

Standard Nomenclature  
and Definitions  
for  
Pavement Components  
and Deficiencies



Special Report 113  
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Special Report 113

# Standard Nomenclature and Definitions for Pavement Components and Deficiencies

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Washington, D.C.

1970

**Standard Book Number 309-01802-1**

**Price: \$1.20**

**Available from**

**Highway Research Board  
National Academy of Sciences  
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Washington, D.C. 20418**



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## FOREWORD

If individuals involved in pavement management processes are to communicate fully, they must use terms that have the same meaning. The purpose of this report is to foster the establishment of standard nomenclature and definitions for describing pavement conditions. These are intended for use by engineers, educators, administrators, inspectors, and others concerned with pavement distress and decision-making related to traffic safety and pavement rehabilitation.

The first chapter of the report lists and defines general terms related to pavement features, defects, components, and characteristics. The recommended term is shown as nomenclature, and other commonly used terms are shown as synonyms. The same format is used in Chapters 2 and 3 to categorize the most common defects of flexible and rigid pavements respectively, except that deficiencies are illustrated with photographs and drawings. The illustrations are included to enable an inspector to readily identify the deficiency and to convey his findings to those responsible for making basic pavement decisions by simply entering the nomenclature on the inspection report.

Sources used by the subcommittee, appointed to prepare this report, include established definitions of the American Association of State Highway Officials and recommendations by engineers and technical personnel in a number of state highway departments, the Asphalt Institute, the Portland Cement Association, and the military offices of the Department of Defense.

Recommendations and suggestions for expanding or improving the material in this report are invited. They should be addressed to the Highway Research Board for referral to the Committee on Pavement Condition Evaluation. Cooperation of all concerned with pavement management is necessary in standardizing the terminology that will ensure complete and effective understanding.

The committee gratefully acknowledges the valuable contribution of time and effort of the Subcommittee on Standard Nomenclature and Definitions. Members of this subcommittee included A. B. Moe, chairman, A. W. Maner, and F. P. Nichols, Jr.



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# GENERAL TERMS AND DEFINITIONS

The following terms and definitions are recommended for use in describing features, defects, components, and characteristics of pavement systems. The recommended standard term is shown under nomenclature, and other frequently used terms are shown under synonyms. An asterisk denotes a definition of the American Association of State Highway Officials. Figure 1 shows a cross section of a typical roadway on which this nomenclature appears.

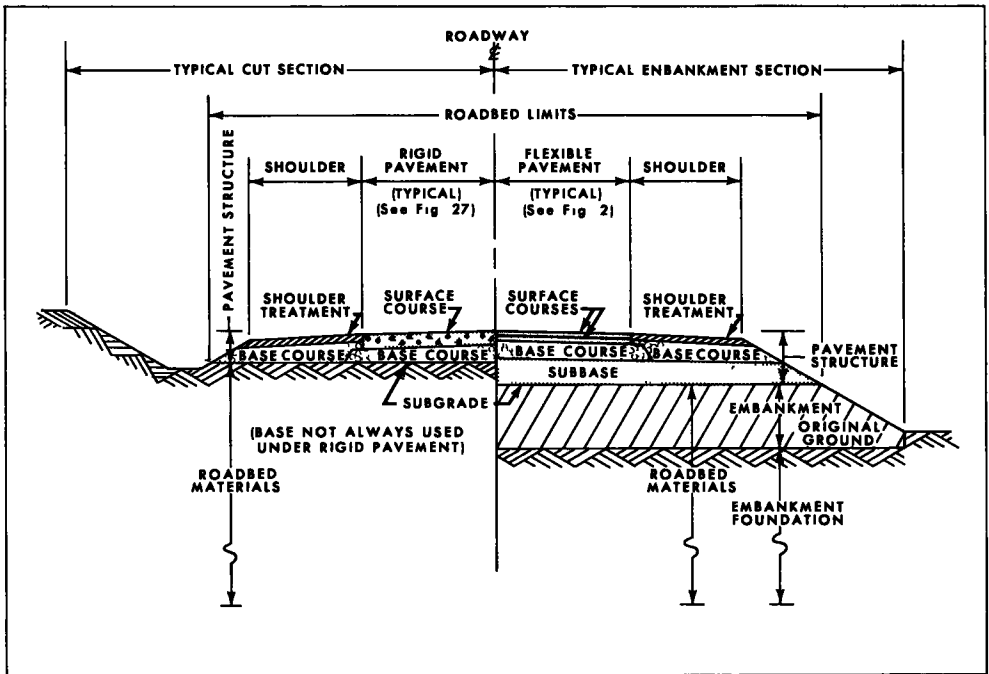


Figure 1 Typical roadway cross section.



## PAVEMENT FEATURES

nomenclature profile  
 synonym none  
 definition The line of intersection of a vertical plane and the surface of the pavement; the outline or silhouette of the pavement surface.

nomenclature texture  
 synonym none  
 definition The appearance or character of the surface of a pavement that depends on the size, shape, arrangement, and distribution of the aggregates and cement or binder. A dense, smooth surface would have a fine texture; an open surface would have a coarse texture. The term rough or roughness should not be used for coarse texture (see roughness). Irregularities in the surface such as potholes, grooves, or rim cuts are not textures. Coarseness of concrete surface caused by screeding, brooming, or dragging is texture.

## PAVEMENT DEFECTS

nomenclature aggregate, polished  
 synonym none  
 definition Aggregate that has a low coefficient of friction as a result of traffic action or natural causes.

nomenclature distortion  
 synonym none  
 definition Any deviation in the pavement surface from its original shape.

nomenclature distress  
 synonym none  
 definition Any indication of poor or unfavorable pavement performance or signs of impending failure; any unsatisfactory performance of a pavement short of failure.

nomenclature failure  
 synonym none  
 definition Unsatisfactory performance of a pavement or portion thereof such that it can no longer serve its intended purpose.

nomenclature roughness  
 synonym none  
 definition Irregularities in the pavement surface that adversely affect riding quality of the vehicle. See texture.

nomenclature stripping  
 synonym none  
 definition Separation of bituminous films from aggregate particles in the presence of moisture.

#### PAVEMENT STRUCTURE AND ROADBED COMPONENTS

nomenclature base course  
 synonym base  
 definition \*The layer or layers of specified or selected material of designed thickness placed on a subbase or a subgrade to support a surface course.

nomenclature embankment  
 synonym fill  
 definition \*A structure of soil, soil-aggregate, or broken rock between the embankment foundation and the subgrade.

nomenclature roadbed  
 synonym foundation  
 definition \*The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulder.

nomenclature roadbed material  
 synonym basement soil  
 definition \*The material below the subgrade in cuts and embankments and in embankment foundations extending to such depth as affects the support of the pavement structure.

nomenclature pavement, flexible  
 synonym none  
 definition \*A pavement structure that maintains intimate contact with and distributes loads to the subgrade and depends on aggregate interlock, particle friction, and cohesion for stability.

nomenclature pavement, rigid  
 synonym none  
 definition \*A pavement structure that distributes loads to the subgrade having as one course a portland cement concrete slab of relatively high bending resistance.



nomenclature	<u>pavement structure</u>
synonym	pavement
definition	*The combination of subbase, base course, and surface course placed on a subgrade to support the traffic load and distribute it to the roadbed.
nomenclature	<u>selected material</u>
synonym	select material
definition	*Suitable native material obtained from roadway cuts or borrow areas or other similar material used for subbase, roadbed material, shoulder surfacing, slope cover, or other specific purposes.
nomenclature	<u>stabilization</u>
synonym	none
definition	*Modification of soils or aggregates by incorporating materials that will increase load bearing capacity, firmness, and resistance to weathering or displacement.
nomenclature	<u>subbase</u>
synonym	none
definition	*The layer or layers of specified or selected material of designed thickness placed on a subgrade to support a base course.
nomenclature	<u>subgrade</u>
synonym	none
definition	*The top surface of a roadbed on which the pavement structure and shoulders including curbs are constructed.

#### PERFORMANCE CHARACTERISTICS

nomenclature	<u>performance</u>
synonym	none
definition	measure of the accumulated service provided by a pavement, i. e., the adequacy with which a pavement fulfills its purpose.
nomenclature	<u>performance index</u>
synonym	none
definition	Summary of present serviceability indexes over a time period. Abbreviation PI.
nomenclature	<u>present serviceability index</u>
synonym	none
definition	Numerical index of the ability of a pavement in its present condition to serve traffic. Abbreviation PSI.

**nomenclature** service life

**synonym** none

**definition** A period of time over which a pavement performs its design purpose.

**nomenclature** serviceability

**synonym** none

**definition** Ability of a pavement to serve traffic with safety and comfort and with a minimum of detrimental effects to either vehicle or pavement.

## FLEXIBLE PAVEMENT DEFICIENCIES

In order to facilitate recognition of flexible pavement deficiencies, the most common signs of distress are illustrated and described in this chapter. When a condition is recognized from an illustration, the descriptive term shown under nomenclature will identify the deficiency. Figure 2 shows a cross section of a typical flexible pavement.

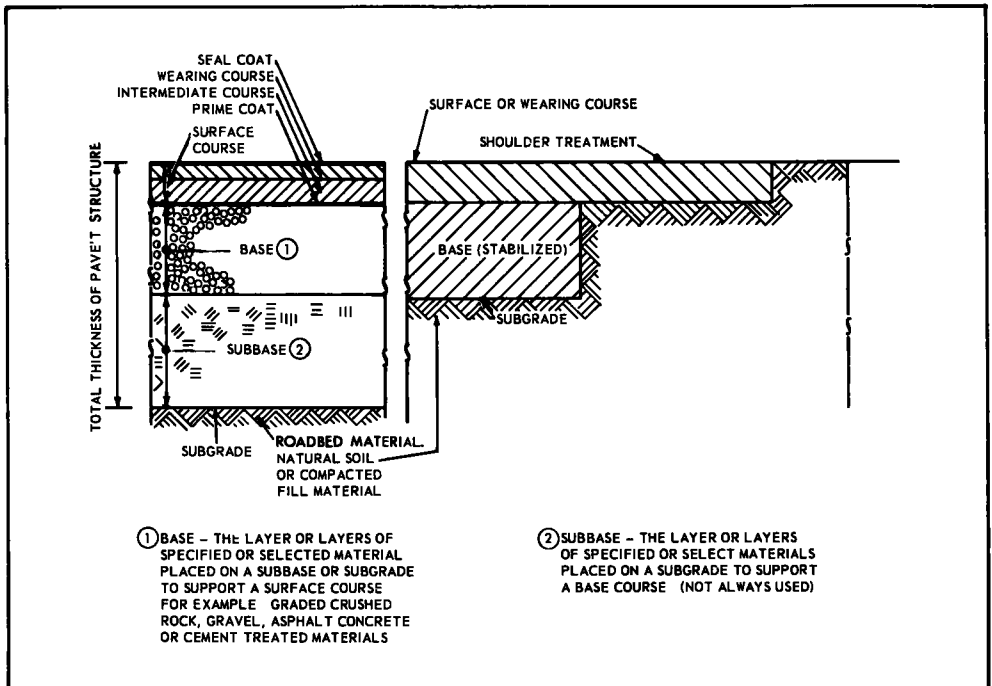


Figure 2. Typical flexible pavement cross section



Figure 3

nomenclature	<u>abrasion</u>
synonym	none
description	Scuffing of the wearing course.
probable cause	Equipment blades, dragging chains, tire chains, or bulldozer cleats. Damage from tractor lugs or wheel rim cuts are indentations (Fig. 19).



Figure 4

nomenclature	<u>blast erosion</u>
synonym	none
description	Deep erosion or scouring of a pavement in which a portion of structure is lost.
probable cause	Continued jet blast impinging on the pavement; the effect of the combination of heat and blast of sufficient duration to char and blow away the pavement material.



Figure 5

nomenclature	<u>bleeding</u>
synonym	flushing
description	Free bitumen on the surface of the pavement.
probable cause	Excess bitumen; rich application of bitumen with insufficient blotter; in joints, excessive amounts of asphalt cement or tar.

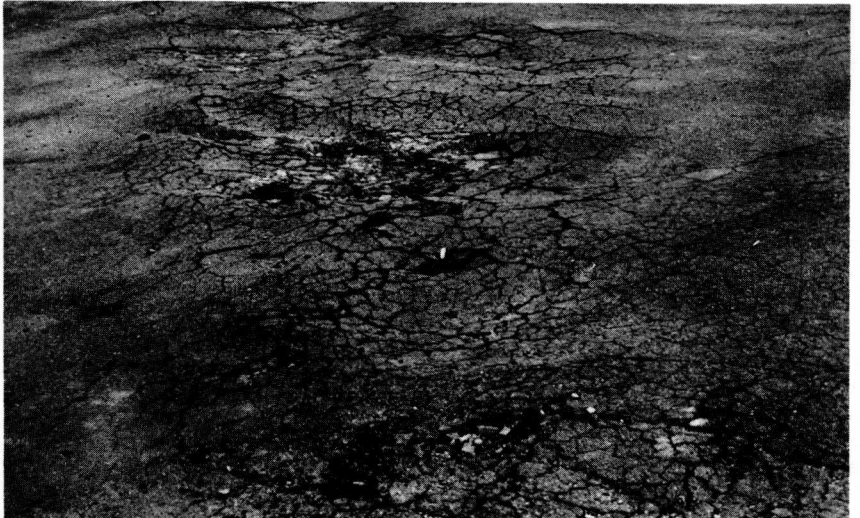


Figure 6

nomenclature	<u>bump</u>
synonym	none
description	Localized upward displacement of the pavement.
probable cause	Frost heave or upward thrust of ice forming under the pavement; bulging of a soft pavement from shoving; swelling of high clay content base, subbase, or roadbed materials caused by the absorption of moisture.

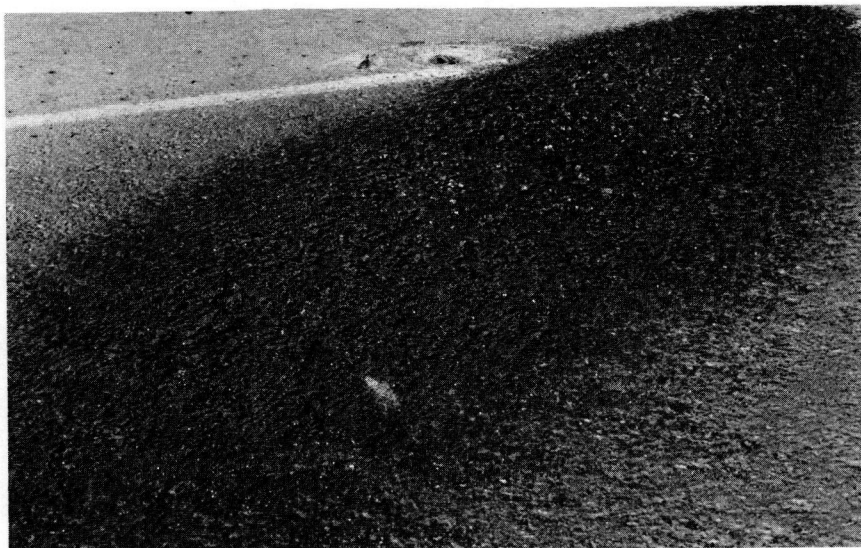


Figure 7

nomenclature char

synonym burn

description Charred surface in which bitumen has been lost or carbonized.

probable cause Hot jet blast that strikes the pavement close to the jet tail pipe for short periods.



Figure 8

nomenclature corrugation

synonym wash board

description Transverse undulations at regular intervals in the surface of the pavement consisting of alternate valleys and crests less than 2 feet apart.

probable cause Traffic action on an unstable pavement or on a pavement over an unstable roadbed; surface course too soft to resist shoving.



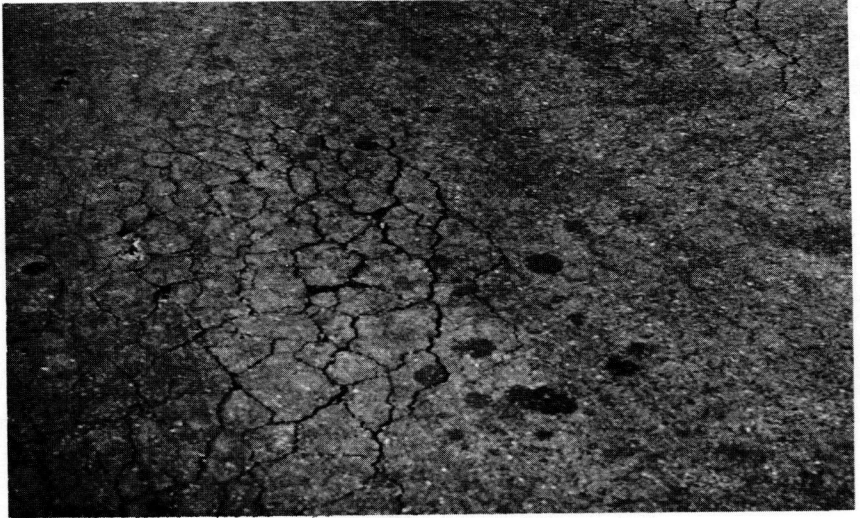


Figure 9

- nomenclature cracking, alligator
- synonym alligating; map cracking
- description Interconnected or interlaced cracks forming a series of small polygons that resemble an alligator's hide.
- probable cause Generally, unstable base or roadbed; weakening of pavement caused by embrittlement over a resilient foundation.



Figure 10

- nomenclature cracking, block
- synonym map cracking
- description Interconnected cracks forming a series of large polygons usually with sharp corners or angles.
- probable cause Hardening and shrinkage of the asphalt; roadbed becoming unstable. Unless corrected, block cracking may increase until it becomes alligatored as a result of water entering the roadbed and decreasing its stability.



Figure 11

nomenclature	<u>cracking, contraction</u>
synonym	shrinkage cracking
description	Horizontal separation of a pavement overlay.
probable cause	Shrinkage of the surface course with a possible loss of bond with the underlying layer; loss of flexibility of the surface course.



Figure 12

nomenclature	<u>cracking, edge</u>
synonym	none
description	Longitudinal cracking near the edge of the pavement.
probable cause	Inadequate thickness of the pavement to support traffic; vertical settlement or lateral displacement of embankment or both if there are no traffic loads.



Figure 13

nomenclature	<u>cracking, longitudinal</u>
synonym	none
description	A crack or break approximately parallel to the pavement centerline.
probable cause	Cold or improperly constructed joint between pavement sections; reflection of underlying joint; settlement of roadbed under traffic; possibly shrinkage of surface course or insufficient pavement thickness.



Figure 14

nomenclature	<u>cracking, reflection</u>
synonym	none
description	Cracking of a resurface or overlay above underlying cracks or joints.
probable cause	Movement of underlying pavement, or lack of bridging over underlying cracks or joints; possibly shrinkage of underlying layer.





Figure 15

nomenclature	<u>cracking, slippage</u>
synonym	crescent crack
description	Half-moon or crescent-shaped cracks in the direction of traffic.
probable cause	Soft asphalt surface course shoved and torn by braking wheels or from starting wheel thrusts; unstable sand mix surface course.



Figure 16

nomenclature	<u>cracking, transverse</u>
synonym	none
description	A crack approximately at right angles to the pavement centerline.
probable cause	Shrinking of the surface courses or pavement structure and possibly traffic action; reflection of cracks under the surface course or insufficient pavement thickness.



Figure 17

nomenclature	<u>depression</u>
synonym	bird bath
description	Localized pavement areas at an elevation lower than that of the adjacent paved areas or of the design elevation.
probable cause	Subsidence of the roadbed or compression of the roadbed materials; settlement of improperly compacted fill in trenches or patched roadbeds.

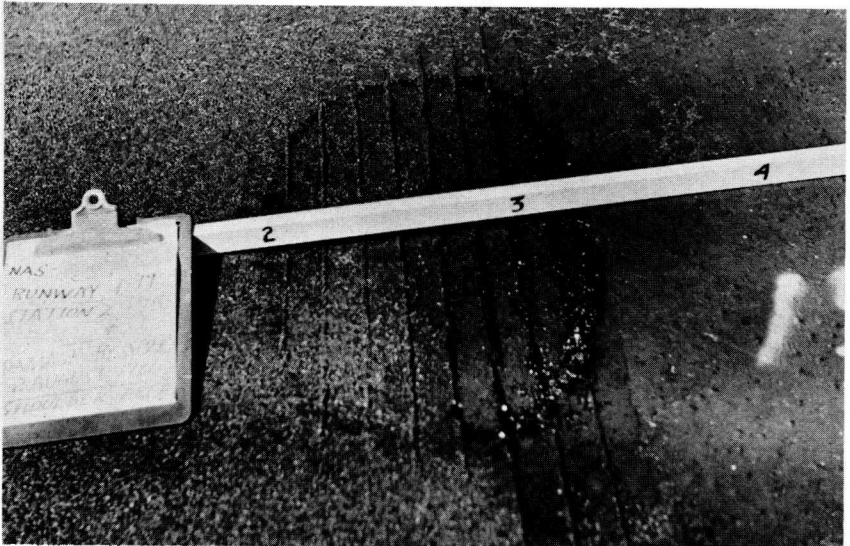


Figure 18

nomenclature	<u>imprint</u>
synonym	none
description	Localized impression in the pavement surface.
probable cause	A tire or other objects standing on a soft pavement surface.

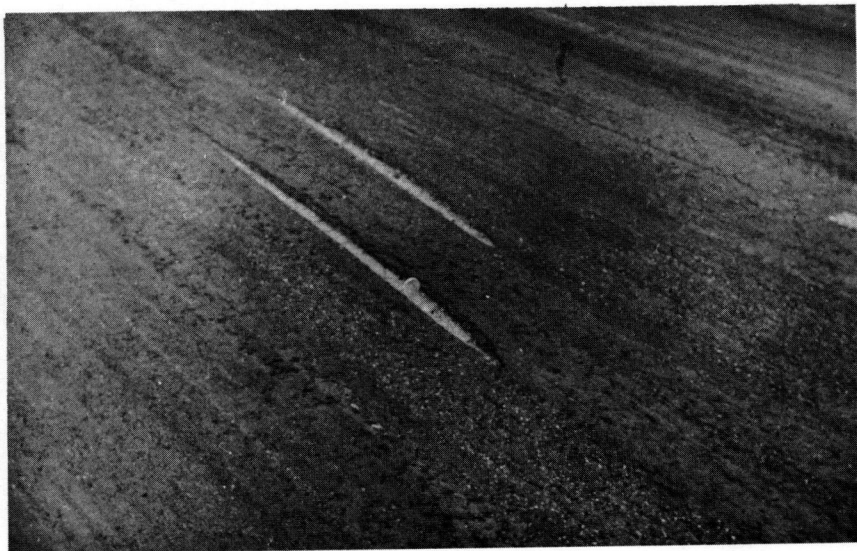


Figure 19

nomenclature	<u>indentation</u>
synonym	scarring
description	Shearing of or indenting the surface.
probable cause	Wheel rims of blown tires, tractor cleats, sharp rimmed metal wheels, or sharp objects dragged over the surface.



Figure 20

nomenclature	<u>pothole</u>
synonym	chuckhole
description	Bowl-shape holes of various sizes in the pavement.
probable cause	Small, localized disintegration or failure of the pavement from traffic over weakened spots on the surface.





Figure 21

**nomenclature** raveling  
**synonym** surface disintegration  
**description** The progressive disintegration from the surface downward by the dislodgement of aggregate particles.  
**probable cause** Uneven distribution of bitumen from the spray bar; insufficient bitumen or binding agent in the surface; traffic action on a weak surface.

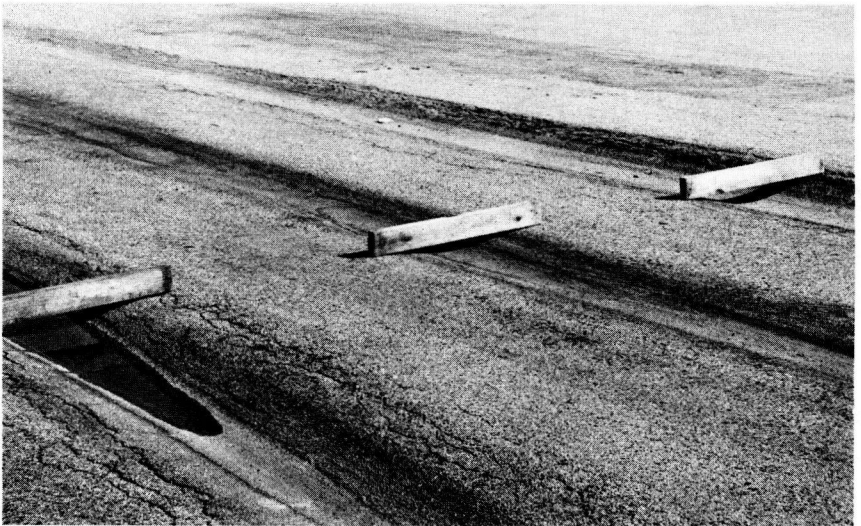


Figure 22

**nomenclature** rutting  
**synonym** grooving; channeling  
**description** Longitudinal depressions that form under traffic in the wheel paths and have a minimum length of approximately 20 ft.  
**probable cause** Localized and channeled wheel traffic over unstable pavement or foundation; traffic heavier than the design strength of the pavement structure.

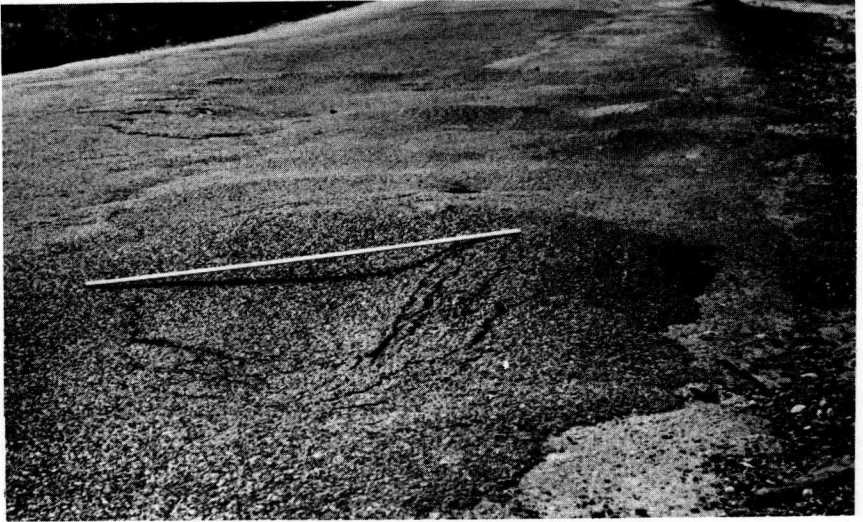


Figure 23

nomenclature	<u>shoving</u>
synonym	none
description	Displacement or bulging of paving material in the direction of loading or pressure.
probable cause	Surface course that is too soft to resist the horizontal pressure and that has a poor bond with the underlying pavement.



Figure 24

nomenclature	<u>streaking</u>
synonym	none
description	Alternate lean and heavy lines of bitumen running parallel to the pavement centerline.
probable cause	Clogged nozzles or improperly adjusted nozzles of the spray bar of the bitumen distributor during sealcoating.



Figure 25

nomenclature waves  
synonym none  
description Longitudinal or transverse undulations in the surface of the pavement, consisting of alternate valleys and crests approximately 2 ft or more apart.  
probable cause Contour of the roadbed or subsidence of the roadbed or base. A runway with waves is detrimental to aircraft operations.



Figure 26

nomenclature weathering  
synonym none  
description Gradual disintegration of the pavement wearing surface, increasing the texture and exposing more and more of the aggregates.  
probable cause Drying out or loss of bitumen caused by climatic conditions.

## RIGID PAVEMENT DEFICIENCIES

In order to facilitate recognition of rigid pavement deficiencies, the most common signs of distress are illustrated and described in this chapter. When a condition is recognized from an illustration, the descriptive term shown under nomenclature will identify the deficiency. Figure 27 shows a cross section of a typical rigid pavement.

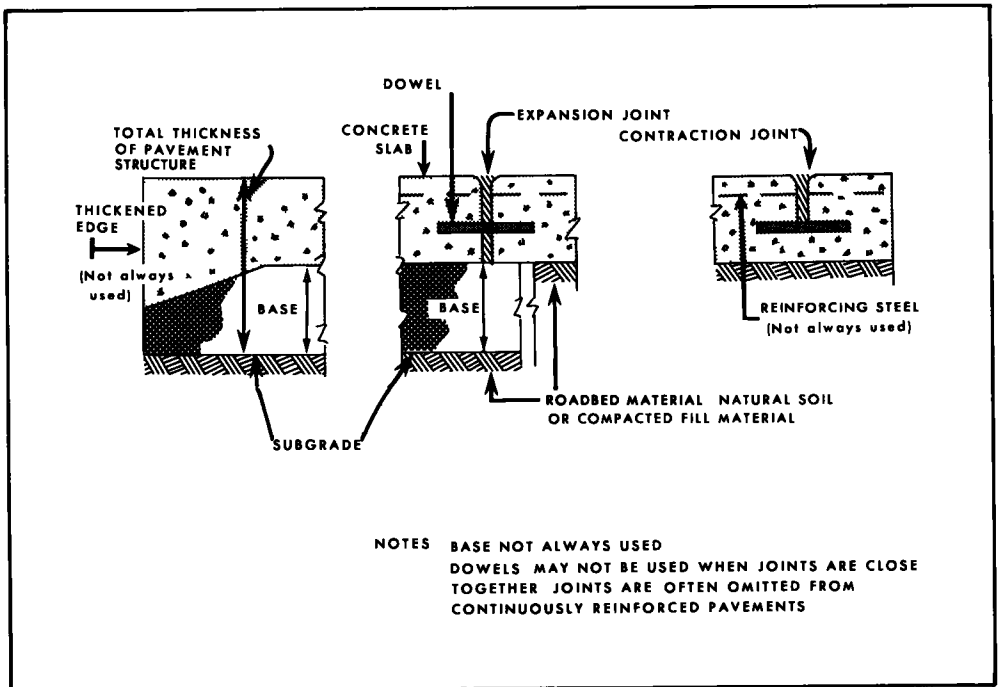


Figure 27. Typical rigid pavement cross section.



Figure 28

**nomenclature** blow-up, buckling  
**synonym** tenting  
**description** Localized upward buckling of the slab occurring usually at a transverse crack or joint.  
**probable cause** Excessive expansion of the slab with insufficient joint width; joints fouled with incompressible material preventing the joint from serving its purpose.



Figure 29

**nomenclature** blow-up, shattering  
**synonym** none  
**description** Localized shattering of the slab occurring usually at a transverse crack or joint.  
**probable cause** Excessive expansion of the slab with insufficient joint width; joints fouled with incompressible material preventing the joint from serving its purpose.





Figure 30

nomenclature	<u>cracking, corner</u>
synonym	corner break
description	A break in a pavement at the corner of the slab near the juncture of the transverse joint and longitudinal joint or slab edge.
probable cause	Overloading the pavement slabs at or near the corners; an unstable foundation or voids formed because of loss of foundation material under the slab.

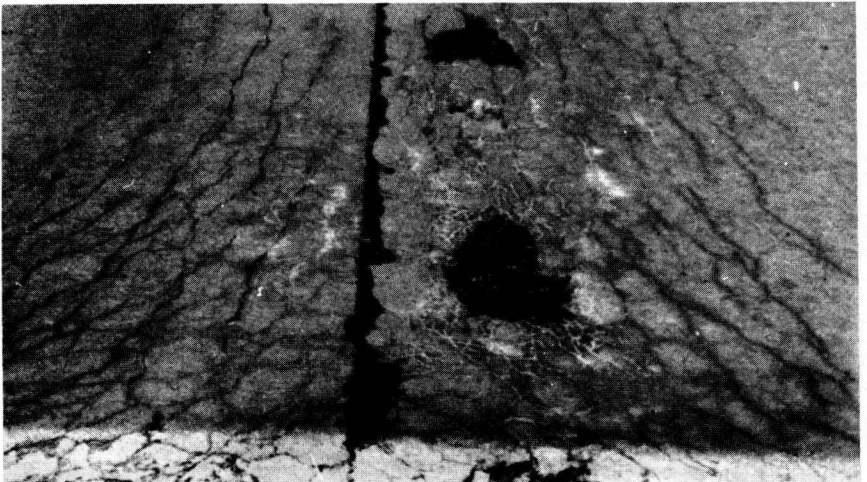


Figure 31

nomenclature	<u>cracking, D</u>
synonym	none
description	A series of fine, hairline crescent-shaped cracks in the concrete surface usually paralleling a joint or major crack and usually curving across slab corners.
probable cause	Causes are still under study but generally attributed to freeze-thaw cycles and peculiar aggregate pore structure.





Figure 32

nomenclature cracking, diagonal  
synonym none  
description A crack similar to a corner crack except that the fracture extends diagonally across the end of the slab.  
probable cause Overloading at the slab ends; insufficient thickness of pavement or lack of support from the roadbed.



Figure 33

nomenclature cracking, longitudinal  
synonym none  
description A crack or break approximately parallel to the pavement centerline.  
probable cause Lateral contraction; lateral movement and settlement of the roadbed; possibly lateral bending or curling.



Figure 34

nomenclature	<u>cracking, random</u>
synonym	none
description	Unrestrained, or uncontrolled, irregular break or separation of the slab.
probable cause	Overloading of unreinforced concrete slab; inadequate roadbed support.

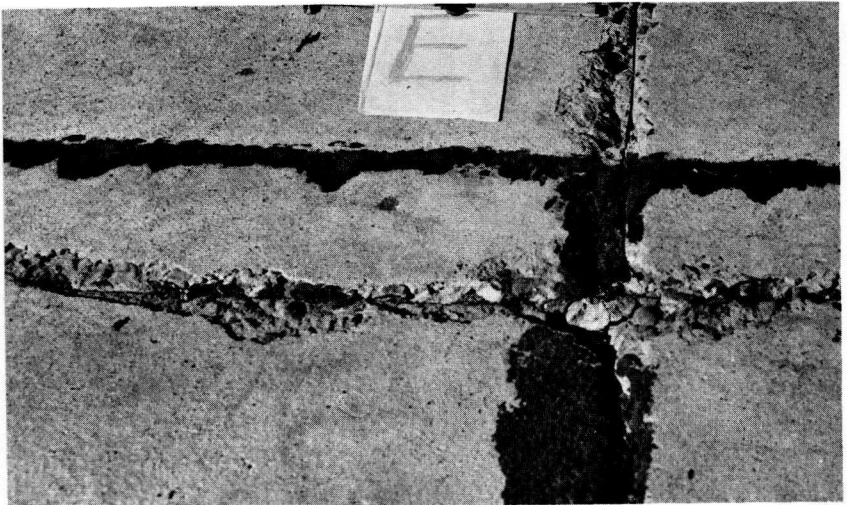


Figure 35

nomenclature	<u>cracking, second stage</u>
synonym	none
description	Transverse crack developing a short distance from the transverse joint, generally at the end of the joint dowels.
probable cause	Impact on the edge of a slab past the joint at or near the ends of the dowels on poorly supported slabs; loss of base or roadbed support at the slab ends from pumping or other causes; frozen load transfer dowels.

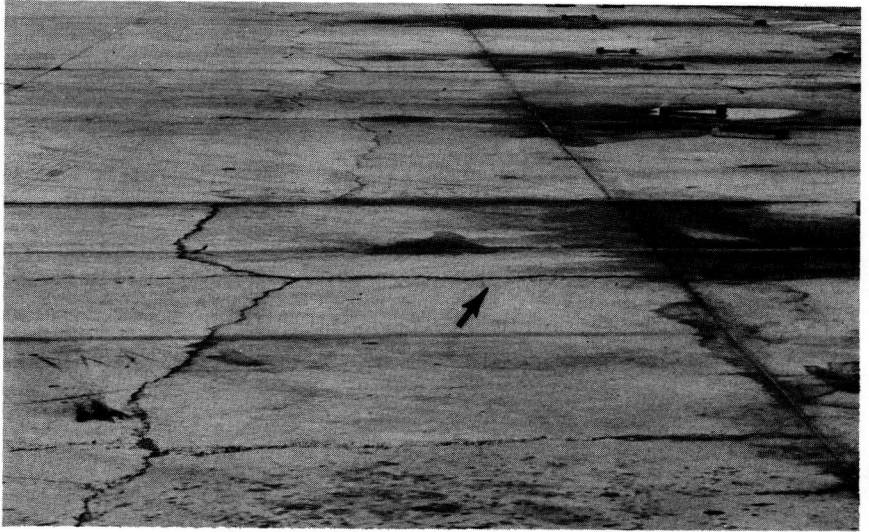


Figure 36

nomenclature	<u>cracking, third stage</u>
synonym	none
description	Longitudinal crack developing between the second stage crack and the transverse joint and also between other cracks and joints.
probable cause	Continued application or repetition of heavy loads on a poorly supported slab.



Figure 37

nomenclature	<u>cracking, transverse</u>
synonym	none
description	A crack or break approximately at right angles to the pavement centerline.
probable cause	Insufficient contraction joints or weakened plane joints; overloading an upward curled slab having inadequate roadbed support.

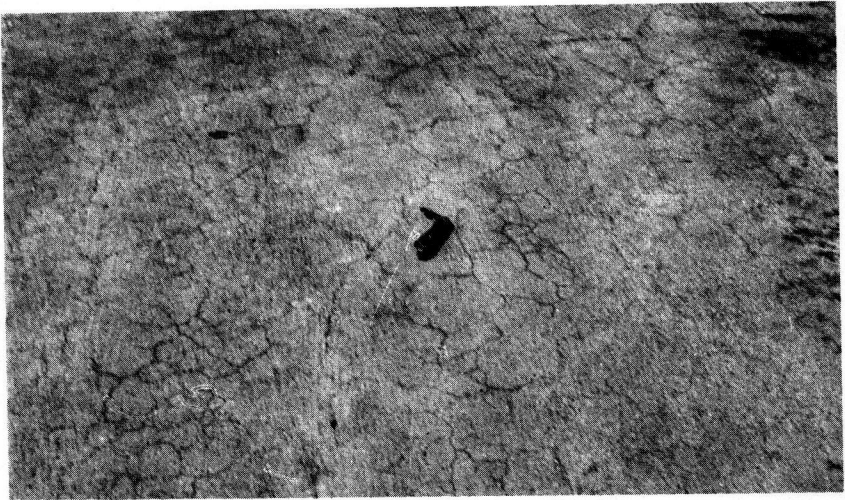


Figure 38

nomenclature	<u>crazing</u>
synonym	none
description	Fine, hairline cracks apparently extending only through the surface layer and tending to intersect at an angle of approximately 120 deg forming a chicken-wire pattern.
probable cause	Weak surface of the slab caused by excessive finishing; possibly rich mortar in surfacing.

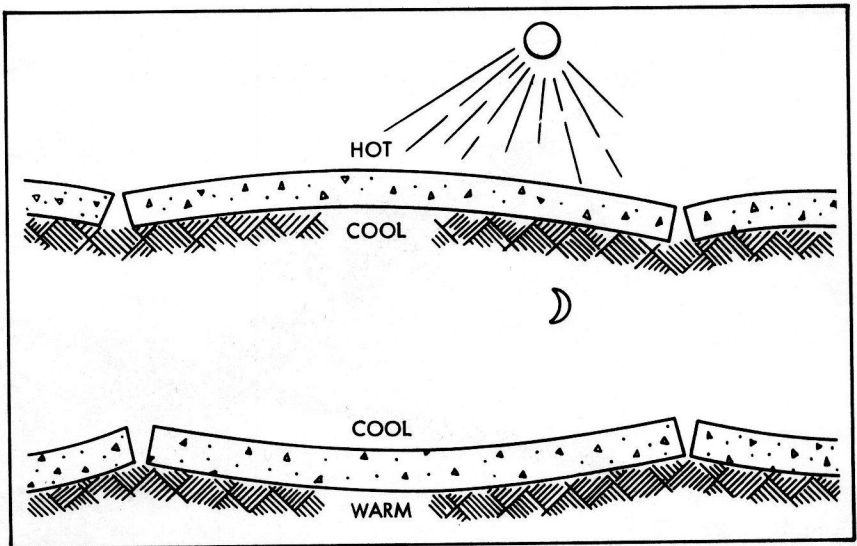


Figure 39

nomenclature	<u>curling</u>
synonym	bending; warping
description	Slab bending.
probable cause	Uneven expansion or contraction of the top and bottom slab surfaces caused by differences in temperature above and below the slab or differences in moisture conditions between these surfaces.





Figure 40

nomenclature

faulting

synonym

step-off; step

description

Differential vertical displacement of abutting slabs at joints or cracks creating a "step" deformation in the pavement surface.

probable cause

One slab settling more than the adjacent slab; uneven roadbed support under the slabs; heaving of one of the slabs. Faulting often occurs at the junction of a rigid and a flexible pavement.

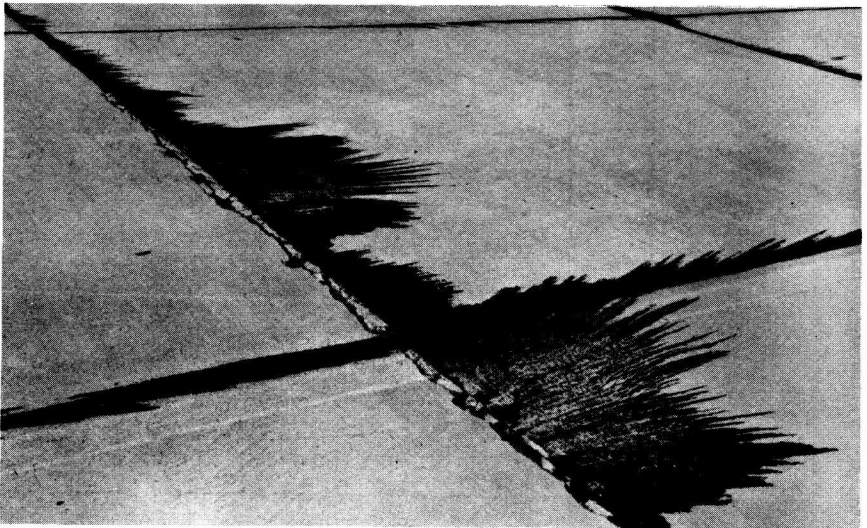


Figure 41

nomenclature

joint blast damage

synonym

none

description

Joint material softened and blown out of the joint.

probable cause

Heat and blast from jet aircraft moving slowly or standing near a joint.

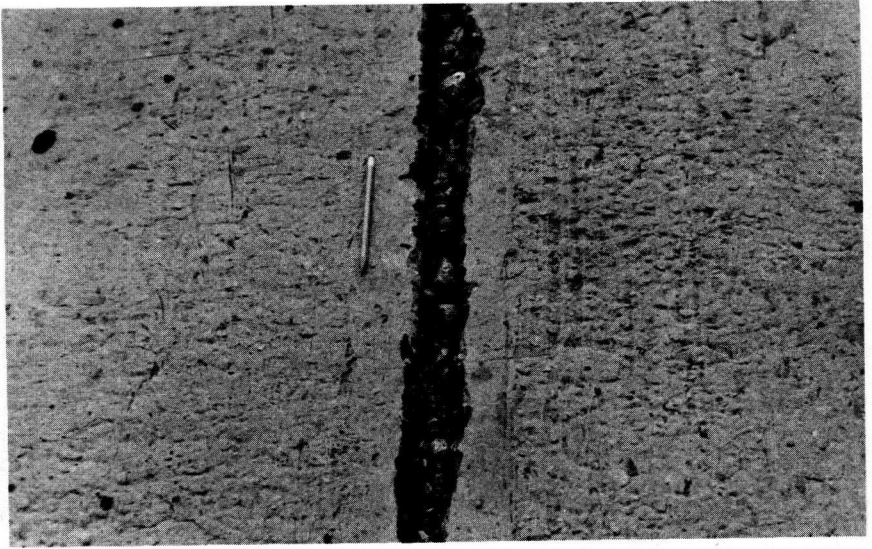


Figure 42

nomenclature	<u>joint failure</u>
synonym	none
description	Broken or crushed slab edges.
probable cause	Joints fouled by incompressible materials tending to prohibit slab expansion.



Figure 43

nomenclature	<u>joint filler extrusion</u>
synonym	none
description	Joint filler protruding above joint edges.
probable cause	Poor adhesion between joint filler and slab edges; too much material in the joint; joint too narrow to take care of slab expansion; improper application of joint filler.





Figure 44

nomenclature	<u>joint stripping</u>
synonym	none
description	Joint filler coming out of the joint.
probable cause	Lack of adhesion to the joint edges; incompatible joint material; contaminated joint edges from previously used joint filler.



Figure 45

nomenclature	<u>pumping</u>
synonym	none
description	The ejection of mixtures of water, clay, or silt along or through transverse or longitudinal joints, cracks, or pavement edges.
probable cause	Insufficient support from water-saturated bases or roadbeds. When a load is imposed on the slab, it is depressed onto the saturated material underneath, squeezing the water and fines out through the joints and cracks or from under the slab.

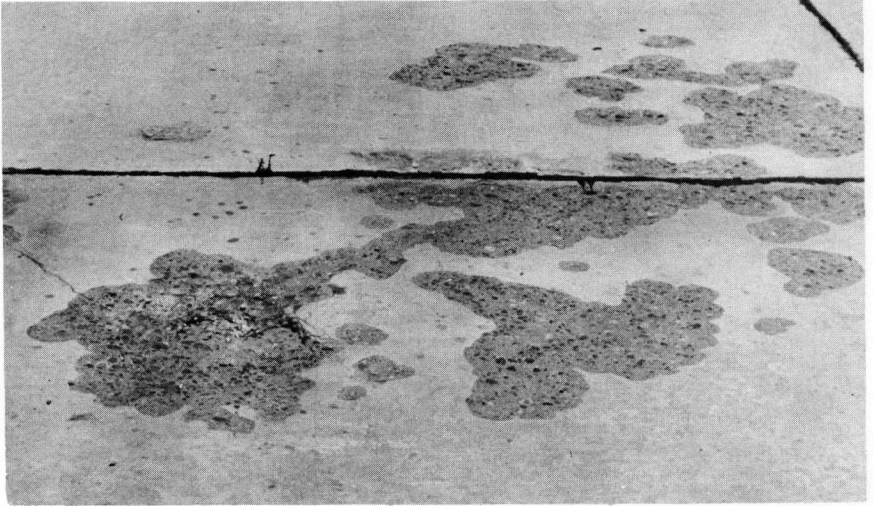


Figure 46

nomenclature	<u>scaling</u>
synonym	none
description	Progressive disintegration and loss of the concrete wearing surface.
probable cause	Eroding of the surface by reaction from de-icing materials; repetitive freezing and thawing cycles or weakened surface caused by overfinishing.

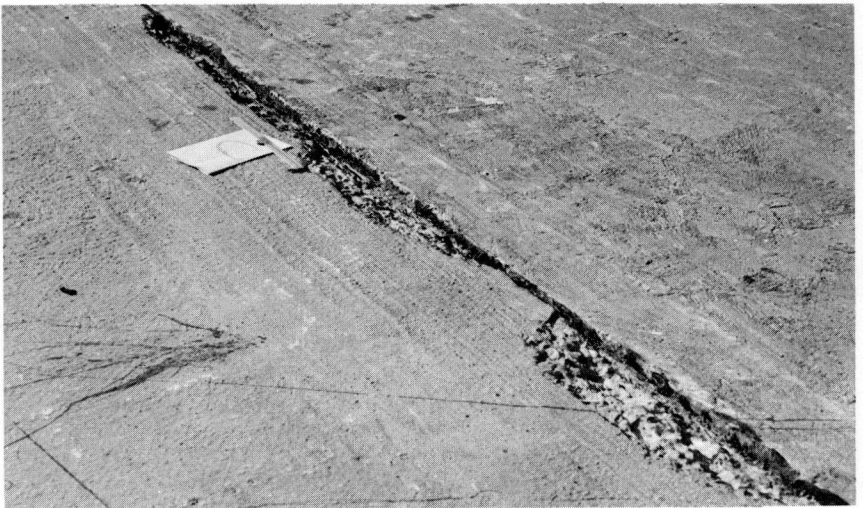


Figure 47

nomenclature	<u>spalling</u>
synonym	none
description	Breakdown or disintegration of slab edges at joints or cracks or directly over reinforcing steel, usually resulting in the removal of sound concrete.
probable cause	Breakdown of pavement joint edges from traffic action and progressive destruction of the surface adjacent to this damage; possibly weakening of this surface caused by overfinishing of the slab at the joint.



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