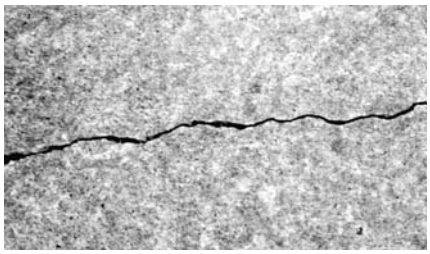
▲ **Severe spalling along joint and crack. Creates debris.**

PAVEMENT CRACKS

Slab cracks

Slab cracks divide the slab into 2 or more pieces. They can be caused by thermal stresses, poor subgrade support, or heavy loadings. They are sometimes related to slabs with joints spaced too widely. Slabs with a length-to-width ratio greater than 1.25 are more likely to develop mid-slab cracks.

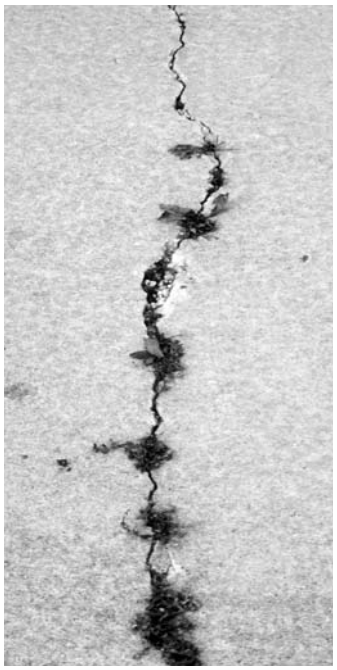
As with joints, these cracks may deteriorate further if not sealed well. Slabs can fault at cracks. Cracks can spall and develop additional parallel cracking. Severe deterioration may require patching individual cracks. Multiple transverse cracks in individual slabs indicate further deterioration. Extensive slab cracking indicates pavement failure and the need for complete replacement.



▲
Hairline slab crack. Tight with no spalling.

◄
Crack next to joint often caused by late sawing. Crack shows early signs of spalling.

Slab crack with grass, no sealant, and spalls developing.
▼



◄◄
Slab crack with spalling and debris.

Multiple slab cracks and broken pavement. Replacement needed.
▼

◄
Closely spaced, hair-line, transverse cracks indicate slab is broken and needs replacing.

D-cracks

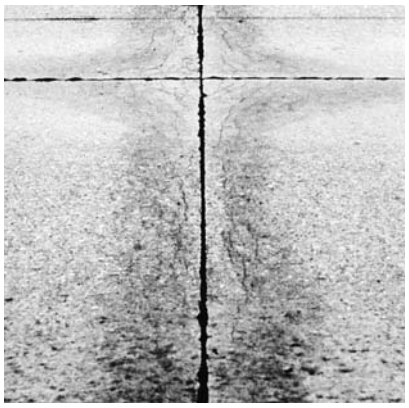
Occasionally, severe deterioration may develop from poor quality aggregate. So called D-cracks or disintegration cracking, develop when the aggregate is able to absorb moisture.
This causes the aggregate to break apart under freeze-thaw action which leads to deterioration. Usually, it starts at the bottom of the slab and moves upward.

Fine cracking and a dark discoloration adjacent to the joint often indicate a D-cracking problem. Once this is visible on the surface the pavement material is usually severely deteriorated and complete replacement is required.

Joint or crack sealing helps slow D-cracking deterioration. This is a serious defect because it may indicate a material quality problem throughout the pavement. Milling and patching has proven successful as a short term repair.

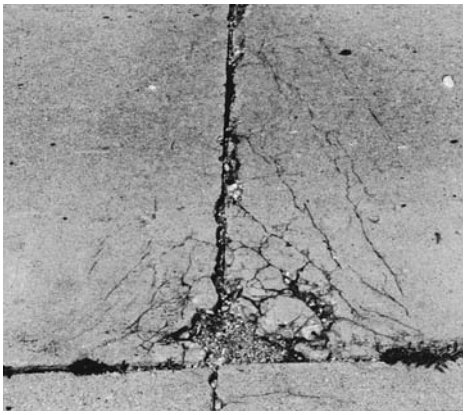
Surface discoloration near joints and cracks indicates D-cracking and severe slab deterioration.

▼ ►



►

Multiple crack patterns adjacent to joints. Common D-cracking pattern.



Corner cracks

Diagonal cracks may develop near the corner of a concrete slab, forming a triangle with the joint. Usually these cracks are within a foot or two of the slab corner and are caused by insufficient soil support or concentrated stress due to temperature-related slab movement. The corner breaks under traffic loading. They may begin as hairline cracks.

Some corner cracks extend the full depth of the slab while others start at the surface and angle down toward the joint. With further deterioration, more cracking develops, and eventually the entire broken area may come loose. This may be a localized failure, but it often indicates widespread maintenance problems.

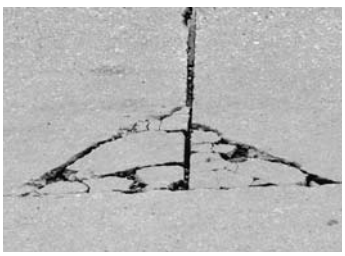
Partial or full depth concrete patching or full depth joint replacement may be needed when corner cracking is extensive.

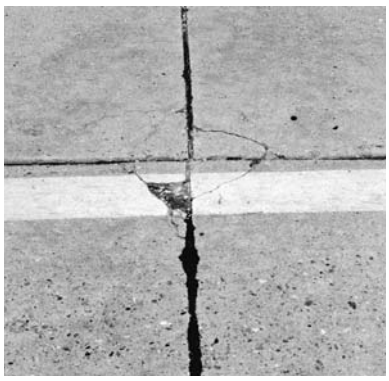
►

Corner cracking with slight spalling.

►

Corner cracking, severe spalling, and dangerous debris.





►

Corner cracking in all four slabs.

◄ **Meander crack caused by settlement. Lack of maintenance allows water to intrude and debris to collect in crack.**

Meander cracks

Some pavement cracks appear to wander randomly. They may cross a slab diagonally or meander in a random manner. Meander cracks may be caused by settlement due to unstable subsoil or drainage problems. Frost heave and spring thaw can also cause them. They are often local in nature and may not indicate general pavement problems.

Minor cracks may benefit from sealing to minimize water intrusion. Extensive or severe meander cracks may require replacing the slab, stabilizing the subsurface, or improving drainage.

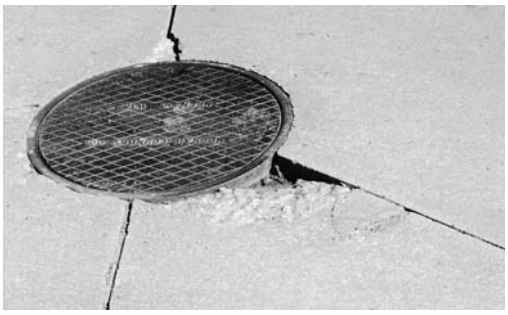
◄ **Faulting and spalling of a meander crack.**

Manhole and inlet cracks

The pavement adjacent to a light can, manhole, or storm sewer inlet often cannot accommodate normal pavement movement due to frost heaving and temperature changes. Cracks and faulting may develop and the concrete slab may deteriorate further. These are often localized design defects that may not indicate a general pavement problem. Sealing and patching may slow the deterioration. Eventually full depth repairs may be required.

▲ **Slabs replaced next to inlet. Good joint design.**

Two spalls at manhole in a new pavement. Partial depth ▼ patching would be beneficial.



► **Inlet with severe cracking and spalling. Full depth slab repair required.**

PAVEMENT DISTORTION

Pavement settling or heave

Unstable or poorly drained subgrade soils may cause pavements to settle after construction. Poorly compacted utility trenches may also settle. This may be a gentle swale or a fairly severe dip.

Frost-susceptible soils and high water tables can cause pavements to heave during the winter months. Extensive pavement cracking and loss of strength during the spring can result in severe deterioration. Improved drainage and stabilization of subgrade soils is usually necessary, along with pavement reconstruction.

Blowups

Concrete slabs may push up or be crushed at a joint. This is caused by expansion of the concrete where incompressible materials (sand, debris, etc.) have infiltrated into poorly sealed joints. As a result, there is no space to accommodate expansion. It is more common in older pavements with long joint spacing. Pavements that have aggregate susceptible to ASR may experience more frequent blowups. Pressure relief joints can be installed and blowup areas must be patched or reconstructed. Cleaning and sealing joints will help prevent blowups.

▼ **Pavement blowup in progress—concrete is crushed and slab buckled.**

▲ **Settlement caused meander crack with faulting.**

Extensive cracking and patching caused by settlement. Pavement was
▼ **built on unstable sub-grade soils.**

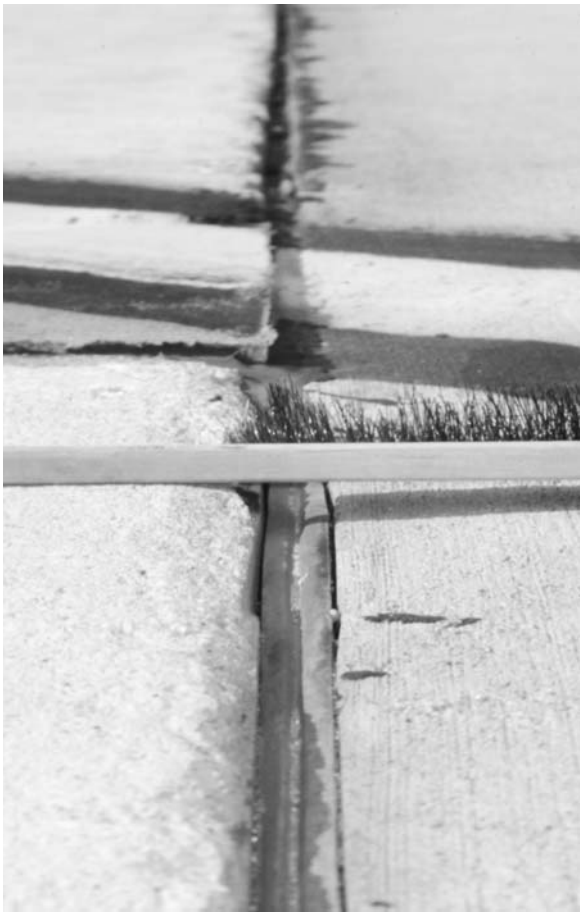
▲ **Internal pressure has partially raised slab at the joint. Complete replacement is required.**

▲
Faulting of joints. Aggravated by heavy traffic in one direction. Could improve surface by grinding.

Faulting

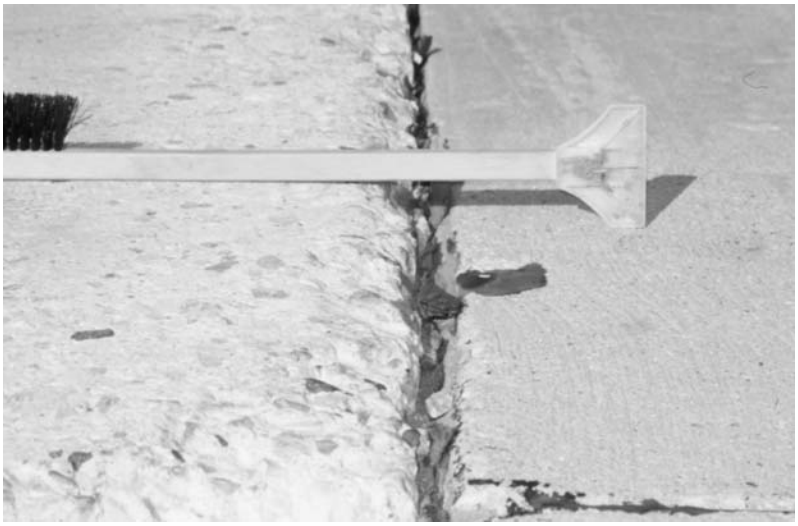
Joints and cracks may fault or develop a step between adjacent slabs. Faulting is caused by pumping of subgrade soils and creation of voids. Heavy traffic can rapidly accelerate faulting. Joints may fault due to settlement of an adjacent slab.

Faulting creates a rough pavement and may cause slab deterioration. Minor faulting can be corrected by surface grinding. Voids can be subsealed, or slabs can be mud jacked back to level position. Severe cases may need joint or slab replacement.



Severe joint fault.

◄

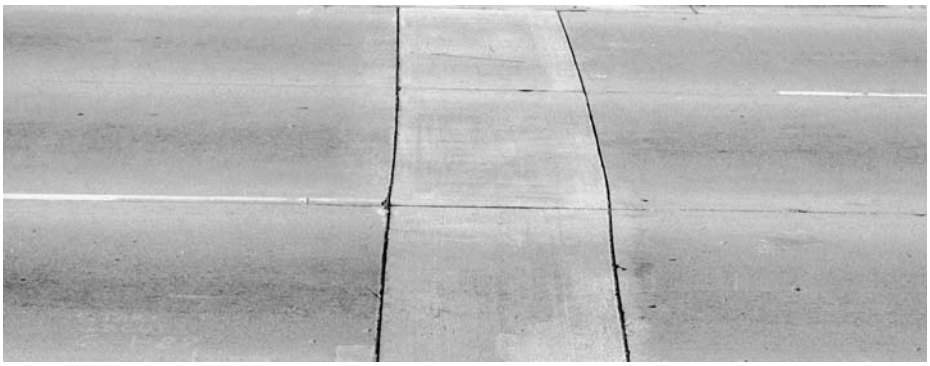


►
Severe joint fault and spalling.

Utility repairs, patches and potholes

Slab replacement or repair of utilities will require cuts and slab patching. Patches from previous repairs may perform like original pavement or may show settlement, joint deterioration or distress.

Localized failures of materials or subgrade soil can cause individual potholes. Surface spalling or other material defects may develop into localized potholes. Full depth patching or slab replacement is usually required.



▲ **Full depth joint repair. Very good condition.**

► **Joint repair with asphalt. Very good condition.**

► **Partial depth concrete patch to repair corner cracks. Good condition.**

Potholes caused by severe joint deterioration. Need repair. ▼

► **Asphalt patches. Poor** *(top)* **and fair** *(bottom)* **condition.**

Rating pavement surface condition

Using your understanding of pavement conditions and distress, you can evaluate and rate airfield PCC pavements. The rating scale ranges from **5–excellent** condition to **1–very poor or failed.** Some pavements will deteriorate through the phases listed in the rating scale. The time it takes to go from an excellent (5) to failed condition (1) depends largely on the quality of the original construction, age, and the amount of heavy traffic loading.

Once significant deterioration begins, it is common to see pavements deteriorate rapidly. This is usually due to the combined effects of loading and additional moisture. As a pavement ages and additional cracks develop, more moisture can enter and accelerate the rate of deterioration.

Look at the photographs which follow and become familiar with the descriptions of the individual rating categories. To evaluate an individual pavement, first determine its general condition. Is it relatively new, toward the top end of the scale? In very poor condition and at the bottom of the scale? Or somewhere in between? Next, think generally about the appropriate maintenance method.

Finally, review the individual pavement condition and distress and select the appropriate pavement surface rating. Individual pavements may not have all of the types of distress listed for any particular rating. They may have only one or two types. Use the categories in the rating table below.

Each rating also includes a recommendation for needed maintenance or repair. This makes the rating system easier to use and enhances its value as a tool in ongoing airfield pavement maintenance.

Rating 5 – Excellent
No maintenance required.

Rating 4 – Good
Minor routine maintenance, crack or joint sealing.

Rating 3 – Fair
More crack or joint sealing. Isolated joint repairs or slab patching.

Rating 2 – Poor
Extensive crack or joint sealing. Repair severe joint deterioration. Partial and full-depth slab repairs.

Rating 1 – Failed
Reconstruction.

Rating system

Surface rating	*Visible distress**	*General condition/ treatment measures*
5 Excellent	None.	New pavement or recent major concrete rehabilitation. Like-new condition. Less than 5 years old. No maintenance required.
4 Good	Hairline or sealed cracks ⅛" wide or less. Map cracking. Pop-outs.	Concrete over 5 years old. Signs of wear. Minor spot repair of cracks or joint sealant.
3 Fair	Several slabs broken into two pieces by slab cracks. Corner cracking on several slabs, ¼" wide with no spalling. Joint sealant mostly in good condition, less than 10% needing replacement. Several patches in fair to good condition. Map cracking or scaling on 10% or less of the surface area. Slight faulting, less than ¼", in several locations.	First sign of significant slab cracking, corner cracking, scaling, or faulting. Several patches. Joint sealant repair required. Isolated repair of joint or patch.
2 Poor	Many slab cracks, some breaking the slab into three or more pieces. Cracks open ⅛" or cracks with spalling. D-cracks at several joints. Sealant failure over 10% of joints. Several patches in fair to poor condition with cracks in patch and uneven surface. Faulting ¼" to ½" in several locations. Severe or extensive scaling.	Needs sealant replacement on more than 10% of cracks or joints. Partial depth or full depth joint repairs or patch replacement. Repair faulted joints. Replace or overlay slabs with severe scaling. Bonded or unbonded concrete overlay.
1 Failed	Many wide cracks with failed sealant and grass. Extensive crack and joint spalling. Slabs extensively cracked or shattered. Many corner breaks with spalling. D-cracks with spalling. Patches in poor condition with spalling. Numerous faults over ½".	Extensive full depth joint repairs or slab replacements. Extensive patching and complete overlay. Complete reconstruction.

** A given pavement segment may not have all of the types of distress listed for a particular rating. It may have only one or two types.*

RATING 5

EXCELLENT —
No maintenance required

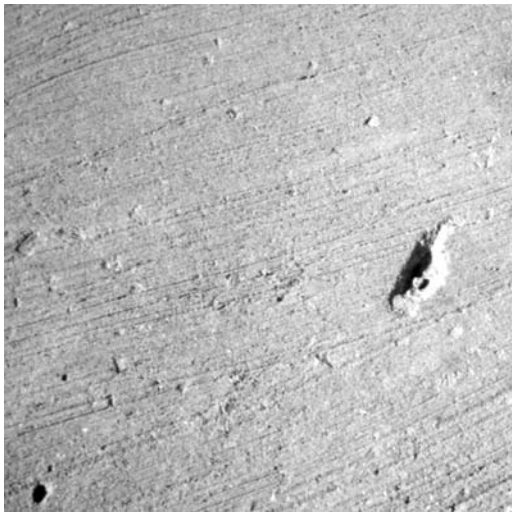
Rating 5 is for new pavement or for recent major concrete rehabilitation. Like-new condition. Less than 5 years old. No maintenance required.

► **New or like-new pavement condition.**

RATING 4

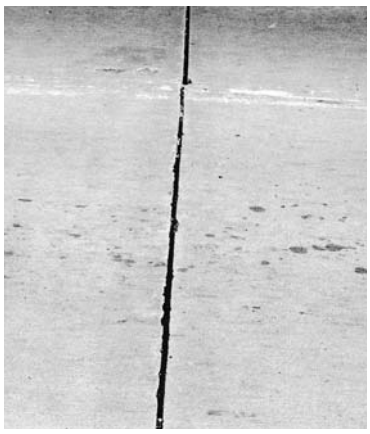
GOOD — Little or no maintenance required

Minor spot repair of cracks or joint sealing required. PCC pavement over 5 years old. Signs of wear: hairline or sealed cracks 1/8" wide or less, map cracking, pop-outs.



► **Surface wear and pop-outs.**

▲ **Map cracking, but pavement is sound.**



▲ **Partial loss of joint sealant.**

◄ **Isolated meander crack, tight and well sealed.**

▲
Isolated spall at manhole.

◄
Moderate scaling.

RATING 3

FAIR — First sign of significant slab cracking, corner cracking, scaling, or faulting. Several patches. Joint sealant repair required. Isolated repair of joint or patch.

Several slabs broken into two pieces by slab cracks. Corner cracking on several slabs, ¼" wide with no spalling. Joint sealant mostly in good condition, less than 10% needing replacement. Several patches in fair to good condition. Map cracking or scaling on 10% or less of the surface area. Slight faulting, less than ¼", in several locations.

▲
Crack breaks slab into two pieces. Well sealed.

◄
Crack breaks off large corner of slab.

▲
Severe scaling. Joint and sealant in fair condition.

◄
Crack parallel to joint. Open ¼". No spalling.

RATING 2

POOR —Cracks open 1/8", D-cracks at joints. Replace sealant, repair joints.

Many slab cracks, some breaking the slab into three or more pieces. Cracks open 1/8" or cracks with spalling. D-cracks at several joints. Sealant failure over 10% of joints. Several patches in fair to poor condition with cracks in patch and uneven surface. Faulting 1/4" to 1/2" in several locations. Severe or extensive scaling.

▲ **Open joints and cracks. Need sealant on more than 10% of joints.**

► **Open joint with spalling.**

► **Corner cracks with spalling. Full depth patch required.**

Open cracks with edge spalling. Corner crack
▼ and broken corner piece.

▲ **Faulting of joints aggravated by heavy traffic in one direction.**

▲ **Full depth joint repair required.**

▲ **Concrete patch in poor condition.**

RATING 1

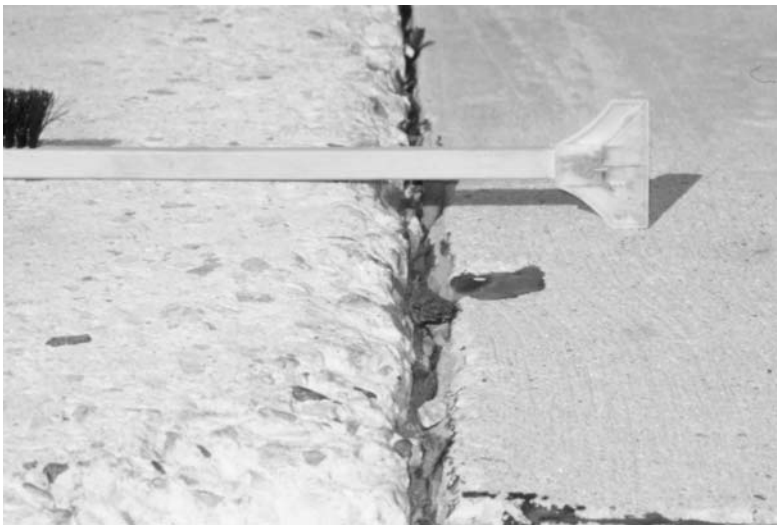
FAILED — Extensive repairs, overlay, or complete reconstruction necessary.

Many wide cracks with failed sealant and grass. Extensive crack and joint spalling. Slabs extensively cracked or shattered. Many corner breaks with spalling. D-cracks with spalling. Patches in poor condition with spalling. Numerous faults over 1/2". Extensive full depth joint repairs or slab replacements, extensive patching and complete overlay, or complete reconstruction needed.

▲
Multiple slab cracks, spalling and shattered slabs.

▲
Failed joint with severe spalling and pothole.

Inlet with severe cracking and spalling. Full depth slab repair required.
▼



►
Severe joint fault and spalling.

RATING 1

FAILED (continued)

► **Closely spaced cracks and poor joint. Reconstruct.**

► **Severe deterioration. Requires reconstruction.**

► **Severe scaling over extensive areas. Reconstruction required.**

Practical advice on rating airfield pavements

Inventory and field inspection

Most airport owners routinely observe pavement conditions as a part of their normal work. However, an actual inspection means looking at the entire system as a whole and preparing a written summary of conditions. This inspection has many benefits over casual observations. It can be helpful to compare pavement features, and ratings decisions are likely to be more consistent because the system is considered as a whole within a relatively short time.

An inspection also encourages a review of specific conditions important in pavement maintenance, such as drainage, adequate strength, and safety.

A simple written inventory is useful in making decisions where other people are involved. You do not have to trust your memory, and you can usually answer questions in more detail. Having a written record and objective information also improves your credibility with the funding agencies.

Finally, a written inventory is very useful in documenting changing pavement conditions. Without records over several years, it is more difficult to know if conditions are improving, holding their own, or declining.

A sample inventory form is shown on the inside back cover. It is very helpful to collect background information on each feature. Pavement thickness, age, and major maintenance are examples of helpful information.

Annual budgets and long range planning are best done when based on actual needs as documented with a written inventory.

Pavement features

Inventory and pavement condition data are normally organized by dividing the pavements into segments or features. A plan or aerial photo of the entire airfield is most helpful in identifying these individual features. Runways, taxiways and aprons should be considered as separate categories. Within each category, the pavement should be separated into features with similar construction. For example, pavements with different thickness, age, or type of construction should be rated separately.

A runway may be all one feature if conditions are similar. However, if parts of the runway have significantly different construction details or condition, then separate features will make the rating more logical and useful.

Each taxiway, can be considered a separate feature. You may combine several sections of taxiway if conditions are similar.

Apron areas can be separated into features according to the areas they serve. For example, aprons serving a terminal, hangers, tie-down area, or fueling area would be separate features. Areas in different conditions may also be separated into features.

It is helpful to note the size of slabs or panels as well as the number of slabs in a feature. The overall area can be calculated and used to prepare maintenance or construction estimates.

Averaging and comparing sections

No pavement feature is entirely consistent. Also surfaces in one section may not have all of the types of distress listed for any particular rating. They may have only one or two types.

The objective is to rate the condition that represents the majority of the pavement feature. Small or isolated conditions should not influence the rating. It is useful to note these special conditions on the inventory form so this information can be used in planning specific improvement projects. For example, some spot repairs may be required.

Occasionally surface conditions vary significantly within a feature. For example, short sections of good condition may be followed by sections of poor surface conditions. In these cases, it is best to rate the feature according to the worst conditions and note the variation on the form.

The overall purpose of condition rating is to be able to compare each feature relative to all the other features in your airport pavement system. On completion you should be able to look at any two pavement features and find that the better surface has a higher rating.

Assessing drainage conditions

Moisture and poor pavement drainage are significant factors in pavement deterioration. Some assessment of drainage conditions during pavement rating is highly recommended. While you should review drainage in detail at the project level, at this stage simply include an overview drainage evaluation at the same time as you evaluate surface condition.

Consider both pavement surface drainage and lateral drainage (ditches or storm sewers). Pavement should be able to quickly shed water off the surface. Ditches should be large and deep enough to drain the pavement and remove the surface water efficiently into adjacent waterways.

Look at the crown and check for low surface areas that permit ponding. Runways and taxiways should have approximately a 1.5°% cross slope or crown across the pavement. Apron areas require positive drainage and often include storm drainage systems. Maintenance of the entire drainage system is critical. Ditches, subsurface drains and outlets should be inspected

and cleaned regularly.

A pavement's ability to carry heavy traffic loads depends on both the pavement materials (concrete slab and granular base) and the strength of the underlying soils. Most soils lose strength when they are very wet. Therefore, it is important to provide drainage to the top layer of the subgrade supporting the pavement structure.

Planning annual maintenance and repair budgets

We have found that relating a normal maintenance or rehabilitation procedure to the surface rating scheme helps managers use the rating system. However, an individual surface rating should not automatically dictate the final maintenance or rehabilitation technique.

Consider future traffic projections, original construction, and pavement strength since these may dictate a more comprehensive rehabilitation than the rating suggests.

Summary

Using funds most efficiently requires good planning and accurate identification of appropriate rehabilitation projects. Assessing pavement conditions is an essential first step in this process. This pavement surface condition rating procedure has proven effective in improving decision making and using funds more efficiently. It can be used directly by airport staff and consultants or combined with additional testing and data collection in a more comprehensive pavement management system.

References

Asphalt Airfield Pavements PASER Manual, 2003, Engineering Professional Development, College of Engineering, University of Wisconsin-Madison.

Guidelines and Procedures for Maintenance of Airport Pavements, 7/14/03, Federal Aviation Administration, Advisory Circular AC:150/5380-6A.