ASPHALT SURFACED AIRFIELDS

PAVER™ DISTRESS IDENTIFICATION MANUAL

DEVELOPED BY:

US ARMY CORPS OF ENGINEERS
ERDC-CERL

AMENDED BY:

AIR FORCE CIVIL ENGINEER CENTER
AFCEC/COAP

FOREWORD

The basic PAVER Distress Identification Manual contains definitions and measuring methods for determining the Pavement Condition Index of Asphalt Surface Airfields. It implements STANAG 7181 ED 1 RD 1, Standard Test Method for Airfield Pavement Condition Index (PCI) Surveys.

This manual was developed by Dr. M. Y. Shahin, U. S. Army Engineering Research and Development Center– Construction Engineering Research Laboratory, Champaign, IL.

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Additions were made by AFCEC/COAP to facilitate the manual's usefulness in the performance of contingency Pavement Condition Index (PCI) surveys. These additions include:

- Definitions of 'Standard', 'Simplified' and 'Cursory' type PCI surveys.
- A brief description of the PCI and Pavement Condition Rating Scales.
- Explanation of the purpose of the PCI survey in contingency scenarios.
- Step by step procedures for performing a 'Simplified' PCI.
- Table1, Flexible Pavement (AC) Individual Distress Deduct Values which can be used in lieu of the numerous "AC Pavement Deduct Curves" contained in ASTM D5340-11.
- Table2, Corrected Deduct Values for Flexible (AC) Pavement Distresses which can be used in lieu of the "Corrected DVs for Flexible Airfield Pavements" chart contained in ASTM D5340-11.

August 2015

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OBJECTIVE AND SCOPE OF THIS MANUAL

The basic manual contains distress definitions and measurement methods for asphalt surfaced airfields as originally developed by ERDC-CERL. With the AFCEC/COAP amendments, it is used to quantify the identified distresses with deduct values and to calculate the reportable Pavement Condition Index (PCI) and Pavement Condition Rating for each surveyed pavement section in a contingency scenario.

GENERAL DEFINITIONS

Crack Spalling. Several crack related distresses reference the degree of spalling in determining the appropriate severity level to assign to the cracks. The following suggested descriptions apply:

Lightly spalled means no spall longer than 3 inches, no spall particles larger than 4 square inches, and less than 10% of the crack faces are spalled.

Moderately spalled means no spall longer than 6 inches and less than 50% of the crack segment is spalled.

Severely spalled means the crack segment is spalled beyond the condition listed in the medium spall definition.

Crack Filler. Several crack related distresses reference the condition of the crack filler or sealant in determining the appropriate severity level to assign to the cracks. The following suggested descriptions apply:

Satisfactory filled means that the crack filler is in generally good condition with no or only minor damage. The sealant may be de-bonded from the crack walls in places but it is still in contact with crack walls.

Unsatisfactory filled means that the crack filler is in generally fair to poor condition, and needs to be replaced within the next two years, if not sooner. There may be water penetration (visible gaps between the sealant and the crack walls), the sealant is oxidized or hardened, vegetation is present in the cracks, 10% or more of the sealant extends above the crack edges, or any part of the sealant extends more than ½ inch above the crack edges.

If the crack sealant height has subsided more than ¼ inch, the crack should be rated at the next higher severity.

If the crack sealant height has subsided more than ½ inch, the crack should be rated as high severity.

FREQUENTLY OCCURRING PROBLEMS IN ASPHALT PAVEMENT DISTRESS IDENTIFICATION

Situation	Action	Remarks
1. Alligator cracking and rutting in same area	Record each separately at respective severity levels.	
2. Bleeding counted in area	Polished aggregate is not counted in same area.	
3. Polished aggregate in very small amount	Do not count.	Polished aggregate is only counted when there is a significant amount.
4. Any distress (including cracking) in a patched area	Do not count.	Effect of distress is considered in patch severity level.
5. Block cracking is recorded	Neither longitudinal nor transverse cracking should be recorded.	
6. Asphalt overlay over concrete	Block cracking and joint reflection cracking are recorded separately.	AC over PCC could have for example, 100% block cracking and 100 feet of joint reflection cracking.
7. Medium or high severity raveling is recorded	Do not count weathering in the same area.	
8. Pavement is broken into pieces smaller than (1 foot by 1 foot) throughout an area	If thin surface seal or painted area, count as raveling. If asphalt layer, count as high severity block cracking.	Type of surface material and depth of the cracks determine the distress type.

ALLIGATOR OR FATIGUE CRACKING (41)*

Description

Alligator or fatigue cracking is a series of interconnecting cracks caused by fatigue failure of the asphalt surface under repeated traffic loading. The cracking initiates at the bottom of the asphalt surface (or stabilized base) where tensile stress and strain is highest under a wheel load. The cracks propagate to the surface initially as a series of parallel cracks. After repeated traffic loading, the cracks connect and form multi-sided, sharp-angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are less than 2 feet (0.6 meters) on the longest side. Alligator cracking occurs only in areas that are subjected to repeated traffic loadings, such as wheel paths. Therefore, it would not occur over an entire area unless the entire area was subjected to traffic loading. (Pattern-type cracking, which occurs over an entire area that is not subject to loading, is rated as block cracking, which is not a load associated distress.) Alligator cracking is considered a major structural distress.

Severity Levels

Fine, longitudinal hairline cracks running parallel to each other with no or only a few interconnecting cracks. The cracks are not spalled.

Further development of light alligator cracking into a pattern or network of cracks that may be lightly spalled. Medium severity alligator cracking is defined by a well-defined pattern of interconnecting cracks, where all pieces are securely held in place (good aggregate interlock between pieces).

Network or pattern cracking progressed so that pieces are well-defined and spalled at the edges; some of the pieces rock under traffic and may cause FOD potential.

How To Measure

Alligator cracking is measured in square feet (square meters) of surface area. The major difficulty in measuring this type of distress is that many times two or three levels of severity exist within one distressed area. If these portions can be easily distinguished from each other, they should be measured and recorded separately. However, if the different levels of severity cannot be easily divided, the entire area should be rated at the highest severity level present. If alligator cracking and rutting occur in the same area, each is recorded separately at its respective severity level.

**PAVER Distress Code*

41 ALLIGATOR

BLEEDING (42)

Description

Bleeding is a film of bituminous material on the pavement surface which creates a shiny, glass-like, reflecting surface that usually becomes quite sticky. Bleeding is caused by excessive amounts of asphalt cement or tars in the mix and/ or low air-void content. It occurs when asphalt fills the voids of the mix during hot weather and then expands onto the surface of the pavement. Since the bleeding process is not reversible during cold weather, asphalt or tar will accumulate on the surface.

Severity Levels

No degrees of severity are defined. Bleeding should be noted when it is extensive enough to cause a reduction in skid resistance.

How To Measure

Bleeding is measured in square feet (square meters) of surface area. If bleeding is counted, polished aggregate is not counted in the same area.

42 BLEEDING

BLOCK CRACKING (43)

Description

Block cracks are interconnected cracks that divide the pavement into approximately rectangular pieces. The blocks may range in size from approximately 1 by 1 foot to 10 by 10 feet (0.3 by 0.3 meters to 3 by 3 meters). Block cracking is caused mainly by shrinkage of the asphalt concrete (AC) and daily temperature cycling (which results in daily stress/strain cycling). It is not load associated. The occurrence of block cracking usually indicates that the asphalt has hardened significantly. Block cracking normally occurs over a large proportion of pavement area but sometimes will occur in non-traffic areas. This type of distress differs from alligator cracking in that alligator cracks form smaller, multi-sided pieces with sharp angles. Also, unlike block cracks, alligator cracks are caused by repeated traffic loadings and, therefore, are located only in traffic areas (i.e., wheel paths).

Severity Levels

Blocks are defined by cracks that are non-spalled (sides of the crack are vertical) or only lightly spalled, causing no FOD potential. Non-filled cracks have 1/4 inch (6 mm) or less mean width, and filled cracks have filler in satisfactory condition.

Blocks are defined by either: (1) Filled or non-filled cracks that are moderately spalled (some FOD potential); (2) Non-filled cracks that are not spalled or have only minor spalling (some FOD potential), but have a mean width greater than approximately 1/4 inch (6 mm); or (3) Filled cracks that are not spalled or have only minor spalling (some FOD potential), but have filler in unsatisfactory condition.

Blocks are well-defined by cracks that are severely spalled, causing a definite FOD potential.

How To Measure

Block cracking is measured in square feet (square meters) of surface area. It usually occurs at one severity level in a given pavement section; however, any areas of the pavement section having distinctly different levels of severity should be measured and recorded separately. For asphalt pavements, not including AC over PCC, if block cracking is recorded, no longitudinal and transverse cracking should be recorded in the same area. For asphalt overlay over concrete, block cracking, joint reflection cracking, and longitudinal and transverse cracking reflected from old concrete should all be recorded separately.

43 BLOCK CRACKING

CORRUGATION (44)

Description

Corrugation is a series of closely spaced ridges and valleys (ripples) occurring at fairly regular intervals, usually less than 5 feet (1 1/2 meters) along the pavement. The ridges are perpendicular to the traffic direction. Traffic action combined with an unstable pavement surface or base usually causes this type of distress.

Severity Levels

L — Corrugations are minor and do not significantly affect ride quality (see measurement criteria below).

M — Corrugations are noticeable and significantly affect ride quality (see measurement criteria below).

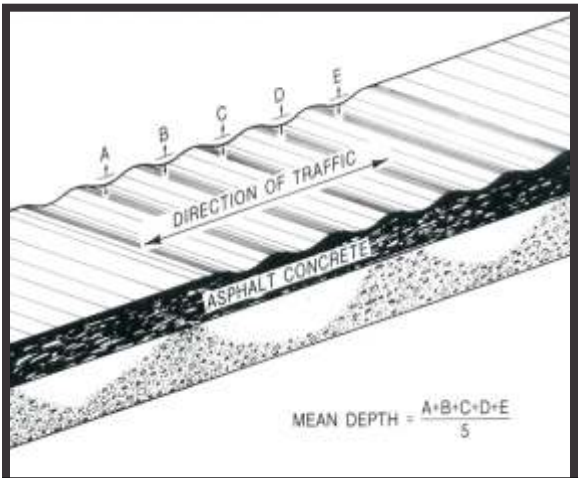
H — Corrugations are easily noticed and severely affect ride quality (see measurement criteria below).

How To Measure

Corrugation is measured in square feet (square meters) of surface area. The mean elevation difference between the ridges and valleys of the corrugations indicates the level of severity. To determine the mean elevation difference, a 10 foot (3 meter) straightedge should be placed perpendicular to the corrugations so that the depth of the valleys can be measured in inches (mm). The mean depth is calculated from five such measurements.

Measurement Criteria

Severity	Runways & High-Speed Taxiways	Taxiways & Aprons
L	< 1/4 in. (< 6 mm)	< 1/2 in. (< 13 mm)
M	1/4 to 1/2 in. (6 to 13 mm)	1/2 to 1 in. (13 to 25 mm)
H	> 1/2 in. (> 13 mm)	> 1 in. (> 25 mm)



44 CORRUGATION

DEPRESSION (45)

Description

Depressions are localized pavement surface areas having elevations slightly lower than those of the surrounding pavement. In many instances, light depressions are not noticeable until after a rain, when ponding water creates "birdbath" areas; but the depressions can also be located without rain because of stains created by ponding water. Depressions can be caused by settlement of the foundation soil or can be "built up" during construction. Depressions cause roughness and, when filled with water of sufficient depth, can cause hydroplaning of aircraft.

Severity Levels

Depression can be observed or located by stained areas, only slightly affects pavement riding quality, and may cause hydroplaning potential on runways (see measurement criteria below).

The depression can be observed, moderately affects pavement riding quality, and causes hydroplaning potential on runways (see measurement criteria below).

The depression can be readily observed, severely affects pavement riding quality, and causes definite hydroplaning potential (see measurement criteria below).

How To Measure

Depressions are measured in square feet (square meters) of surface area. The maximum depth of the depression determines the level of severity. This depth can be measured by placing a 10 foot (3 meter) straightedge across the depressed area and measuring the maximum depth in inches (mm). Depressions larger than 10 feet (3 meters) across must be measured by either visual estimation or direct measurement when filled with water.

Maximum Depth of Depression

Severity	Runways & High-Speed Taxiways	Taxiways & Aprons
L	1/8 to 1/2 in. (3 to 13 mm)	1/2 to 1 in. (13 to 25 mm)
M	1/2 to 1 in. (13 to 25 mm)	1 to 2 in. (25 to 51 mm)
H	> 1 in. (> 25 mm)	> 2 in. (> 51 mm)

45 DEPRESSION

JET BLAST EROSION (46)

Description

Jet blast erosion causes darkened areas on the pavement surface when bituminous binder has been burned or carbonized; localized burned areas may vary in depth up to approximately 1/2 inch (13 mm). This distress is typically caused by fighter aircraft with afterburners or downward exhausting APUs and is often found on runway ends.

Severity Levels

No degrees of severity are defined. It is sufficient to indicate that jet blast erosion exists.

How To Measure

Jet blast erosion is measured in square feet (square meters) of surface area.

JOINT REFLECTION CRACKING FROM PCC (47)

Description

This distress occurs only on pavements having an asphalt or tar surface over a PCC slab. This category does not include reflection cracking from any other type of base (i.e., cement stabilized, lime stabilized); such cracks are listed as longitudinal and transverse cracks. Joint reflection cracking is caused mainly by movement of the PCC slab beneath the AC surface because of thermal and moisture changes; it is not load related. However, traffic loading may cause a breakdown of the AC near the crack, resulting in spalling and FOD potential. If the pavement is fragmented along a crack, the crack is said to be spalled. A knowledge of slab dimensions beneath the AC surface will help to identify these cracks.

Severity Levels

Cracks have only light spalling (little or no FOD potential) or no spalling and can be filled or non-filled. If non-filled, the cracks have a mean width of 1/4 inch (6 mm) or less. Filled cracks are of any width, but their filler material is in satisfactory condition.

One of the following conditions exists: (1) cracks are moderately spalled (some FOD potential) and can be either filled or non-filled of any width; (2) filled cracks are not spalled or are only lightly spalled, but the filler is in unsatisfactory condition; (3) non-filled cracks are not spalled or are only lightly spalled, but the mean crack width is greater than 1/4 inch (6 mm); or (4) light random cracking exists near the crack or at the corner of intersecting cracks.

Cracks are severely spalled (definite FOD potential) and can be either filled or non-filled of any width.

How To Measure

Joint reflection cracking is measured in linear feet (linear meters). The length and severity level of each crack should be identified and recorded. If the crack does not have the same severity level along its entire length, each portion should be recorded separately. For example, a crack that is 50 feet (15 meters) long may have 10 feet (3 meters) of high severity, 20 feet (6 meters) of medium severity, and 20 feet (6 meters) of low severity; these would all be recorded separately. If the different levels of severity in a portion of a crack cannot be easily divided, that portion should be rated at the highest severity present.

47 JOINT REFLECTION

LONGITUDINAL AND TRANSVERSE CRACKING (48) (NON-PCC JOINT REFLECTIVE)

Description

Longitudinal cracks are parallel to the pavement's centerline or laydown direction. They may be caused by (1) a poorly constructed paving lane joint, (2) shrinkage of the AC surface due to low temperatures or hardening of the asphalt, or (3) a reflective crack caused by cracks beneath the surface course, including cracks in PCC slabs (but not at PCC joints). Transverse cracks extend across the pavement at approximately right angles to the pavement centerline or direction of laydown. They may be caused by items 2 or 3 above. These types of cracks are not usually load associated. If the pavement is fragmented along a crack, the crack is said to be spalled.

Severity Levels

Cracks have either minor spalling (little or no FOD potential) or no spalling. The cracks can be filled or non-filled. Non-filled cracks have a mean width of 1/4 inch (6 mm) or less; filled cracks are of any width, but their filler material is in satisfactory condition.

One of the following conditions exists: (1) Cracks are moderately spalled (some FOD potential) and can be either filled or non-filled of any width; (2) Filled cracks are not spalled or are only lightly spalled, but the filler is in unsatisfactory condition; (3) Non-filled cracks are not spalled or are only lightly spalled, but mean crack width is greater than 1/4 inch (6 mm); or (4) Lightly random cracking exists near the crack or at the corners of intersecting cracks.

Cracks are severely spalled, causing definite FOD potential. They can be either filled or non-filled of any width.

How To Measure

Longitudinal and transverse cracks are measured in linear feet (linear meters). The length and severity of each crack should be identified and recorded. If the crack does not have the same severity level along its entire length, each portion of the crack having a different severity level should be recorded separately. For an example, see joint reflection cracking. If block cracking is recorded, longitudinal and transverse cracking is not recorded in the same area.

48 LONG. CRACKING

LONGITUDINAL AND TRANSVERSE CRACKING (48) (NON-PCC JOINT REFLECTIVE) (CONTINUED)

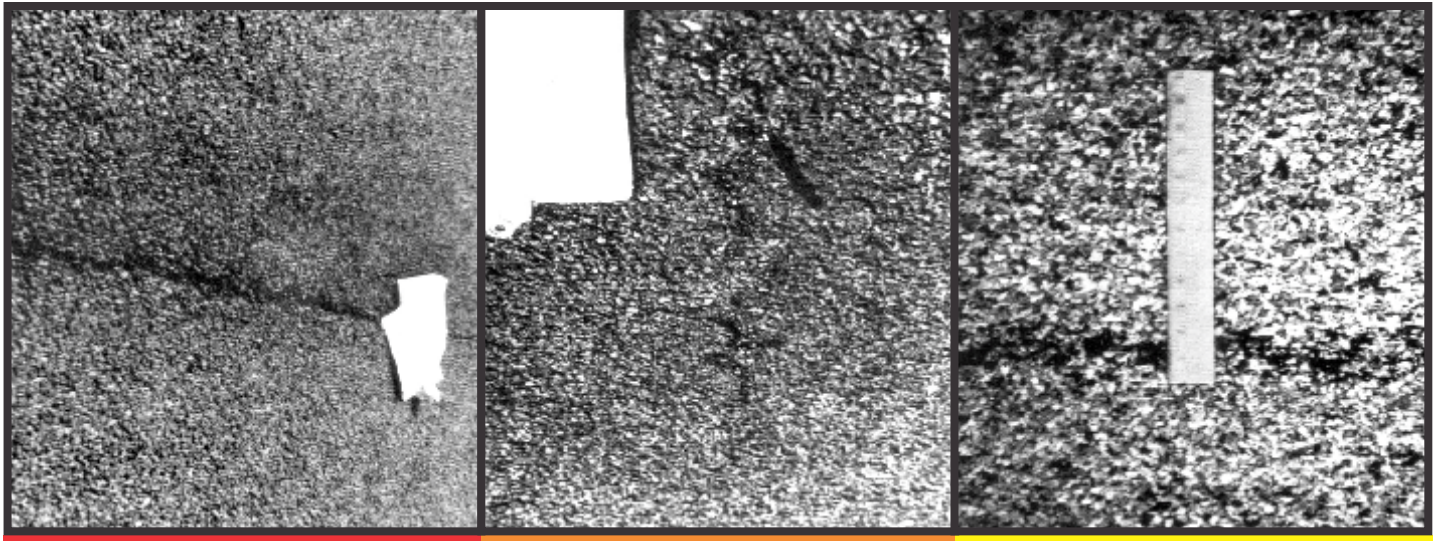
Porous Friction Course Severity Levels

Note: These severity levels are in addition to the existing definitions.

- L — Average raveled area around the crack is less than 1/4 inch (6 mm) wide.
- M — Average raveled area around the crack is 1/4 to 1 inch (6 to 25 mm) wide.
- H — Average raveled area around the crack is greater than 1 inch (25 mm) wide.

How To Measure

Longitudinal and transverse cracks are measured in linear feet (linear meters). The length and severity of each crack should be identified and recorded. If the crack does not have the same severity level along its entire length, each portion of the crack having a different severity level should be recorded separately. For an example, see Joint Reflection Cracking. If Block Cracking is recorded, Longitudinal and Transverse Cracking is not recorded in the same area.


HIGH
MEDIUM
LOW

OIL SPILLAGE (49)

Description

Oil spillage is the deterioration or softening of the pavement surface caused by the spilling of oil, fuel, or other solvents.

Severity Levels

No degrees of severity are defined. It is sufficient to indicate that oil spillage exists.

How To Measure

Oil spillage is measured in square feet (square meters) of surface area. A stain is not a distress unless material has been lost or binder has been softened. If hardness is approximately the same as on surrounding pavement, and if no material has been lost, do not record as a distress.

49 OIL SPILLAGE

PATCHING AND UTILITY CUT PATCH (50)

Description

A patch is considered a defect, regardless of how well it is performing.

Severity Levels

L — Patch is in good condition and is performing satisfactorily. Little or no FOD potential.

M — Patch is somewhat deteriorated and affects riding quality to some extent. Some FOD potential.

H — Patch is badly deteriorated and affects riding quality significantly or has high FOD potential. Patch needs replacement.

The use of dense-graded AC patches in porous friction course surfaces causes a water damming effect at the patch that contributes to differential skid resistance of the surface. Low severity, dense-graded patches should be rated as medium severity because of the differential friction problem. Medium and high severity patches are rated the same as above. The use of rigid repair materials, such as PCC, on AC surfaces is discouraged. Low severity rigid patches should be rated as medium severity.

How To Measure

Patching is measured in square feet (square meters) of surface area. However, if a single patch has areas of differing severity levels, these areas should be measured and recorded separately. For example, a 25 ft^2 (2 1/2 m^2) patch may have 10 ft^2 (1 m^2) medium severity and 15 ft^2 (1 1/2 m^2) of low severity. These areas would be recorded separately. Any distress found in a patched area will not be recorded; however, its effects on the patch will be considered when determining the patch's severity level.

A very large patch (area > 2500 ft^2 (230 m^2)), or feathered-edge pavement, may qualify as an additional sample unit or a separate section.

50 PATCHING

POLISHED AGGREGATE (51)

Description

Aggregate polishing is caused by repeated traffic applications. Polished aggregate is present when close examination of a pavement reveals that the portion of aggregate extending above the asphalt is either very small or there are no rough or angular aggregate particles to provide good skid resistance. Existence of this type of distress is also indicated when the number on a skid resistance rating test is low or has dropped significantly from previous ratings.

Severity Levels

No degrees of severity are defined. However, the degree of polishing should be significant before it is included in the condition survey and rated as a defect.

How To Measure

Polished aggregate is measured in square feet (square meters) of surface area. If bleeding is counted, polished aggregate is not counted in the same area.

Polished aggregates are smooth to the touch. Compare the feel of the surface with the adjacent non-traffic surfaces.

51 POLISHED AGG.

RAVELING (52)

Description

Raveling is the dislodging of coarse aggregate particles from the pavement surface.

Dense Mix Severity Levels

As used herein, coarse aggregate refers to predominant coarse aggregate sizes of the asphalt mix. Aggregate clusters refer to when more than one adjoining coarse aggregate piece is missing. If in doubt about a severity level, three representative areas of 1 square yard (1 square meter) each should be examined and the number of missing coarse aggregate particles counted.

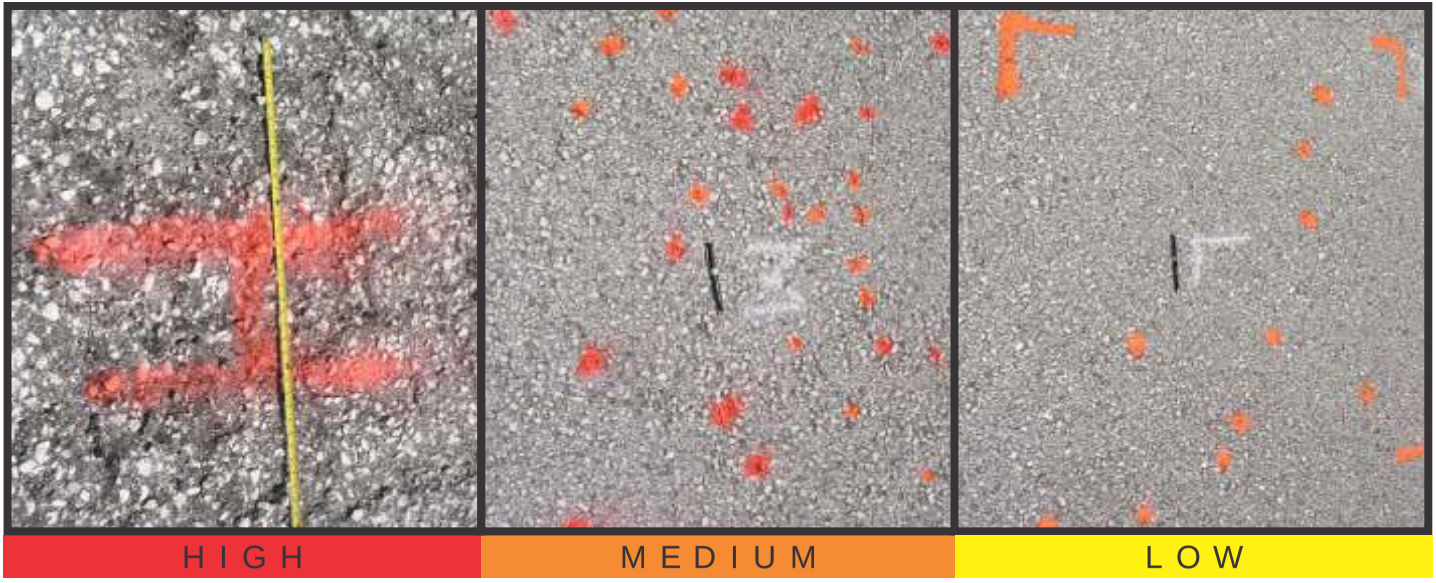
L — Low severity occurs if any one of these conditions exist: (1) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is between 5 and 20. (2) Missing aggregate clusters is less than 2 percent of the examined square yard (square meter) area. In low severity raveling, there is little or no FOD potential.

M — Medium severity occurs if any one of these conditions exist: (1) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is between 21 and 40. (2) Missing aggregate clusters is between 2 and 10 percent of the examined square yard (square meter) area. In medium severity raveling, there is some FOD potential.

H — High severity occurs if any one of these conditions exist: (1) In a square yard (square meter) representative area, the number of coarse aggregate particles missing is over 40. (2) Missing aggregate clusters is more than 10 percent of the examined square yard (square meter) area. In high severity raveling, there is significant FOD potential.

How To Measure

Raveling is measured in square feet (square meters) of surface area. Mechanical damage caused by hook drags, tire rims, or snowplows is counted as areas of high severity raveling.



52 RAVELING

RAVELING (52) (CONTINUED)

Slurry Seal/ Coal Tar Over Dense Mix Severity Levels

(1) The scaled area is less than 1 percent. (2) In the case of coal tar where pattern cracking has developed, the surface cracks are less than 1/4 inch (6 mm) wide.

(1) The scaled area is between 1 and 10 percent. (2) In the case of coal tar where pattern cracking has developed, the cracks are 1/4 inch (6 mm) wide or greater.

(1) The scaled area is over 10 percent. (2) In the case of coal tar the surface is peeling off.

How To Measure

Raveling is measured in square feet (square meters) of surface area. Mechanical damage caused by hook drags, tire rims, or snowplows is counted as areas of high severity raveling.


HIGH
MEDIUM
LOW

RAVELING (52) (CONTINUED)

Porous Friction Course Severity Levels

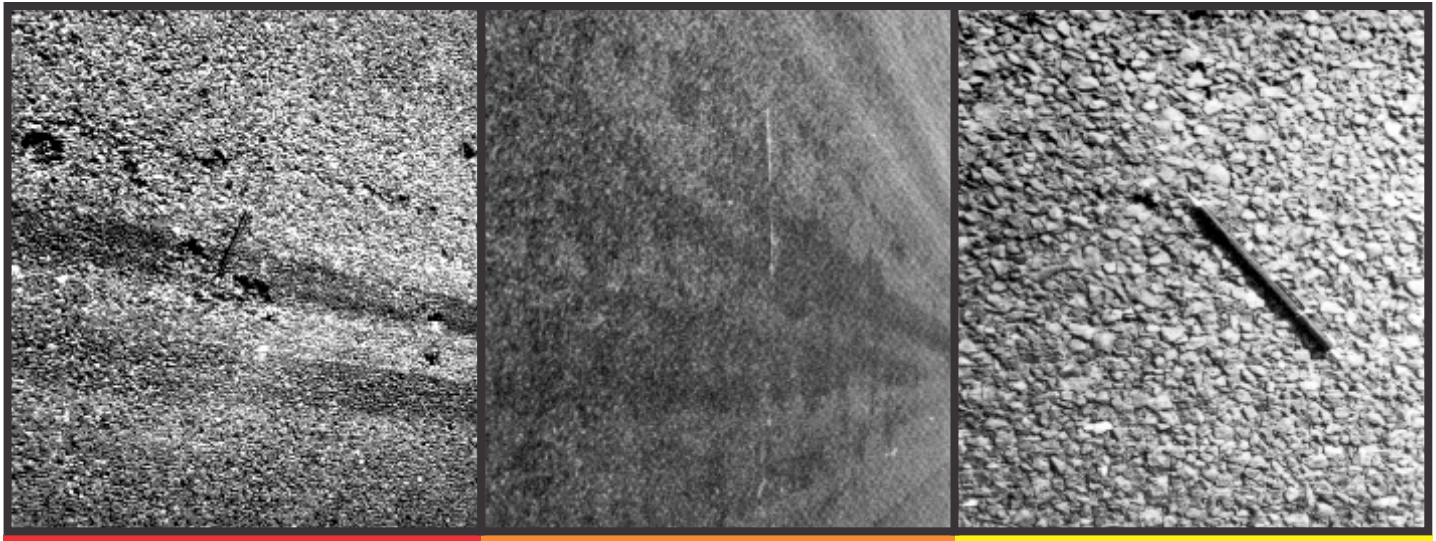
In a 1 square foot (1/10 square meter) representative sample, the number of aggregate pieces missing is between 5 and 20 and/ or the number of missing aggregate clusters does not exceed 1.

In a 1 square foot (1/10 square meter) representative sample, the number of aggregate pieces missing is between 21 and 40 and/ or the number of missing aggregate clusters is greater than 1 but does not exceed 25 percent of the area.

In a 1 square foot (1/10 square meter) representative sample, the number of aggregate pieces missing is over 40 and/ or the number of missing aggregate clusters is greater than 25 percent of the area.

How To Measure

Raveling is measured in square feet (square meters) of surface area. Mechanical damage caused by hook drags, tire rims, or snowplows is counted as areas of high severity raveling.


HIGH
MEDIUM
LOW

RUTTING (53)

Description

A rut is a surface depression in the wheel path. Pavement uplift may occur along the sides of the rut; however, in many instances ruts are noticeable only after a rainfall, when the wheel paths are filled with water. Rutting stems from a permanent deformation in any of the pavement layers or subgrade. It is usually caused by consolidation or lateral movement of the materials due to traffic loads. Significant rutting can lead to major structural failure of the pavement.

Severity Levels

Mean Rut Depth Criteria

Severity	All Pavement Sections
L	1/4 to 1/2 in. (6 to 13 mm)
M	1/2 to 1 in. (13 to 25 mm)
H	> 1 in. (> 25 mm)

How To Measure

Rutting is measured in square feet (square meters) of surface area, and its severity is determined by the depth of the rut. To determine the rut depth, a straightedge should be laid across the rut and the depth measured. The mean depth in inches (mm) should be computed from measurements taken along the length of the rut. If alligator cracking and rutting occur in the same area, each is recorded at its respective severity level.

53 RUTTING

SHOVING OF ASPHALT PAVEMENT BY PCC SLABS (54)

Description

PCC pavements occasionally increase in length at ends where they adjoin flexible pavements (commonly referred to as “pavement growth”). This “growth” shoves the asphalt or tar surfaced pavements, causing them to swell and crack. The PCC slab “growth” is caused by a gradual opening of the joints as they are filled with incompressible materials that prevent them from reclosing.

Severity Levels

As a guide, the swell table below may be used to determine the severity levels of shoving. At the present time, no significant research has been conducted to quantify levels of severity of shoving.

Shoving Criteria

Severity	Height Differential
L	< 3/4 in. (< 19 mm)
M	3/4 in. to 1 1/2 in. (19 mm to 38 mm)
H	> 1 1/2 in. (> 38 mm)

A slight amount of shoving has occurred, with little effect on ride quality and no breakup of the asphalt pavement.

A significant amount of shoving has occurred, causing moderate roughness or breakup of the asphalt pavement.

A large amount of shoving has occurred, causing severe roughness or breakup of the asphalt pavement.

How To Measure

Shoving is measured by determining the area in square feet (square meters) of the swell caused by shoving.

HIGH | MEDIUM | LOW

54 SHOVING

SLIPPAGE CRACKING (55)

Description

Slippage cracks are crescent or half-moon shaped cracks having two ends pointed in the direction of traffic. They are produced when braking or turning wheels cause the pavement surface to slide and deform. This usually occurs when there is a low strength surface mix or poor bond between the surface and next layer of pavement structure.

Severity Levels

No degrees of severity are defined. It is sufficient to indicate that a slippage crack exists.

How To Measure

Slippage cracking is measured in square feet (square meters) of surface area.

55 SLIPPAGE

SWELL (56)

Description

A swell is characterized by an upward bulge in the pavement's surface. A swell may occur sharply over a small area or as a longer, gradual wave. Either type of swell can be accompanied by surface cracking. A swell is usually caused by frost action in the subgrade or by swelling soil, but a small swell can also occur on the surface of an asphalt overlay (over PCC) as a result of a blowup in the PCC slab.

Severity Levels

L — Swell is barely visible and has a minor effect on the pavement's ride quality as determined at the normal aircraft speed for the pavement section under consideration. (Low severity swells may not always be observable, but their existence can be confirmed by driving a vehicle over the section at the normal aircraft speed. An upward acceleration will occur if the swell is present).

M — Swell can be observed without difficulty and has a significant effect on the pavement's ride quality as determined at the normal aircraft speed for the pavement section under consideration.

H — Swell can be readily observed and severely affects the pavement's ride quality at the normal aircraft speed for the pavement section under consideration.

How To Measure

The surface area of the swell is measured in square feet (square meters). The severity rating should consider the type of pavement section (i. e., runway, taxiway, or apron). For example, a swell of sufficient magnitude to cause considerable roughness on a runway at high speeds would be rated as more severe than the same swell located on the apron or taxiway where the normal aircraft operating speeds are much lower. The following guidance is provided for runways:

Swell Criteria

Severity	Height Differential
L	< 3/4 in. (< 19 mm)
M	3/4 to 1 1/2 in. (19 to 38 mm)
H	> 1 1/2 in. (> 38 mm)

WEATHERING (SURFACE WEAR) - DENSE MIX ASPHALT (57)

Description

The wearing away of the asphalt binder and fine aggregate matrix from the pavement surface.

Severity Levels

L — Asphalt surface beginning to show signs of aging which may be accelerated by climatic conditions. Loss of the fine aggregate matrix is noticeable and may be accompanied by fading of the asphalt color. Edges of the coarse aggregates are beginning to be exposed (less than 0.05 inches or 1 mm). Pavement may be relatively new (as new as 6 months old).

M — Loss of fine aggregate matrix is noticeable and edges of coarse aggregate have been exposed up to ¼ width (of the longest side) of the coarse aggregate due to the loss of fine aggregate matrix.

H — Edges of coarse aggregate have been exposed greater than ¼ width (of the longest side) of the coarse aggregate. There is considerable loss of fine aggregate matrix leading to potential or some loss of coarse aggregate.

How To Measure

Surface wear is measured in square feet (square meters). Surface wear is not recorded if medium or high severity raveling is recorded.

AIRFIELD
SURFACE WEAR
L
AIRFIELD
SURFACE WEAR
M
HIGH
MEDIUM
LOW

Pavement Condition Assessments

Pavement condition assessments may impact the reported capacity of an airfield and can make or break the mission for the operational community.

Pavement condition assessments are classified by AFCEC as 'Standard', 'Simplified' , or 'Cursory'.

Although the evaluation methods are similar, the number of sample units inspected and procedures used greatly influence the reliability of the results.

A 'Standard' pavement condition survey denotes an assessment that is conducted IAW ASTM D5340-11, *Standard Test Method for Airport Pavement Condition Index Surveys,* with an appropriate number of sampling units in order to achieve a 95% confidence level. This is generally required for project level pavement inspections.

A 'Simplified' pavement condition survey denotes an assessment that is also conducted primarily IAW ASTM D5340-11, but with a reduced number of sampling units, as outlined in the ASTM as the 'lesser sampling rate'. This will provide sufficient reliability for most contingency operations.

Pavement condition ratings reported in support of long term use (sustainment or permanent level evaluations) of the airfield should be determined using 'Standard' or 'Simplified' sampling methods and procedures.

A 'Cursory' pavement condition survey denotes an assessment in which the number of inspected sampling units fails to meet the minimum requirements in order to be considered either a 'Standard' or 'Simplified' pavement condition assessment. These are generally conducted to assess the suitability of the pavement surface for near term aircraft operations.

When 'Cursory' survey methods are used to determine and report the pavement condition, similarly to reports based upon a limited number of Dynamic Cone Penetrometer (DCP) tests, the evaluation should be considered an 'expedient' type evaluation and applicable only for limited and/or immediate use.

In most cases, the proposed mission and/or time available to perform the pavement assessment will determine the assessment method used.

Pavement Condition Index (PCI)

The results of a 'Standard' or 'Simplified' pavement condition assessment are reported as PCIs and Pavement Condition Ratings.

The PCI is a numerical scale (on a scale of 0 to 100 with 0 being the worst possible condition and 100 being the best possible condition) determined by a visual pavement survey, based on procedures in ASTM D5340-11, *Standard Test Method for Airport Pavement Condition IndexSurveys* .

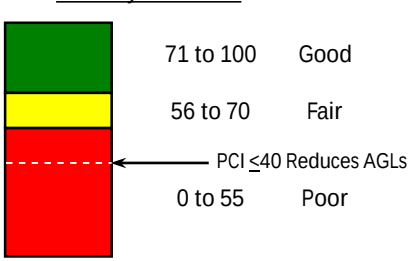
The Pavement Condition Rating is a verbal description of pavement condition as a function of the PCI value that varies from "failed" to "good".

Standard/Simplified PCI Scale

Color Code		PCI	Rating
Green		86 –100	Good
Bright Green		71 –85	Satisfactory
Yellow		56 –70	Fair
Rose		41 –55	Poor
Red		26 –40	Very Poor
Dark Red		11 –25	Serious
Light Gray		0 -10	Failed

The results of a 'Cursory' pavement condition assessment should be reported as a qualitative assessment of the pavement surface condition. If the results are to be presented in a tabular or map format, a 3-color scale should be used.

Cursory PCI Scale



The evaluator should narratively quantify the level of effort, and subsequent statistical reliability of pavement condition ratings reflected in evaluation reports.

When the pavement condition ratings that result from a 'Cursory' type pavement condition survey are listed and/or discussed in various sections, tables, and/or maps in the evaluation report, it should be clearly stated that they were estimated using cursory survey methods and were not determined using 'Standard' or 'Simplified' PCI procedures.

Regardless of the inspection method or assessment type used, the evaluator's most important task is to accurately identify and quantify the pavement distresses. Especially in contingency scenarios, one must consider the causes of the identified distresses and their impact on the structural or load-carrying capability of the pavement section. Specifically, if the assessment results in pavement condition rating of 'very poor' or below (PCI ≤ 40) its capability in terms of allowable gross load is reduced by 25%.

Particular attention should also be given to pavement distresses or other surface conditions that could present safety issues or cause operational limitations for the proposed mission aircraft; such as abrupt changes in surface elevation, pot holes or delaminations, ponding potential, excessive foreign object damage (FOD) material, or improper or inadequate surface repairs

Locations of the distresses in relation to the proposed aircraft operations are also significant. For example, one swell with an abrupt change in elevation located adjacent to the runway centerline could render the airfield unusable, while others located in areas that could be avoided during operations may have little or no impact. If a particular surface distress or condition indeed restricts or limits operations, its location and impact should be clearly addressed in the report.

Every evaluation is different, and ultimately it is up to the evaluator to exercise engineering judgment based upon the intended mission; keeping in mind that either the structural or surface condition can be of greater importance based upon the amount of time available for data collection.

Purpose of the Contingency PCI Survey

The purpose of a Pavement Condition Index (PCI) survey in contingency operations is three-fold.

First, a visual survey of the pavement surface can provide information on apparent structural integrity, operational condition, and projected performance to help identify potential pavement problems which would preclude aircraft operations.

Second, these ratings can impact the allowable gross load (AGL)or pass level computations . Specifically, if the feature is rated very poor (PCI of 40) or below, the AGLs will be reduced by 25 percent;

Third, the PCI ratings, with supporting photographs, if accomplished prior to contingency operations, will serve as a baseline to assess any pavement damage caused by aircraft ground operations. This is important in the determination of costs or liabilities associated with aircraft deployments.

A thorough inspection of the pavement sections should be performed and the distress types, quantities, and severity levels should be identified. The inspection procedures are taken primarily from ASTM D5340-11. The sections should then be assigned overall condition ratings. Emphasis should be placed on structural- or foreign object damage (FOD) related distresses.

PAVER and Field Inspector

Department of Defense (DOD) uses the computer based *PAVER* Pavement Maintenance Management System to manage M&R for its vast inventory of pavements. It uses inspection data and a PCI rating from zero (failed) to 100 (good) for consistently describing a pavement's condition and for predicting its M&R needs many years into the future.

PAVER software program provides pavement management capabilities to:

(1) Develop and organize the pavement inventory
(2) Assess the current condition of pavements
(3) Develop models to predict future conditions
(4) Reporton past and future pavement performance
(5) Develop scenarios for M&R based on budget or condition requirements
(6) Plan projects

Field Inspector is a computer tablet-based software application for collecting pavement distress data and calculating real-time PCIs.

In contingency scenarios where *PAVER* software and automated data collection tools, such as *Field Inspector,* are not available or appropriate, one must use manual inspection methods to determine the PCIs for pavement surfaces.

Performing the PCI Survey

Step 1. Divide the Airfield into Branches and Sections

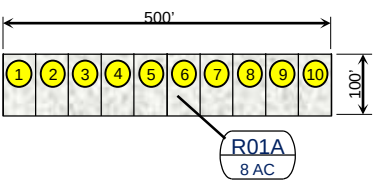
A branch is an identifiable part of the pavement network that is a single entity and has a distinct function. For example, runways, named taxiways, and apron areas are all separate branches.

A section is a subset of a branch. It is an area of pavement having a uniform pavement type, thickness, and condition; as well as the same pavement use, traffic type, construction history and subsurface layer structure.

Step 2. Subdivide Each Section into Sample Units

The deduct values prescribed in ASTM D5340-11 are based upon standard sample sizes. If one chooses to use sample sizes other than the standard sample sizes, then the distress densities must be adjusted.

The standard sample size for flexible pavements is a 5,000 contiguous ft^2 area ($\pm$ 2,000 ft^2 if the total area of the section is not evenly divisible by 5,000).



In this example, section R01A (500' x 100') is divided into 10 sample units, each containing 5,000 SF in area.

Step 3. Inspect Randomly Selected Sample Units

The sample units to inspect are determined by a systematic random sampling technique. This means that the samples are selected such that they are distributed evenly throughout the section. The selected samples should be typical of the overall condition of the section being surveyed. Don't just look for areas of higher distress. If some areas are significantly better or worse than the overall area, then the original section should perhaps be broken into multiple sections and the newsections given conditions ratings based upon those distresses actually contained in each respective section. A significant difference is a change in the PCI of 15 or more, which results in a different pavement condition rating.

No pavement section is entirely consistent. Also surfaces in one sample unit may not have all of the types of distress found in the pavement section. The objective is to rate the condition that represents the majority of the pavement section. Small or isolated conditions should not influence the PCI rating, but they may adversely impact operations. It is useful to note these special conditions in the report so this information can be used in planning specific improvement projects. For example, some spot repairs may be required.

For contingency pavement evaluations, if the randomly selected sample unit is not typical of the pavement section, another sample unit should be chosen instead. A non-representative sample unit may be one that has an unusual or isolated distress such as a utility cut.

A sufficient number of samples should be surveyed in each section to obtain confidence in the PCIs that will ultimately be assigned to the sections. For contingency evaluations, the minimum number of sample units to be surveyed is based upon the overall size of the section they represent. For a 'Simplified' PCI, the recommended minimum number of sample units to be surveyed based upon various section sizes are as follows:

Minimum Number of Samples to Survey

Section Size	Samples to Survey
1 to 5 Samples	1 Sample
6 to 10 Samples	2 Samples
11 to 15 Samples	3 Samples
16 to 40 Samples	4 Samples
> 40 Samples	10 %

In our example, section R01A contains 10 samples, so a minimum of two randomly selected sample areas should be surveyed.

One suggested method that can be used to select the sample units to inspect is:

a. Determine the number of sample units to inspect. In our example there are two samples to inspect.

b. Determine spacing interval by dividing the total number of samples contained in the pavement section by the number of samples to be inspected, and round to the next lowest whole number. In our example 10/2 = a spacing interval of 5.

c. Select the first sample unit to inspect at random, then use the spacing interval to evenly space the additional sample units to be inspected. The first sample selected for inspection should be a number between 1 and the determined spacing interval. In our example, a number between 1 and 5 should be selected, say 4.

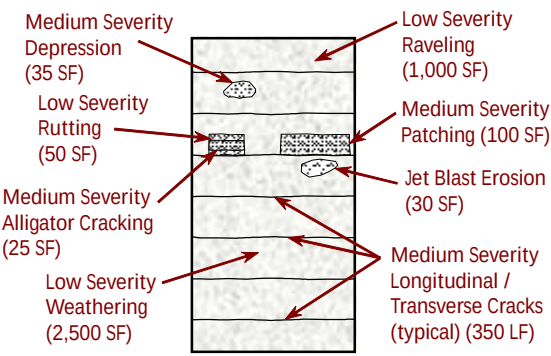
d. Select the remaining samples for inspection by using the calculated spacing interval. In our example, the second unit to inspect would be (4+5)=9.

Step 4. Determine Deduct Values for All Distresses

A thorough survey should be performed of each selected sample area noting all distress types found, along with their severity levels and densities.

In the evaluation of flexible pavements, the distresses and their resultant densities are determined in some cases by the length (in feet) of the distress and in other cases by the area (in square feet) covered by the distress. The density of each distress is determined by the calculating the percentage of the distress's measured quantity to the sample area size. If a given distress quantity is 250 LF in a standard 5,000 SF sample area, its density is recorded as 5%.

Example Sample Unit Inspection Results



5,000 SF Sample Area... Distresses

Distress Type	Severity	Density
Long./Trans. Cracks	Medium	350 LF = 7%
Depression	Medium	35 SF = 0.7%
Patching	Medium	100 SF = 2%
Weathering	Low	2,500 SF = 50%
Raveling	Low	1,000 SF = 20%
Rutting	Low	50 SF = 1%
Alligator Cracking	Medium	25 SF = 0.5%
Jet Blast Erosion	N/A	30 SF = 0.6%

Using the distress deduct value curves in ASTM D5340-11 or Table 1, Flexible Pavement (AC) Individual Distress Deduct Values, a deduct value should be determined for each distress type and severity level combination noted during the survey. List the deduct values in descending order.

5,000 SF Sample Area... Distresses

Distress Type	Severity	Density	Deduct Value
Long./Trans. Cracks	Medium	7%	29
Alligator Cracking	Medium	0.5%	23
Rutting	Low	1%	16
Raveling	Low	20%	14
Depression	Medium	0.7%	13
Patching	Medium	2%	13
Weathering	Low	50%	4
Jet Blast Erosion	N/A	0.6%	4

Step 5. Compute Total Deduct Value for Sample

The deduct values determined for all distresses noted in the sample area should be totaled to compute the total deduct value (TDV) for the sample. Adding the deduct values together for our example sample area would result in a TDV of 116.

Step 6. Determine Max Corrected Deduct Value

Determine *m*, the maximum allowable number of distress deduct values that can be used to calculate the PCI for the surveyed sample, using the 'M' Chart or following formula:

$$m = 1 + (9/95)(100\text{-}HDV)$$

HDV = highest individual deduct value

Note: This *m* number will always be equal to or less than 10.

In our example, the HDV is 29, so:

$$m = 1 + (9/95)(100\text{-}29) = 7.73$$

Our example sample had 8 identified distress deduct values. The first 7 deduct values can be used as calculated, but only 73% of the 8th deduct value can be used to determine the PCI.

If none or only one of the individual distress deduct values is greater than five, the total deduct value (TDV) is used to determine the PCI; otherwise, the maximum corrected deduct value (CDV) must be determined.

Enter the individual distress deduct values on line one of the chart below in descending order. Sum the deduct values and enter it under'TDV'. Count the number of individual distress deduct values greater than five and enter it under'q'.

Total Deduct Value

#	Deduct Values										TDV	q	CDV
1	29	23	16	14	13	13	4	3			115	6	
2													
3													
4													
5													
6													

Using the 'Corrected DVs for Flexible Airfield Pavements' chart in ASTM D5340-11 or Table 2, Corrected Deduct Values for Flexible (AC) Pavement Distresses determine the CDV. In our example, a TDV of 115 with a 'q' of 6 yields a CDV of 58.

Corrected Deduct Value

#	Deduct Values										TDV	q	CDV
1	29	23	16	14	13	13	4	3			115	6	58
2													
3													
4													
5													
6													

Copy the deduct values on current line onto the next line, changing the smallest deduct value greater than five to five, as shown. Repeat this process until 'q' = 1. Again, using the appropriate CDV chart, determine the CDV for each line. Compare the CDVs for each line. The Maximum CDV is the largest value in the 'CDV' column. In our example, 61.

Maximum Corrected Deduct Value

#	Deduct Values										TDV	q	CDV
1	29	23	16	14	13	13	4	3			115	6	58
2	29	23	16	14	13	5	4	3			107	5	55
3	29	23	16	14	5	5	4	3			99	4	52
4	29	23	16	5	5	5	4	3			90	3	57
5	29	23	5	5	5	5	4	3			79	2	55
6	29	5	5	5	5	5	4	3			61	1	61

Step 7. Compute PCI for Each Sample

A pavement sample area with no distresses has a PCI of 100. For any given pavement sample 100 – Maximum CDV = PCI.

In our example the reported PCI =(100 – 61)= 39, which results in a rating of "Very Poor". Because the PCI is $\leq$40, computed AGLs for this pavement section would be reduced by 25%.

Step 8. Compute PCI for Entire Section

The section PCI is determined by averaging the PCIs of all the samples surveyed in the section.

DEDUCT VALUE TABLES

Flexible Pavement (AC)
Individual Distress Deduct Values

	DISTRESS DENSITY %		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	2	3	4	5	6	7
41	ALLIGATOR CRACKING (SF)	L	7	9	12	13	15	16	18	19	20	21	27	31	34	36	37	39
		M	10	16	18	21	23	25	26	27	28	29	36	41	44	47	48	51
		H	16	23	25	28	30	32	33	34	36	37	45	50	54	58	61	64
42	BLEEDING (SF)	N/A	0	1	2	3	4	4	5	6	6	7	11	16	20	25	28	32
43	BLOCK CRACKING (SF)	L	5	5	6	6	6	7	7	7	7	8	9	11	12	13	14	15
		M	8	8	8	9	9	10	10	11	11	12	14	16	17	18	20	21
		H	10	11	13	14	15	16	17	17	18	19	24	28	31	34	36	37
44	CORRUGATION (SF)	L	2	3	4	5	6	7	7	8	8	9	14	17	20	22	24	26
		M	6	7	9	11	13	14	16	17	18	19	26	31	34	37	40	43
		H	11	16	19	23	25	27	28	30	31	33	42	47	52	55	58	61
45	DEPRESSION (SF)	L	0	1	1	2	3	3	4	5	6	7	12	15	17	19	22	23
		M	5	6	7	8	10	11	13	14	14	15	22	26	29	32	34	36
		H	12	16	17	19	21	22	23	24	25	26	32	36	40	43	45	47
46	JET BLAST EROSION (SF)	ANY	0	1	2	2	3	4	4	5	5	6	9	12	14	16	18	20
47	JOINT REFLECTIVE CRACKING (LF)	L	0	0	0	0	0	1	2	2	3	3	6	7	9	11	13	14
		M	0	1	3	4	4	5	6	7	8	9	16	21	25	28	31	34
		H	1	4	5	7	8	10	12	13	14	16	25	31	36	40	44	47
48	LONGITUDINAL AND TRANSVERSE CRACKING (LF)	L	3	3	3	3	4	4	4	4	5	5	7	9	12	14	16	18
		M	4	5	6	7	8	8	9	9	10	11	16	19	22	25	27	29
		H	7	9	11	13	14	15	16	17	18	19	27	33	36	40	43	46
49	OIL SPILLAGE (SF)	ANY	2	2	3	3	3	4	4	4	4	4	6	7	9	10	11	13
50	PATCHING AND UTILITY CUT (SF)	L	2	2	2	3	3	3	4	4	4	4	6	7	8	10	11	12
		M	7	7	7	7	8	8	8	9	9	10	13	15	17	19	22	23
		H	15	16	16	17	17	17	18	18	18	19	23	27	29	33	35	37
51	POLISHED AGGREGATE (SF)	ANY	2	2	2	2	2	2	3	3	3	3	6	7	9	11	13	13
52	RAVELING (SF)	L	2	2	2	2	2	3	3	3	3	3	4	6	7	7	8	8
		M	5	5	6	6	7	7	7	8	8	8	11	13	14	16	16	17
		H	7	8	9	10	11	12	13	14	15	16	25	33	39	43	45	48
53	RUTTING (SF)	L	9	10	11	12	13	14	14	15	15	16	18	21	23	24	25	26
		M	13	16	17	19	20	21	22	23	24	24	29	33	35	37	38	40
		H	19	24	26	27	29	30	32	33	34	35	41	45	49	52	54	56
54	(SF)	L	3	3	4	4	5	5	6	6	7	7	10	11	13	14	15	16
		M	6	7	8	10	11	12	13	14	14	15	20	23	25	27	28	30
		H	10	13	15	17	19	20	22	23	24	25	32	35	39	42	44	45
55	SLIPPAGE CRACKING (SF)	ANY	5	6	7	8	8	9	9	10	11	12	19	26	31	35	39	43
56	SWELL (SF)	L	2	2	2	2	3	3	3	3	3	4	6	7	9	11	13	14
		M	10	11	12	12	13	13	13	14	14	14	17	20	23	25	27	29
		H	28	29	30	31	32	32	33	33	33	33	37	42	45	47	49	52
57	WEATHERING (SF)	L	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		M	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4	4
		H	3	4	5	6	7	7	7	8	8	8	11	13	15	16	17	18

Flexible Pavement (AC) Individual Distress Deduct Values											
8	9	10	20	30	40	50	60	70	80	90	100
41	42	43	51	56	60	64	66	68	70	73	74
53	54	56	66	72	75	77	79	81	82	83	84
66	68	71	84	90	94	96	97	98	99	100	100
35	38	40	51	57	60	62	64	65	66	67	67
16	16	17	21	24	26	28	30	32	33	34	35
22	23	24	29	33	37	40	43	46	49	52	55
39	40	42	51	57	61	65	68	72	74	76	78
27	28	29	39	46	50	55	58	63	66	69	72
45	47	48	61	70	77	84	88	95	100	100	100
64	66	68	83	93	100	100	100	100	100	100	100
25	26	27	36	41	46	49	53	56	58	60	62
37	39	40	51	58	64	67	72	76	78	82	85
48	50	52	63	70	76	80	85	88	92	95	97
22	24	25	35	38	39	40	41	41	42	42	42
14	15	16	22	25	27	29	31	32	33	34	34
35	36	38	47	52	55	57	58	60	61	62	63
50	53	55	68	76	81	84	87	88	91	92	93
20	22	24	33	38	41	44	46	47	48	49	50
32	34	36	50	56	61	64	67	68	70	72	73
49	51	54	69	77	84	87	90	94	95	96	97
14	15	17	24	26	26	27	27	28	28	28	28
13	14	15	21	25	27	30	32	34	36	37	38
25	26	27	38	46	51	55	59	63	65	67	70
39	41	43	56	66	74	80	86	90	94	97	100
14	16	17	25	30	34	38	41	44	46	48	50
9	10	10	14	17	19	21	22	24	25	26	27
18	19	20	28	35	40	44	47	50	54	55	57
50	52	53	61	65	66	68	68	69	70	70	70
27	28	28	35	38	42	44	46	47	48	49	50
42	43	44	52	57	62	65	68	71	74	76	79
58	60	62	74	83	89	95	99	100	100	100	100
17	18	19	24	28	30	32	34	35	36	38	39
32	33	34	41	46	49	53	55	58	60	62	64
47	49	50	60	67	72	75	78	82	84	86	88
46	48	52	66	71	74	75	77	78	78	79	80
15	16	17	25	30	34	36	39	42	44	45	46
31	33	34	45	52	57	61	65	68	70	73	75
54	55	56	68	76	84	88	93	97	100	100	100
2	2	2	3	3	4	4	4	5	5	5	6
5	5	6	8	12	13	15	16	17	18	19	20
20	22	23	29	34	38	43	46	49	52	55	57

Corrected Deduct Values for Flexible (AC) Pavement Distresses						
Total Deduct Values (TDV)	q = Number of distresses with deduct values greater than 5					
	1	2	3	4	5	6
1	1					
2	2					
3	3					
4	4					
5	5					
6	6					
7	7					
8	8					
9	9					
10	10					
11	11	4				
12	12	5				
13	13	6				
14	14	6				
15	15	7				
16	16	8				
17	17	9	5			
18	18	9	5			
19	19	10	6			
20	20	11	7			
21	21	11	8			
22	22	12	8			
23	23	13	9			
24	24	14	10			
25	25	14	10	5		
26	26	15	11	6		
27	27	16	12	7		
28	28	17	13	7		
29	29	17	13	8		
30	30	18	14	9		
31	31	19	15	9		
32	32	19	16	10		
33	33	20	16	11		
34	34	21	17	12		
35	35	22	18	12		
36	36	22	18	13		
37	37	23	19	14		
38	38	24	20	15		
39	39	25	21	15		
40	40	25	22	16		
41	41	26	22	17		
42	42	27	23	18		
43	43	28	24	18		
44	44	28	24	19		
45	45	29	25	20		
					1 of 4	

Corrected Deduct Values for Flexible (AC) Pavement Distresses						
Total Deduct Values (TDV)	q = Number of distresses with deduct values greater than 5					
	1	2	3	4	5	6
46	46	30	26	20		
47	47	31	27	21		
48	48	31	27	22		
49	49	32	28	22		
50	50	33	29	23		
51	51	34	30	24		
52	52	35	31	25		
53	53	35	31	25		
54	54	36	32	26		
55	55	37	33	27		
56	56	38	34	27		
57	57	38	35	28		
58	58	39	36	28		
59	59	40	36	29		
60	60	41	37	30		
61	61	41	37	31		
62	62	42	38	31		
63	63	43	38	32		
64	64	44	39	32		
65	65	44	40	33		
66	66	45	41	34		
67	67	46	41	34		
68	68	47	42	35		
69	69	47	43	35		
70	70	48	43	36		
71	71	49	44	37		
72	72	50	45	38		
73	73	51	46	38		
74	74	52	46	39		
75	75	52	47	39		
76	76	53	48	40		
77	77	54	48	41		
78	78	55	49	41		
79	79	55	50	42		
80	80	56	51	42		
81	81	57	51	43		
82	82	57	52	43		
83	83	58	53	44		
84	84	59	54	44		
85	85	60	54	45		
86	86	60	55	46		
87	87	61	55	46		
88	88	62	56	47		
89	89	62	56	47		
90	90	63	57	48		
					2 of 4	

Corrected Deduct Values for Flexible (AC) Pavement Distresses						
Total Deduct Values (TDV)	q = Number of distresses with deduct values greater than 5					
	1	2	3	4	5	6
91	91	64	57	48		
92	92	64	58	49		
93	93	65	59	49		
94	94	66	59	50		
95	95	66	60	50		
96	96	67	60	51	51	51
97	97	68	61	51	51	51
98	98	68	61	52	52	52
99	99	69	62	52	52	52
100	100	69	63	53	53	53
101		70	63	53	53	53
102		71	64	54	53	53
103		71	64	54	54	54
104		72	65	55	54	54
105		73	65	55	54	54
106		73	66	56	55	55
107		74	66	56	55	55
108		74	67	57	56	56
109		75	67	57	56	56
110		76	68	58	57	56
111		76	68	58	57	57
112		77	69	59	58	57
113		78	69	59	58	58
114		78	70	60	59	58
115		79	70	60	59	58
116		79	71	61	60	59
117		80	72	61	60	59
118		81	72	62	61	60
119		81	73	62	61	60
120		82	73	63	62	61
121		82	74	63	62	61
122		83	74	64	62	61
123		83	75	64	63	62
124		84	75	64	63	62
125		84	76	65	63	62
126		85	76	65	64	63
127		86	77	66	64	63
128		96	77	66	65	63
129		87	78	67	65	64
130		87	78	67	66	64
131		88	78	68	66	64
132		89	79	68	66	65
133		90	80	68	67	65
134		90	80	69	67	65
135		91	81	69	67	66

Corrected Deduct Values for Flexible (AC) Pavement Distresses						
Total Deduct Values (TDV)	q = Number of distresses with deduct values greater than 5					
	1	2	3	4	5	6
136		91	81	70	68	66
137		92	81	70	68	66
138		92	82	71	69	67
139		92	82	71	69	67
140		93	83	72	70	67
141		93	83	72	70	68
142		93	84	73	71	68
143		93	84	73	71	68
144		94	85	73	71	69
145		94	85	74	72	69
146		95	85	74	72	70
147		95	86	74	72	70
148		96	86	75	73	70
149		96	87	75	73	71
150		97	87	76	74	71
151		97	88	76	74	71
152		97	88	76	74	71
153		98	88	77	75	72
154		98	89	77	75	72
155		99	89	77	75	72
156		99	90	78	76	73
157		100	90	78	76	73
158		100	90	78	76	73
159		101	91	79	77	74
160		101	91	79	77	74
161		102	92	80	77	74
162		102	92	80	78	74
163		103	93	81	78	75
164		103	93	81	78	75
165		103	93	81	78	75
166		104	94	82	79	75
167		104	94	82	79	76
168		104	94	82	79	76
169		105	95	82	79	76
170		105	95	83	80	76
171			95	83	80	77
172			96	83	80	77
173			96	83	80	77
174			97	84	80	77
175			97	84	81	78
176			97	84	81	78
177			98	85	81	78
178			98	85	82	78
179			98	85	82	78
180			98	85	82	79
					4 of 4	

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