Faculty of Engineering
Department of Civil Engineering

Maintenance of transportation networks
by Prof. Mahmoud Enieb

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Distresses in Rigid Pavements

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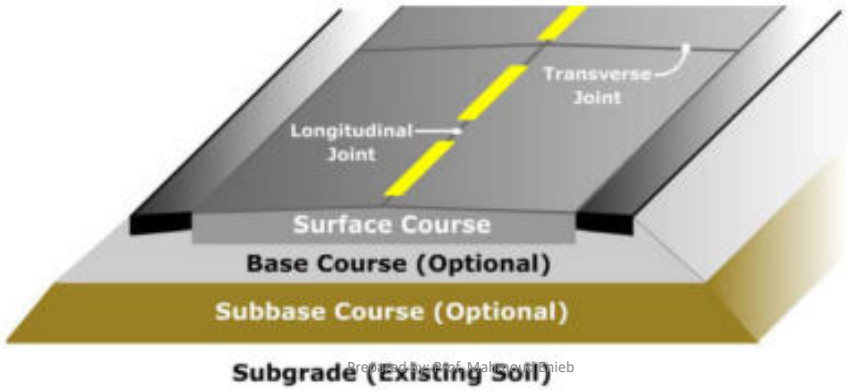
Rigid Pavement

- The wearing surface of a rigid pavement usually is constructed of Portland cement concrete such that it acts like a beam over any irregularities in the underlying supporting material



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AIRFIELD CONCRETE PAVEMENTS
CONDITION SURVEY DATA SHEET FOR SAMPLE UNIT

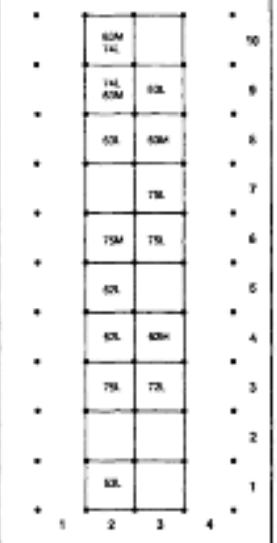
BRANCH 83220 SECTION B03 SAMPLE UNIT 205
SURVEYED BY MYS DATE MM/YY/RD NUMBER OF SLABS 20

Distress Types

01. Blow up
03. Corner Break
03. Long/Trans/Diagonal Crack
04. Durability Crack
08. Joint Seal Damage
09. Patching, S or F
07. Patching/Utility Cut
08. Popouts
09. Pumping
10. Scaling/Map Cracking/Crazing
11. Settlement/Fault
12. Shattered Slab
13. Shrinkage Cracks
14. Spalling-Joints
15. Spalling-Corner

DIST TYPE	SEV	NO. SLABS	DENSITY %	DEDUCT VALUE
05	H			12
02	L	2	10	7.8
02	M	1	5	8.8
03	L	3	15	11.8
03	M	3	20	24.2
12	L	1	5	11.0
15	L	2	10	3.5
15	L	3	15	8.8
15	M	1	5	3.8

SKETCH:



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- **1 – Cracking of pavement**. شروخ الرصف
- **2 – Surface Distortion تشوه السطح**
- **3 – Slippery Surface سطح زلق**
- **4 – Disintegration التفكك**

5

1 – Cracking of concrete pavement

A. Punchout.
B. Map cracking / Crazing / Scaling
C. Linear cracking (longitudinal, Transverse, and Diagonal cracks)
D. Durability ("D") Cracking
E. Divided Slab
F. Corner Break

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A. Punchout الشروخ البلوكية الانكماشية

- *Description.*
- This distress is a localized area of the slab that is broken into pieces. The punchout can take many different shapes and forms, but it is usually defined by a crack and a joint, or two closely spaced cracks (usually 5 ft [1.52 m] wide).

- This distress is caused by heavy repeated loads, inadequate slab thickness, loss of foundation support, and/or a localized concrete construction deficiency.

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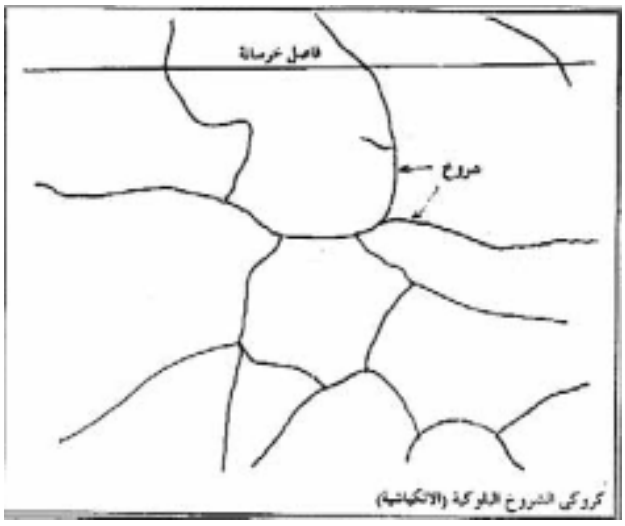
Sketch Punchout

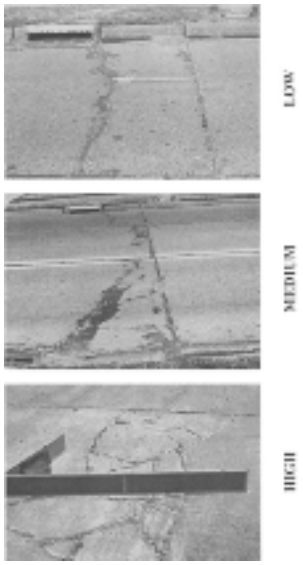


8

Punchout Severity Levels

Table C-3. Levels of Severity for Punchouts.

Severity of Majority of Cracks	Number of Pieces		
	2 to 3	4 to 5	>5
L	L	L	M
M	L	M	H
H	M	H	H



Options for Repair
L—Do nothing; Seal cracks.
M—Full-depth patch.
H—Full-depth patch
How to Measure: no of slaps

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Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 slabs low, 6 slabs medium, Punchout distress type. Determine deduct value for distress.

15
63
48
40

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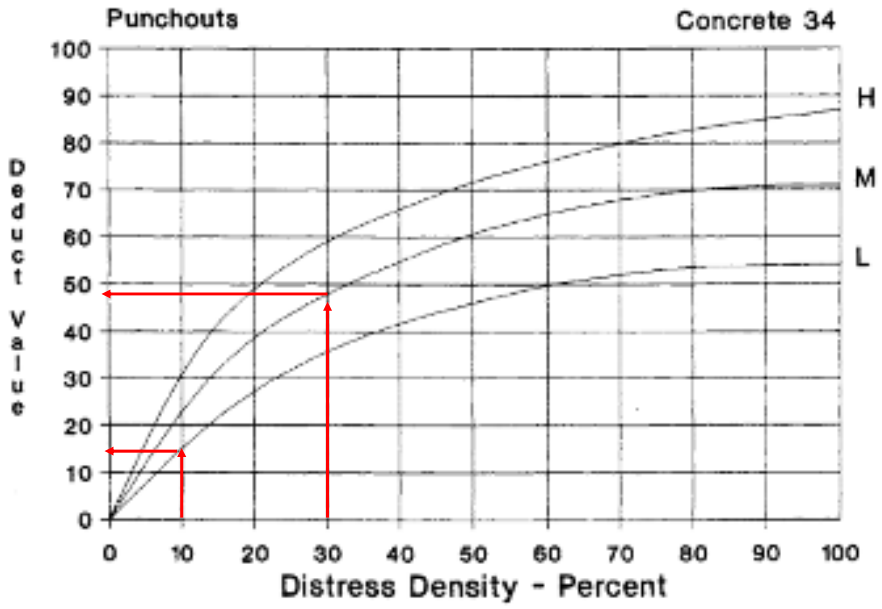

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B. Map cracking / Crazing / Scaling الشروخ السطحية

- *Description.*
- Map cracking or crazing refers to a network of shallow, fine, or hairline cracks that extend only through the upper surface of the concrete. The cracks tend to intersect at angles of 120 degrees. Map cracking or crazing is usually caused by concrete over-finishing, and may lead to surface scaling, which is the breakdown of the slab surface to a depth of approximately 1/4 to 1/2 in. (6 to 13 mm).
- Scaling may also be caused by deicing salts ذوبان الاملاح, improper construction انشاء غير سليم , freeze thaw cycles, and poor aggregate.

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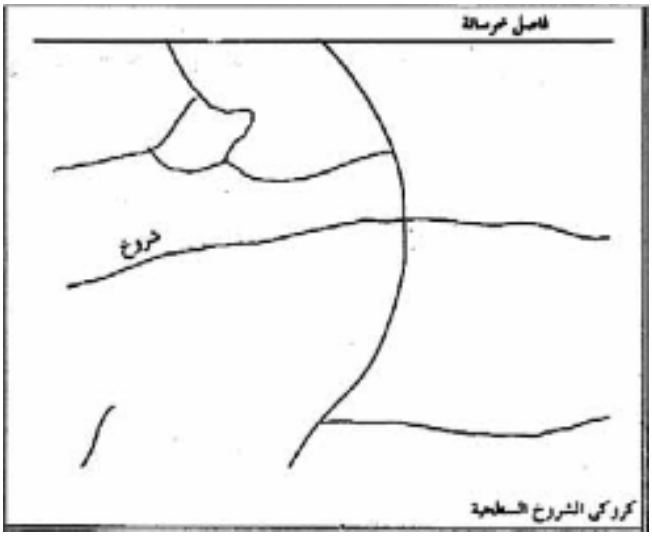
Sketch Map cracking / Crazing / Scaling



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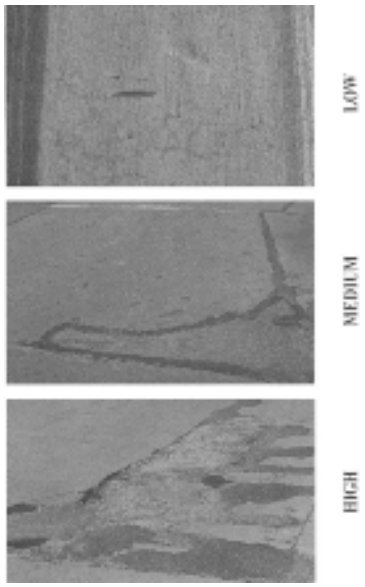
Map cracking / Crazing / Scaling Severity Levels

L—Crazing or map cracking exists over most of the slab area; the surface is in good condition, with only minor scaling present.

M—Slab is scaled, but less than 15 percent of the slab is affected.

H—Slab is scaled over more than 15 percent of its area.



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- **How to Count: يقاس بعدد البلاطات التي بها العيوب**
- A scaled slab is counted as one slab. Low-severity crazing should only be counted if the potential for scaling appears to be imminent قريبة الحدوث, or a few small pieces come out**.**

- **Options for Repair**
- L—Do nothing.
- M—Do nothing; Slab replacement.
- H—Partial or full-depth patch; Slab replacement; Overlay

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Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 slabs low, 6 slabs high, map cracking distress type. Determine deduct value for distress.

30

38

10

20

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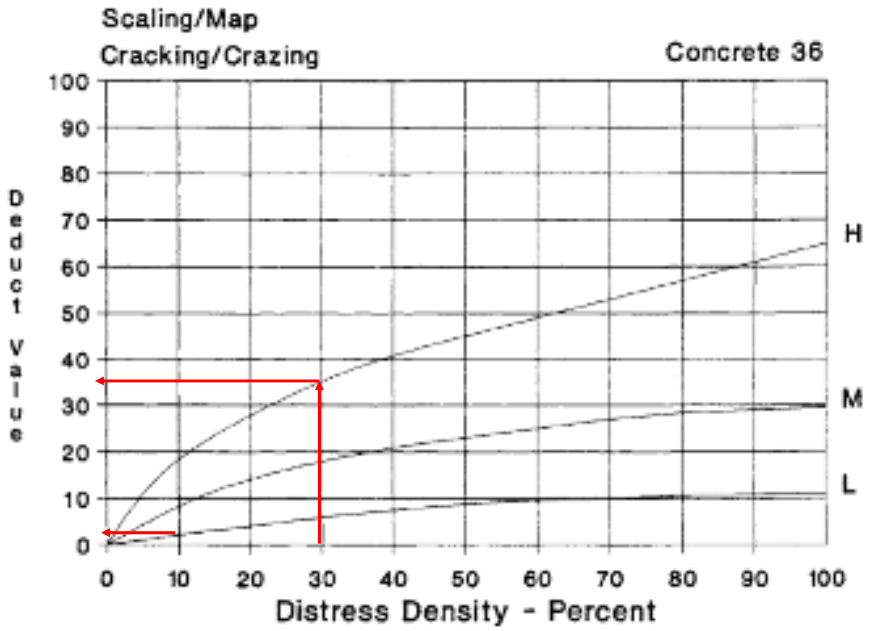

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C. Linear cracking (longitudinal, Transverse, and Diagonal cracks)

- *Description.* شروخ بكامل سمك البلاطة
- These cracks, which divide the slab into two or three or four pieces, are usually caused by a combination of repeated traffic loading, thermal gradient curling, and repeated moisture loading, Surface water, low percent of steel in RC slab.
- Low severity cracks are usually related to warp or friction تشوه أو احتكاك and are not considered major structural distresses.
- Medium or high-severity cracks are usually working cracks and are considered major structural distresses.

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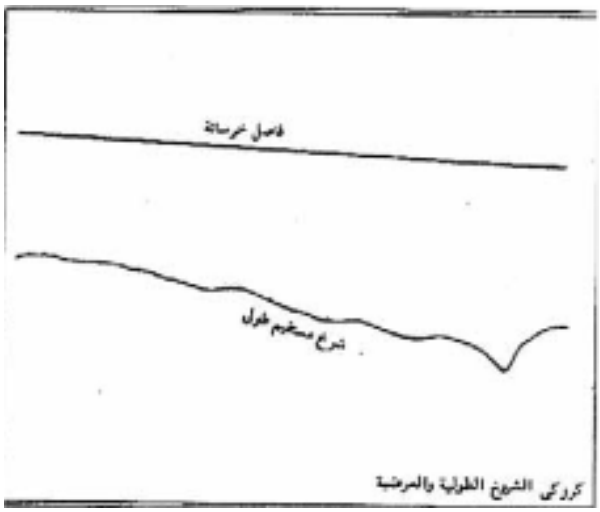
Sketch Linear cracking (longitudinal, Transverse, and Diagonal cracks)



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Linear cracking (longitudinal, Transverse, and Diagonal cracks)Severity Levels

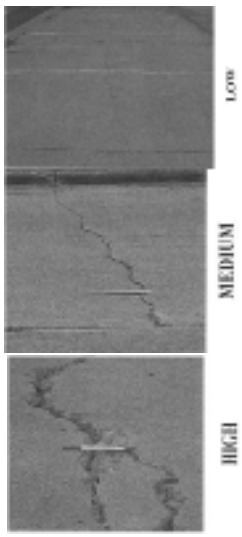
L—Non-filled cracks < 1/2 in. (12 mm) or filled cracks of any width with the filler in satisfactory condition. No faulting exists.
لايوجد فرق في المناسيب بين اجزاء البلاطة المعيبة

M—One of the following conditions exists:

1. Non-filled crack with a width between 1/2 and 2 in.
2. Non-filled crack of any width up to 2 in. (51 mm) with faulting of 3/8 in. (10 mm).
3. Filled crack of any width with faulting <3/8 in. (10 mm)

H—One of the following conditions exists:

1. Non-filled crack with a width >2 in. (51 mm).
2. Filled or non-filled crack of any width with faulting >3/8 in. (10 mm)



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- **How to Count:**
- Once the severity has been identified, the distress is recorded as one slab. If two medium severity cracks are within one slab, the slab is counted as having one high severity crack. Slabs divided into four or more pieces are counted as divided slabs.
- **يقاس بعدد البلاطات اذا كانت البلاطة مقسمة الي 3 قطع او اقل**
- **يقاس بعدد القطع اذا كانت البلاطة مقسمة لاكثر من 4 قطع**
- **في حالة وجود حالتان متوسطة الشدة في البلاطة الواحدة يمكن اعتبارها عالية الشدة**
- **Options for Repair**
- L—Do nothing; Seal cracks over 1/8 in.
- M—Seal cracks.
- H—Seal cracks; Full-depth patch; Slab replacement

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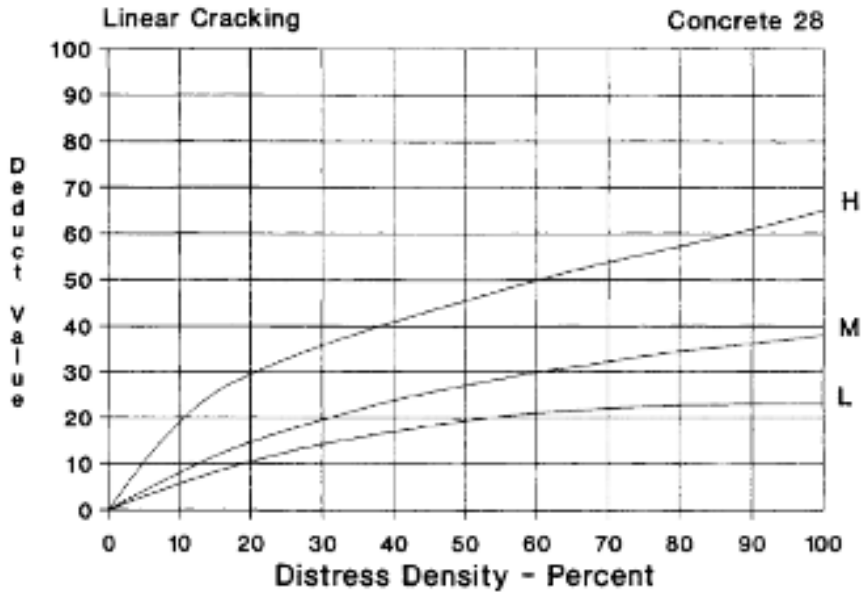
Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 slabs high, 6 slabs medium, linear cracking distress type. Determine deduct value for distress.

19
40
30
20

22



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D. Durability ("D") Cracking الشروخ الناتجة عن الانتفاخ

- *Description.*
- Durability cracking is caused by the inability of the concrete to withstand environmental factors such as freeze-thaw cycles. It usually appears as a pattern of cracks running parallel to a joint or linear crack.
- عند ذوبان العدسات الثلجية مع الحركة تهبط البلاطة فتحدث شروخ
- This type of cracking may eventually lead to disintegration تفكك of the concrete within 1 to 2 ft (0.3 to 0.6 m) of the joint or crack.

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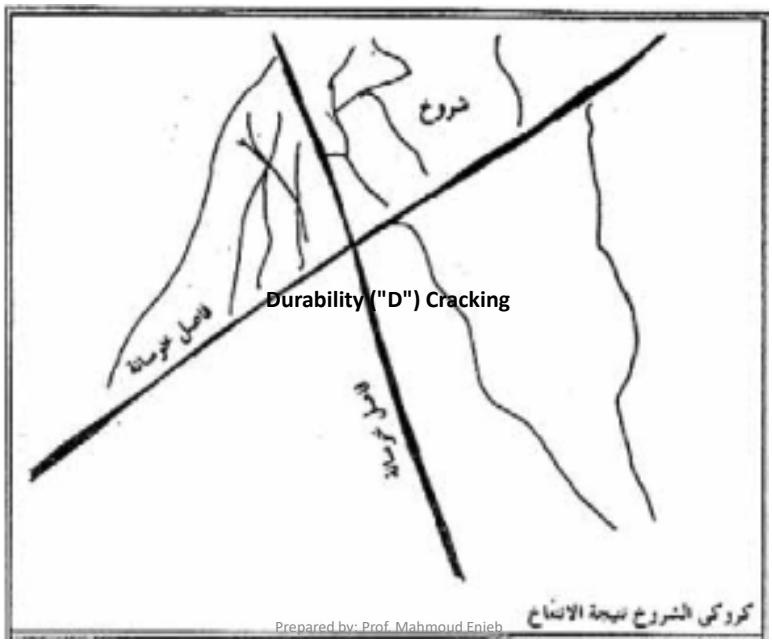
Sketch Durability ("D") Cracking



Durability ("D") Cracking

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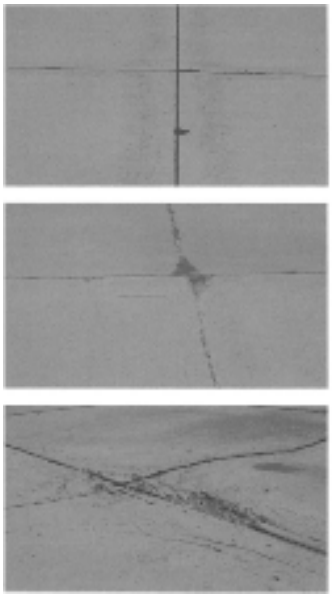
D. Durability ("D") Cracking

- L—"D" cracking is defined by hairline cracks occurring in a limited area of the slab, such as one or two corners or along one joint. Little or no disintegration الانفصالhas occurred.
- الشروخ تغطي 15% من سطح البلاطة ومعظم القطع لايمكن ازالتها
- M—"D" cracking has developed over a considerable amount of slab area with little or no disintegration or FOD المستوي الاولpotential; or (2) "D" cracking has occurred in a limited area of the slab, such as in one or two corners or along one joint, but pieces are missing and disintegration has occurred. الشروخ تغطي اكثر من 15% من سطح البلاطة ومترابطة وبعض القطع يمكن ازالتها
- H—"D" cracking has developed over a considerable amount of slab area with disintegration of FOD potential. الشروخ تغطي اكثر من 15% من سطح البلاطة ومعظم القطع يمكن ازالتها



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- **How to Count:**

- When the distress is located and rated at one severity, it is counted as one slab. If more than one severity level is found, the slab is counted as having the higher severity distress.
- **يقاس بعدد البلاطات التي بها عيب الشروخ**
- **Options for Repair**
- L—Do nothing; Seal joints.
- M—Full-depth patch; Reconstruct joints.
- H—Full-depth patch; Reconstruct joints; Slab replacement

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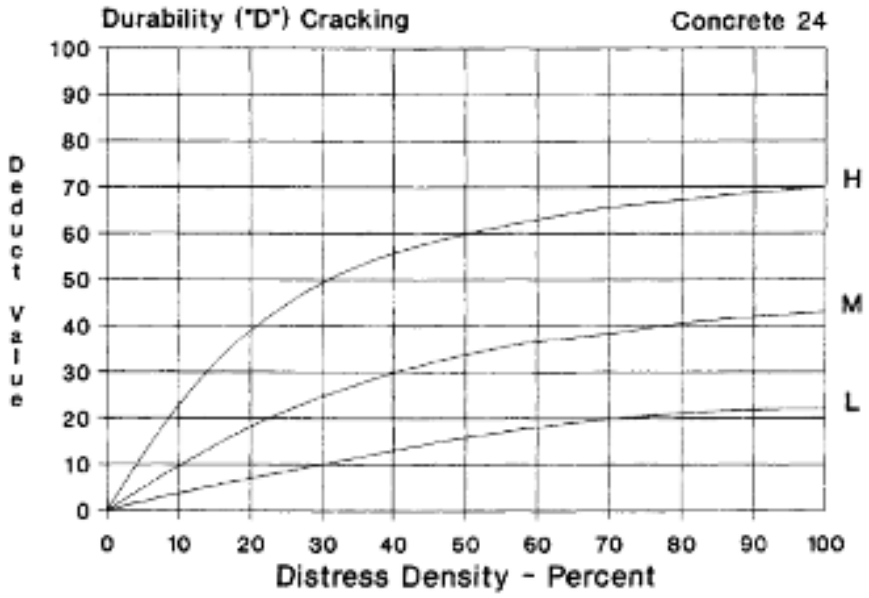
Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 4 slabs high, 8 slabs medium, durability cracking distress type. Determine deduct value for distress.

30
40
70
60

28



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E. Divided Slab تقسيم البلاطات الي قطع منفصلة نتيجة الشروخ

- *Description. انقسام البلاطة الي قطع منفصلة بكامل العمق*
- Slab is divided by cracks into four or more pieces due to overloading and/or inadequate support.
- If all pieces or cracks are contained within a corner break, the distress is categorized as a severe corner break.
- نتيجة زيادة الاحمال المرورية او ضعف طبقة الاساس تحت البلاطات

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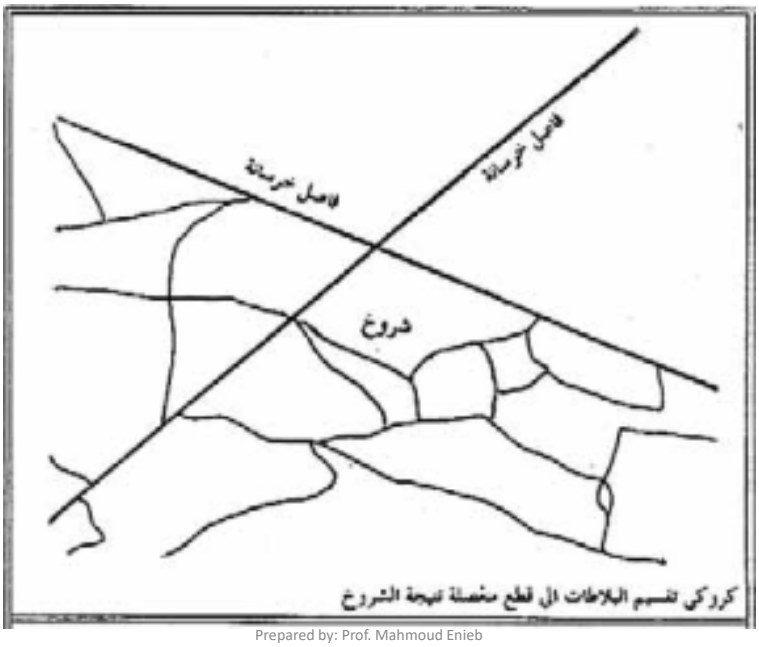
Sketch Divided Slab



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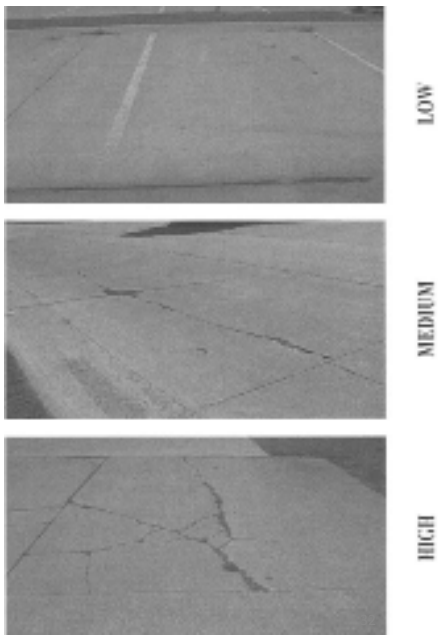
E. Divided Slab Severity Levels

Table C-1. Levels of Severity for Divided Slabs.

Severity of Majority of Cracks	Number of Pieces in Cracked Slab		
	4 to 5	6 to 8	8 or more
L	L	L	M
M	M	M	H
H	M	H	H



32

- **How to Count: يقاس بعدد البلاطات التي بها عيب التقسيم**
- If the divided slab is medium or high-severity, no other distress is counted for that slab.
- **Options for Repair**
- L—Do nothing; Seal cracks more than 1/8 in. wide.
- M—Replace slab.
- H—Replace slab

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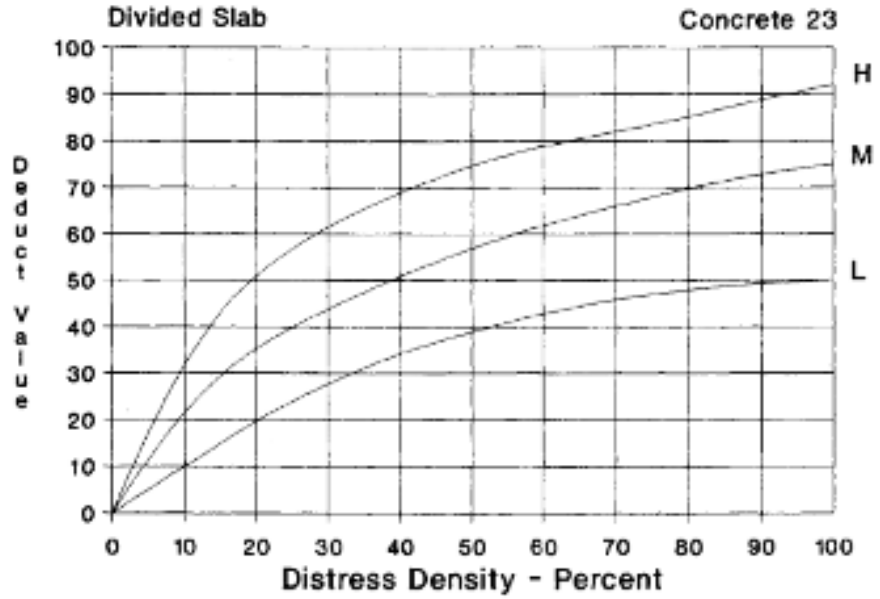
Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 slabs low, 4 slabs high, divided slab distress type. Determine deduct value for distress.

30
40
70
60

34



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F. Corner Break كسر بأركان البلاطة

- *Description.*كسر بعمق البلاطة ويبدأ بشروخ متقاطعة من مع الفواصل
- A corner break is a crack that intersects the joints at a distance less than or equal to one half the slab length on both sides, measured from the corner of the slab.
- For example, a slab with dimensions of 25 by 25 ft (7.5 by 7.5 m) that has a crack intersecting the joint 5 ft (1.5 m) from the corner on one side and 17 ft (5.1 m) on the other side is not considered a corner break; it is a diagonal crack. However, a crack that intersects 7 ft (2.1 m) on one side and 10 ft (3 m) on the other is considered a corner break.
- بحيث تكون المسافة بين ركن البلاطة والشرخ اقل من نصف طول البلاطة في كل اتجاه
- نتيجة الاحمال المرورية الترددية

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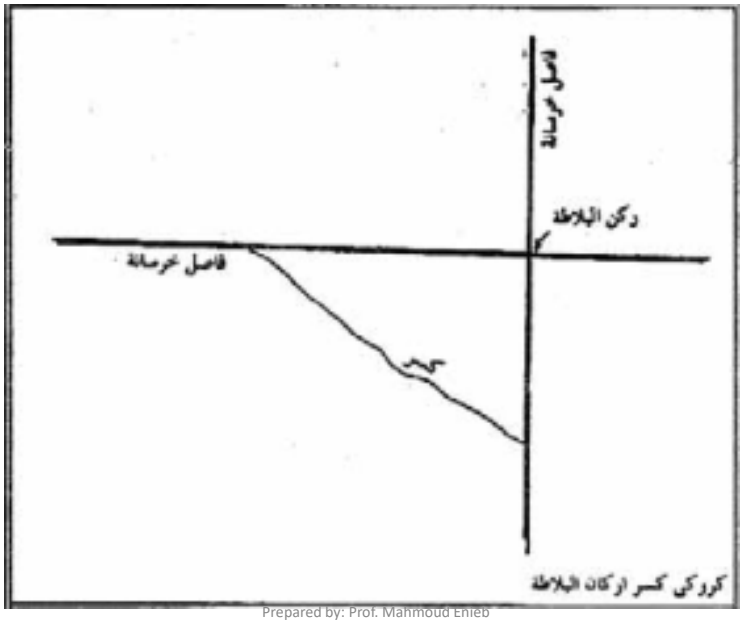
Sketch Corner Break



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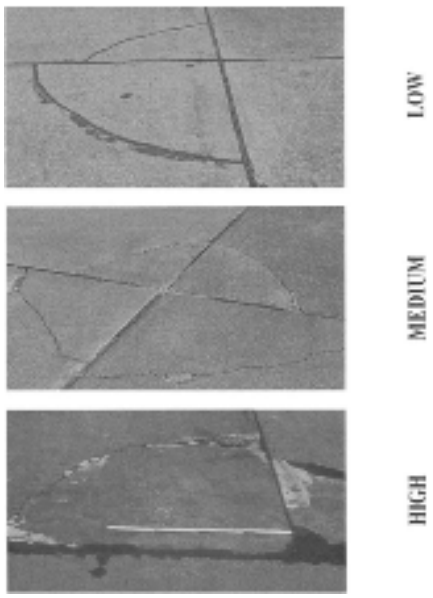
F. Corner Break

- L—Crack has either no spalling or minor spalling (no foreign object damage. If non-filled, it has a mean width less than approximately 1/8 in.(3.2 mm).
- M— A non-filled crack has a mean width between 1 /8 in. (3.2 mm) and 1 in. (25.4 mm).
- H—A non-filled crack has a mean width greater than approximately 1 in.(25.4 mm) creating a tire damage potential



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- **How to Count:** يقاس بعدد البلاطات التي بها عيب كسر الاركان
- A distressed slab is recorded as one slab. For two or more breaks, the highest level of severity should be recorded.
- **Options for Repair**
- L—Do nothing; Seal cracks.
- M—Seal cracks; Full-depth patch; Slab replacement.
- H—Seal cracks; Full-depth patch; Slab replacement

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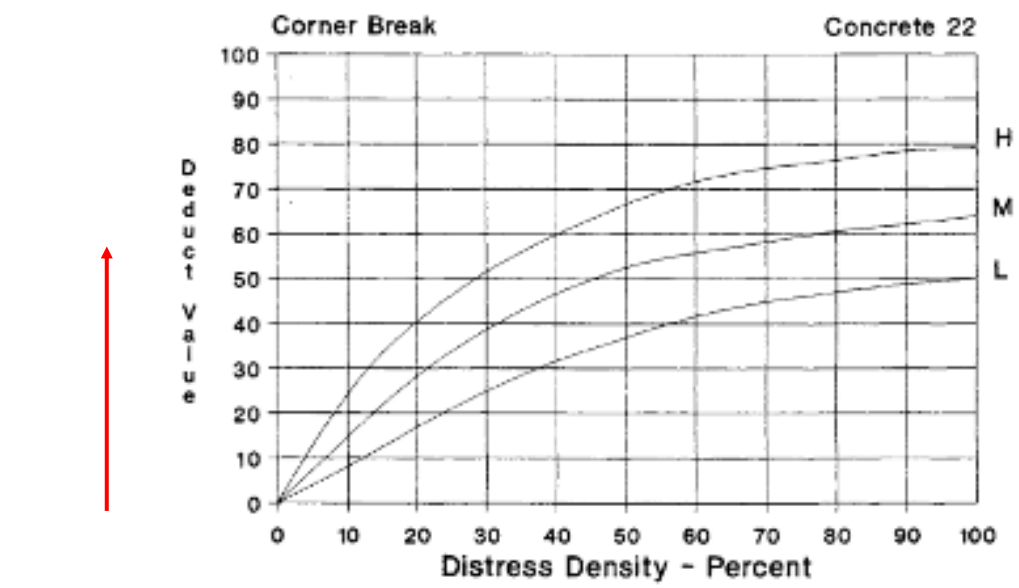
Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 slabs low, 4 slabs medium, corner break distress type. Determine deduct value for distress.

30
37
10
20

40



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2 – Surface Distortion تشوة استواء السطح

- Blowup / Buckling. الانبعاج لاعلي
- Faulting. الفارق في المناسيب عند الفواصل
- Lane/Shoulder Drop-Off الفرق في المناسيب بين الرصف والطبان

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A. Blowup/Buckling الانبعاج لاعلي

- *Description.*
- Blowups or buckles occur in hot weather, usually at a transverse crack or joint that is not wide enough to permit slab expansion.
- The insufficient width is usually caused by infiltration of incompressible materials into the joint space. When expansion cannot relieve enough pressure, a localized upward movement of the slab edges (buckling) or shattering will occur in the vicinity of the joint. Blowups can also occur at utility cuts and drainage inlets.

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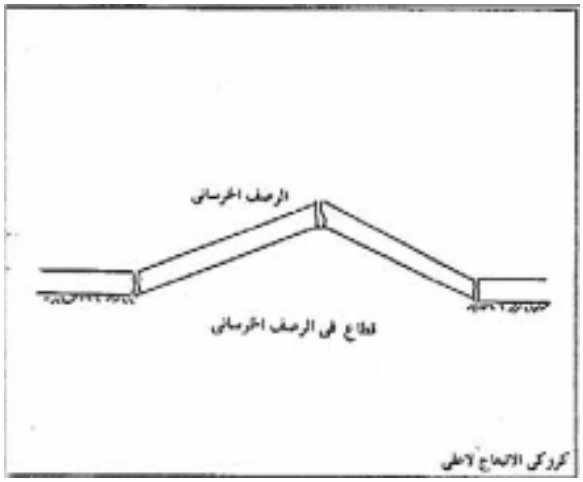
Sketch Blowup/Buckling



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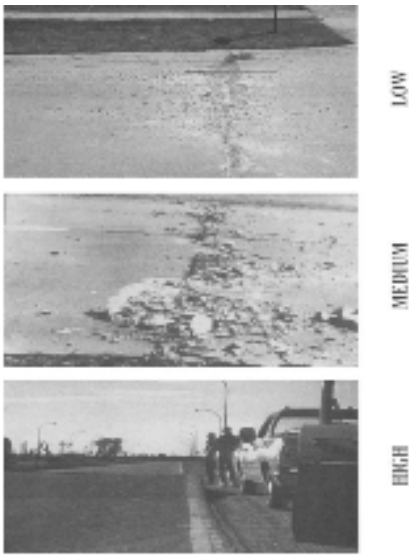
Blowup/Buckling Severity Levels

- L—Buckling or shattering تهشيم causes low severity ride quality.
- M—Buckling or shattering causes medium severity ride quality.
- H—Buckling or shattering causes high severity ride quality



45

- **How to Count:**

- At a crack, a blowup is counted as being in one slab. However, if the blowup occurs at a joint and affects two slabs, the distress should be recorded as occurring in two slabs.

- **Options for Repair**
- L—Do nothing; Partial, or full-depth patch.
- M—Full-depth patch; Slab replacement.
- H—Full-depth patch; Slab replacement

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Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 (4) slabs high, 4 (2) slabs medium, blowup distress type. Determine deduct value for distress.

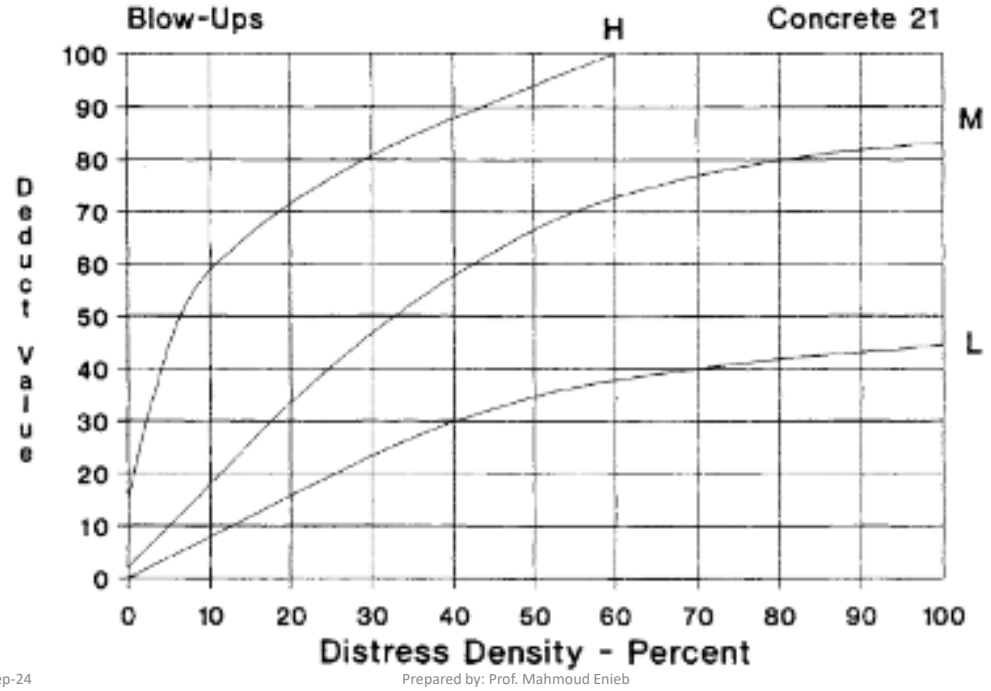
60

93

35

70

47



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B. Faulting

- *Description.*
- Faulting is the difference in elevation across a joint. Some common causes of faulting are:
- 1. Settlement because of soft foundation.
- 2. Pumping or eroding of material تآكل المواد from under the slab.
- 3. Curling التواءof the slab edges due to temperature and moisture changes.
- نتيجة خروج التربة مع المياه بين الشروخ مما يسبب وجود فراغات اسفل احرف البلاطات مما يؤدي الى هبوطها

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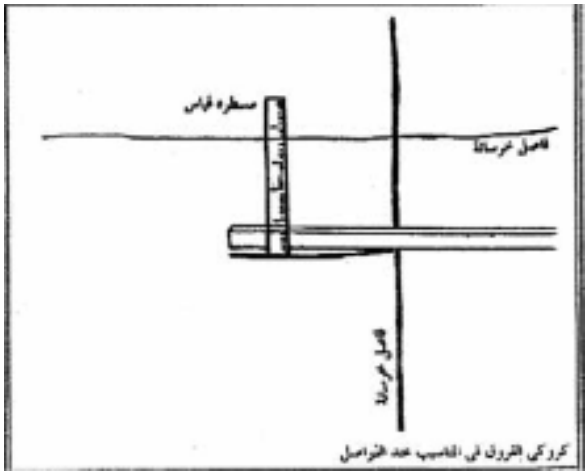
Sketch Faulting



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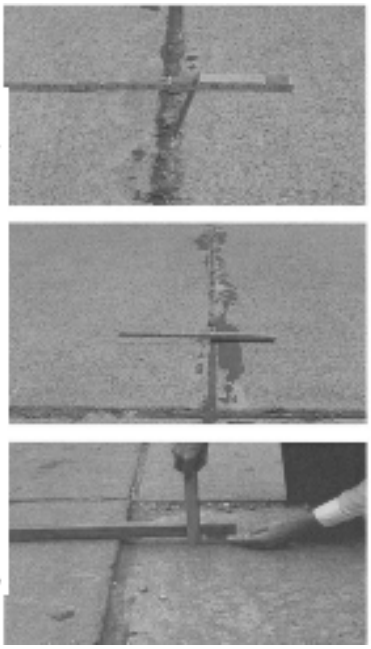
Faulting Severity Levels

Table C-2. Levels of Severity for Faulting.

Severity Level	Difference in Elevation
L	1/8 to 3/8 in. (3 to 10 mm)
M	>3/8 to 3/4 in. (10 to 19 mm)
H	>3/4 in. (>19 mm)



51

- **How to Count:**

- Faulting across a joint is counted as one slab. Only affected slabs are counted. Faults across a crack are not counted as distress, but are considered when defining crack severity.

- **Options for Repair**
- L—Do nothing; Grind.
- M—Grind.صقل او طحن الزيادة
- H—Grind.

52

Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 2 slabs low, 4 slabs high, faulting distress type. Determine deduct value for distress.

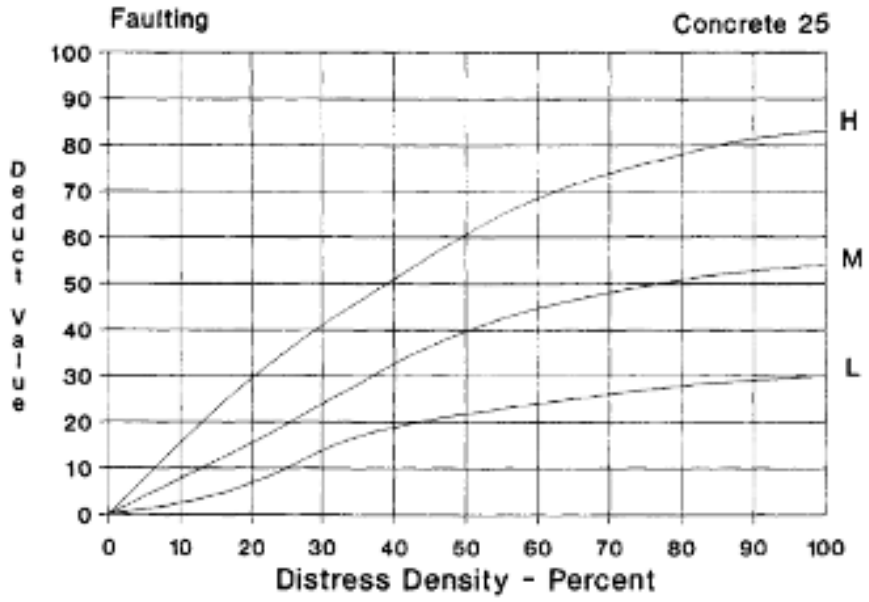
40

33

20

3

53



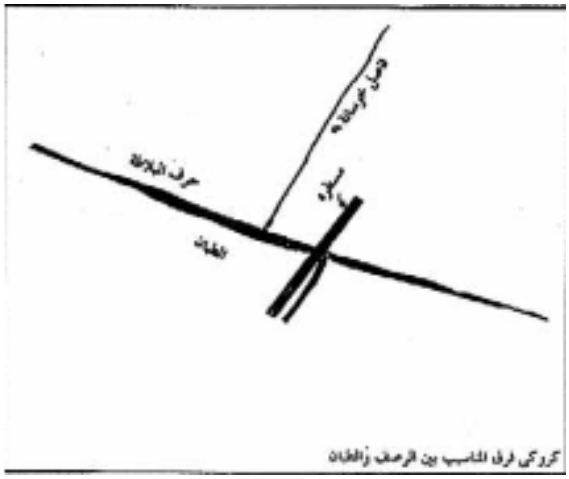
54

C. Lane/Shoulder Drop-Off

- *Description.*
- Lane/shoulder drop-off is the difference between the settlement or erosion of the shoulder and the pavement travel-lane edge. The elevation difference can be a safety hazard; it can also cause increased water infiltration.
- نتيجة تأكل حرف الرصف او الطبان او كليهما

55

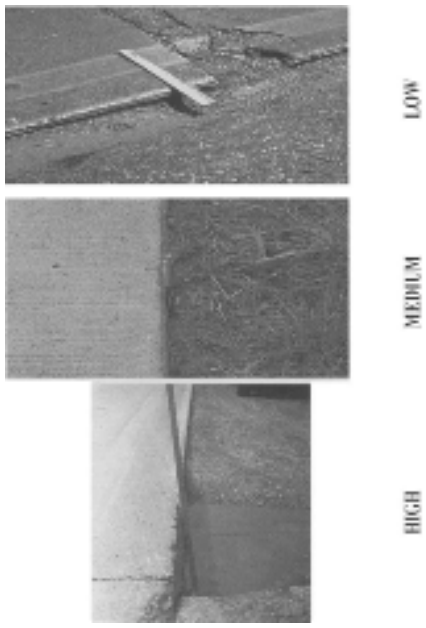
Sketch Lane/Shoulder Drop-Off



56

lane shoulder Severity Levels

- L—The difference between the pavement edge and shoulder is 1 to 2 in. (25 to 51 mm).
- M—The difference in elevation is 2 to 4 in. (51 to 102 mm).
- H—The difference in elevation is >4 in. (102 mm



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- **How to Count:**
- The mean lane/shoulder drop off is computed by averaging the maximum and minimum drop along the slab. Each slab exhibiting distress is measured separately and counted as one slab with the appropriate severity level.
- يقاس بعدد البلاطات التي بها عيب فرق في المناسيب بين الرصف والطبان
- **Options for Repair**
- L, M, H—Regrade and fill shoulders to match lane height

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Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 6 slabs high, 4 slabs medium, lane/shoulder Drop-off distress type. Determine deduct value for distress.

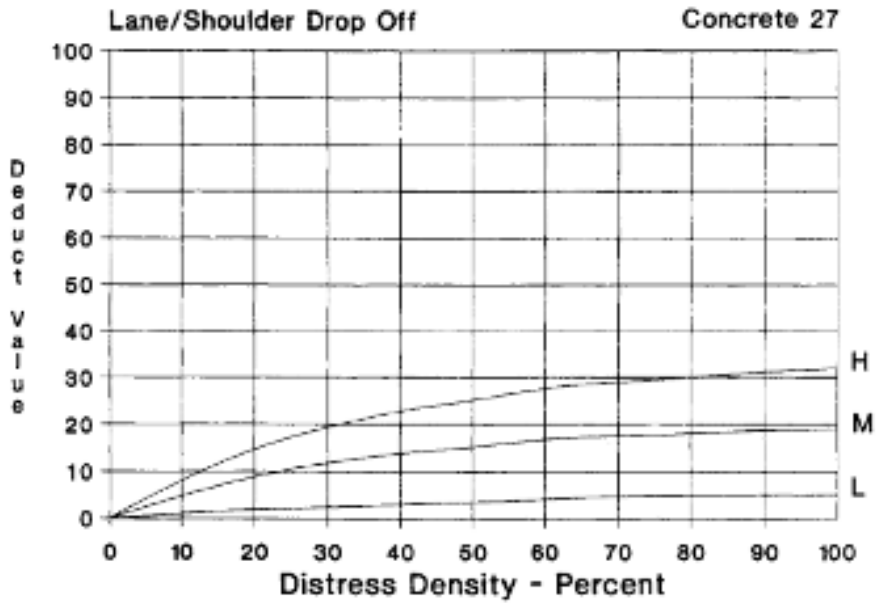
9

27

22

9

59



60

3 – Slippery Surface عيوب الرصف الزلق

- Polished aggregate.

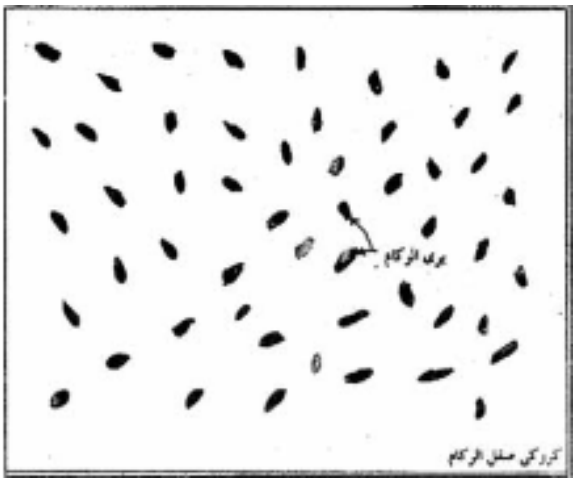
61

A. Polished aggregate

- *Description.*
- This distress is caused by repeated traffic applications. When the aggregate in the surface becomes smooth to the touch, adhesion التصاق with the vehicle tires is considerably reduced. When the portion of aggregate extending above the surface is small, the pavement texture does not significantly contribute to reducing vehicle speed.
- Polished aggregate extending above the asphalt is negligible, and the surface aggregate is smooth to the touch.
- This type of distress is indicated when the number on a skid resistance test is low or has dropped significantly from previous ratings.
- بري سطح حبيبات الركام المكون للخرسانة وجعلها ناعمة وتقليل درجة الاحتكاك والخشونة بينها وبين اطارات السيارات وهو ناتج من احتكاك اطارات السيارات مع سطح الخرسانة

62

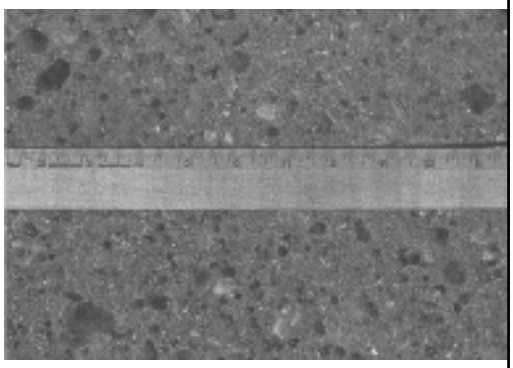
Sketch Polished aggregate



63

Polished aggregate 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
- لايوجد تحديد لدرجة الشدة وتعتبر كأنها شدة ثابتة متوسطةM



64

- **How to Count:**

- A slab with polished aggregate is counted as one slab.

- **Options for Repair**
- M — Overlay

65

Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 6 slabs high, 4 slabs medium, polished aggregate distress type. Determine deduct value for distress.

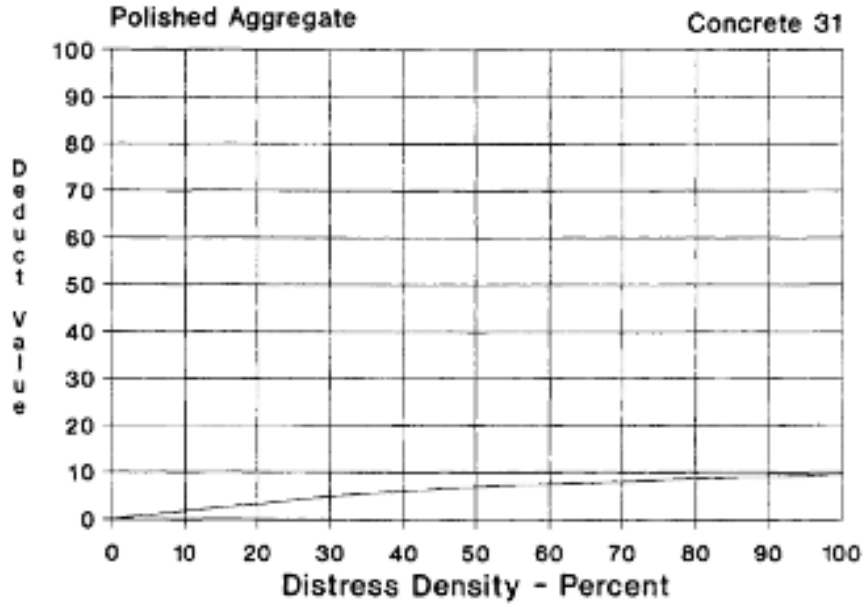
20

10

5

15

66



67

4 – Disintegration تفكك سطح الرصف

- Popout.
- Joint Seal Damage.
- Pumping.
- Spalling Joints.
- Spalling Corner.

68

A. Popout نقر في الطبقة السطحية

- *Description.*
- A popout is a small piece of pavement that breaks loose from the surface due to freeze thaw action, combined with expansive aggregates.
- Popouts usually range in diameter from approximately 1 to 4 in.(25 to 102 mm) and in depth from 0.5 to 2 in. (13 to 51 mm
- نتيجة ظاهرة التجمد والذوبان للعدسات الثلجية بين حبيبات الركام والفراغات وذلك في الاجواء الشديدة البرودة والمنخفضة الحرارة

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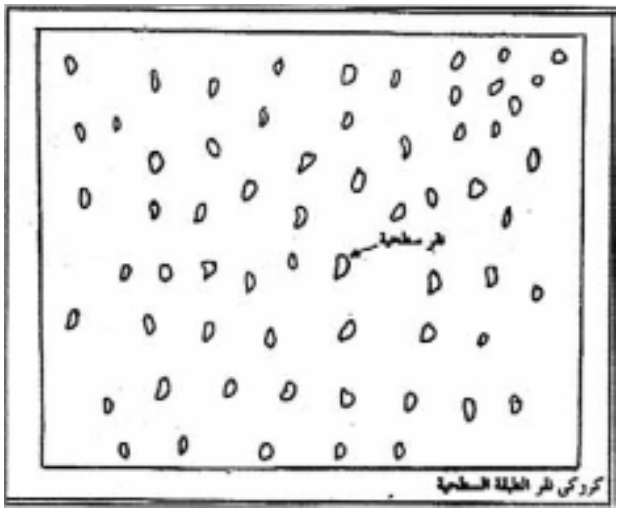
Sketch Popout



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Popout Severity Levels

- No degrees of severity are defined for popouts. However, popouts must be extensive before they are counted as a distress.
- Average popout density must exceed approximately three popouts per square yard over the entire slab area

لا يوجد تحديد لدرجة الشدة وتعتبر متوسطة

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- **How to Count:**

- The density of the distress must be measured. If there is any doubt that the average is greater than three popouts per square yard, at least three random 1 sq yd (0.84 m2) areas should be checked. When the average is greater than this density, the slab should be counted.
- **لايوجد تحديد لدرجة الشدة ولا تعتبر البلاطة بها العيب الا اذا كان عدد النقر بها اكثر من ثلاثة في المتر المربع ويمكن اعتبار الشدة ثابتة متوسطةM**

- **Options for Repair**
- M—Do nothing

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Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 6 slabs high, 4 slabs medium, popout distress type. Determine deduct value for distress.

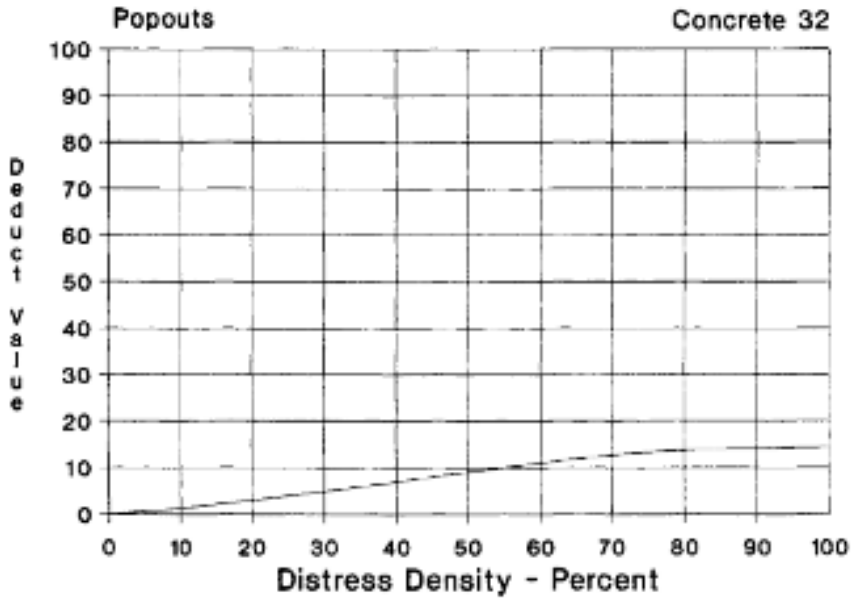
20

9

5

15

73



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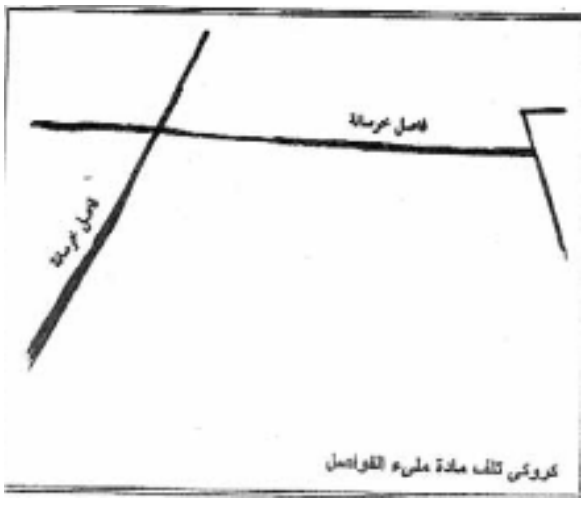
B. Joint Seal Damage تلف مادة ملئ الفواصل

- *Description.*
- Joint seal damage is any condition which enables soil or rocks to accumulate in the joints or allows significant infiltration of water. Accumulation of incompressible materials prevents the slabs from expanding and may result in buckling, shattering, or spalling.
- Typical types of joint seal damage are (1) stripping of joint sealant, (2) extrusion of joint sealant, (3) weed growth, (4) hardening of the filler (oxidation), (5) loss of bond to the slab edges, and (6) lack or absence of sealant in the joint
- نتيجة ضعف التماسك بين المادة المالئة والخرسانة نتيجة حركة المركبات
- خروج مادة ملئ الفواصل على سطح البلاطة او ظهور حشائش بين الفواصل

75

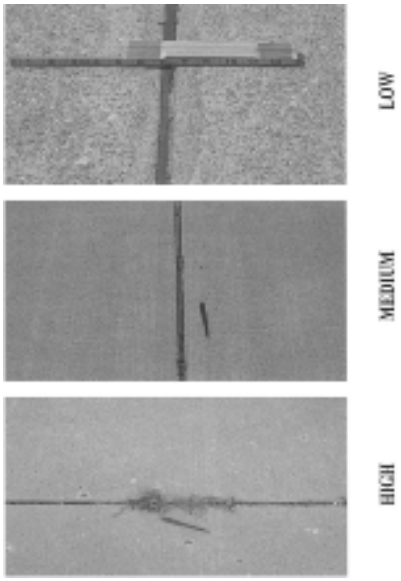
Sketch Joint Seal Damage



76

Joint Seal Damage Severity Levels

- L—Joint sealer is in generally good condition throughout the section. Sealant is performing well, with only a minor amount of any of the above types of damage present.تأكل بسيط في المادة المالئة للفواصل
- M—Joint sealer is in generally fair condition over the entire surveyed section, with one or more of the above types of damage occurring to a moderate degree. Sealant needs replacement within 2 years.
- H—Joint sealer is in generally poor condition over the entire surveyed section, with one or more of the above types of damage occurring to a severe degree. Sealant needs immediate replacement.



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- قليل الشدة "L" تأكل بسيط فى المادة المالئه للفواصل .
- متوسط الشدة "M" تأكل متوسط فى المادة المالئه للفواصل .
- عالى الشدة "H" تأكل كامل أو شبة كامل للمادة المالئه للفواصل .

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- **How to Count:**

- Joint seal damage is not counted on a slab-by-slab basis but is rated based on the overall condition of the sealant in the sample unit.
- **يقاس بعدد البلاطات التي بها عيب ملئ الفواصل**

- **Options for Repair**
- L—Do nothing.
- M—Seal joints.
- H—Seal joints

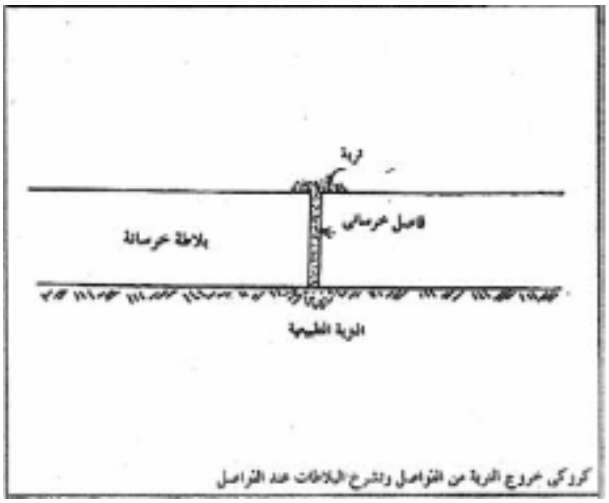
79

C. Pumping خروج التربة من الفواصل والشروخ

- *Description.*
- Pumping is the ejection of material by water through joints or cracks caused by deflection of the slab under passing loads. خروج التربة يسبب فراغات اسفل البلاطات
- As the water is ejected, it carries particles of gravel, sand, clay, or silt and results in a progressive loss of pavement support. Surface staining and base or subgrade material on the pavement close to joints or cracks are evidence of pumping.
- Pumping near joints indicates poor joint sealer and loss of support which will lead to cracking under repeated loads
- خروج التربة مع الماء من الفواصل بين البلاطات وعند الشروخ مسببا فراغات تحت البلاطة تؤدي الي شروخ في البلاطة مع الحركة المرورية ويحدث نتيجة تلف مادة ملئ الفواصل او تواجد الشروخ بكامل سمك البلاطة مما يسبب تسرب المياه من الفواصل والشروخ الي التربة اسفل البلاطات

80

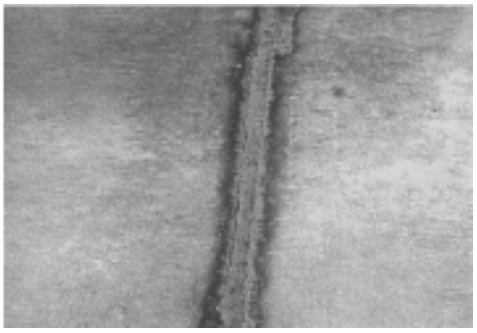
Sketch Pumping



81

Pumping Severity Levels

- No degrees of severity are defined. It is sufficient to indicate that pumping exists
- **لايوجد تحديد لدرجة الشدة ولكن يكفي ان يكون العيب موجودا**



82

- **How to Count:**

- Slabs are counted as follows: one pumping joint between two slabs is counted as two slabs. However, if the remaining joints around the slab are also pumping, one slab is added per additional pumping joint.
- ويقاس بعدد البلاطات التي بها عيب خروج التربة من الفواصل والشروخ

- **Options for Repair**
- Seal cracks and joints; Underseal

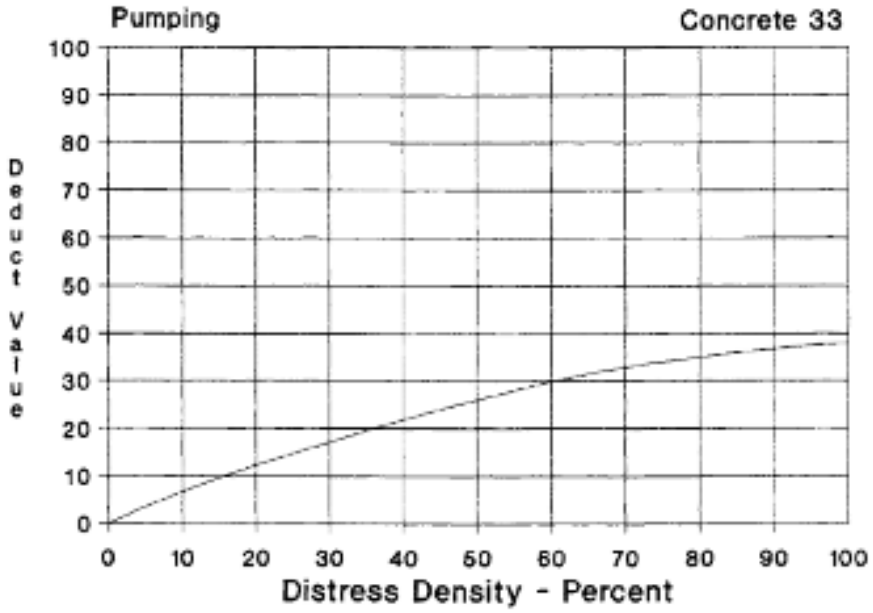
83

Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 6 slabs high, 4 slabs medium, pumping distress type. Determine deduct value for distress.

20
27
12
35

84



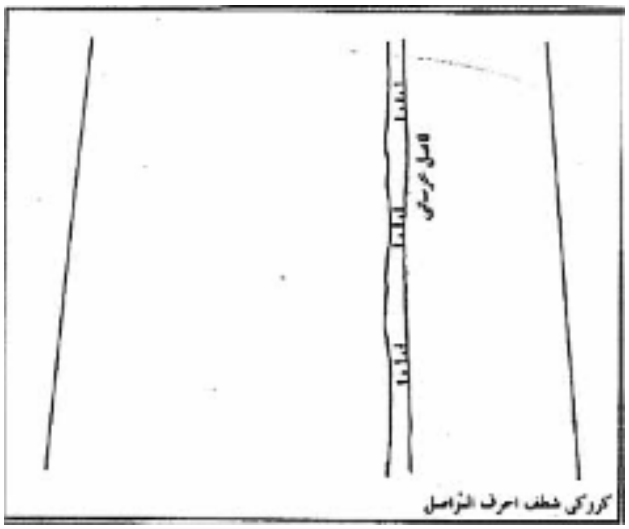
85

D. Spalling Joints شطف احرف الفواصل

- *Description.*
- Joint spalling is the breakdown of the slab edges within 2 ft (0.6 m) of the side of the joint. A joint spall usually does not extend vertically through the slab but intersects the joint at an angle.
- Spalling results from excessive stresses at the joint or crack caused by infiltration of incompressible materials or traffic loads. Weak concrete at the joint (caused by overworking) combined with traffic loads is another cause of spalling.
- هو تفتت وكسر بالحواف السطحية في المناطق المجاورة للفواصل وفي حدود 0.6 متر من الفواصل
- نتيجة الاحمال المرورية الترددية او هبوط في طبقة التأسيس او المساعد او ضعف مكونات الخرسانة

86

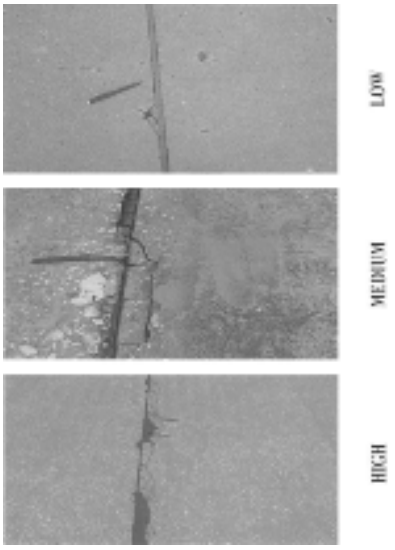
Sketch Spalling Joints



87

Spalling Joints Severity Levels

- L— Spall over 2 ft (0.6 m) long: spall is broken into no more than 3 pieces defined by low or medium-severity cracks
- M— Spall over 2 ft (0.6 m) long: spall is broken into more than three pieces defined by light or medium cracks
- H— Spall greater than 2 ft (0.6 m) long: spall is broken into more than three pieces defined by one or more high-severity cracks with high FOD potential;



88

نوع الشطف وخصائصة	عرض الشطف	طول الشطف	
		أقل من ٦ر٠ متر	أكبر من ٦ر٠ متر
الاجزاء التى بها الشروخ متماسكة ولا يمكن فصلها عن بعض بسهولة	أقل من أويساوى ١٠سم أكبر من ١٠ سم	قليل الشدة "L" قليل الشدة "L"	قليل الشدة "L" قليل الشدة "L"
الأجزاء التى بها الشروخ مفككة وبعضها يمكن إزالته بسهولة وعمق الشرخ لا يزيد عن ٢ سم.	أقل من أو يساوى ١٠سم أكبر من ١٠ سم	قليل الشدة "L" قليل الشدة "L"	متوسط الشدة "M" متوسط الشدة "M"
الأجزاء التى بها الشروخ مفككة ويمكن إزالتها بسهولة .	أقل من أو يساوى ١٠سم أكبر من ١٠ سم	قليل الشدة "L" متوسط الشدة "M"	متوسط الشدة "M" عالى الشدة "H"

89

- **How to Count:**
- If the joint spall is located along the edge of one slab, it is counted as one slab with joint spalling. If spalling is located on more than one edge of the same slab, the edge having the highest severity is counted and recorded as one slab.

يقاس بعدد البلاطات التي بها عيب شطف احرف الفواصل وفي حالة وجود العيب عند فاصلين او اكثر نعتبر الاعلى شدة

- **Options for Repair**
- L—Do nothing.
- M—Partial-depth patch.
- H—Partial-depth patch

90

Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 6 slabs high, 4 slabs medium, spalling joints distress type. Determine deduct value for distress.

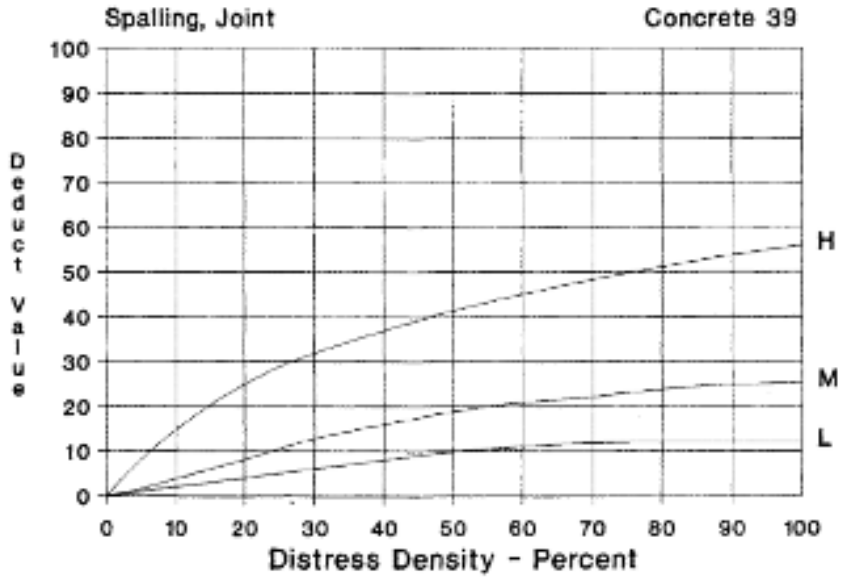
30

40

10

25

91



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E. Spalling Corner شطف بأركان البلاطات

- *Description.*
- Corner spalling is the raveling or breakdown of the slab within approximately 2 ft (0.6 m) of the corner. A corner spall differs from the corner break in that the spall angles downward to intersect the joint, while a break extends vertically through the slab
- هو شطف في اركان البلاطات الخرسانية في حدود 0.6 متر من ركن البلاطة واذا قل البعد عن 13 سم فأنه لايعتد به.
- ويحدث نتيجة ضعف مكونات الخرسانة عند الفواصل والاركان مع الحركة المرورية.

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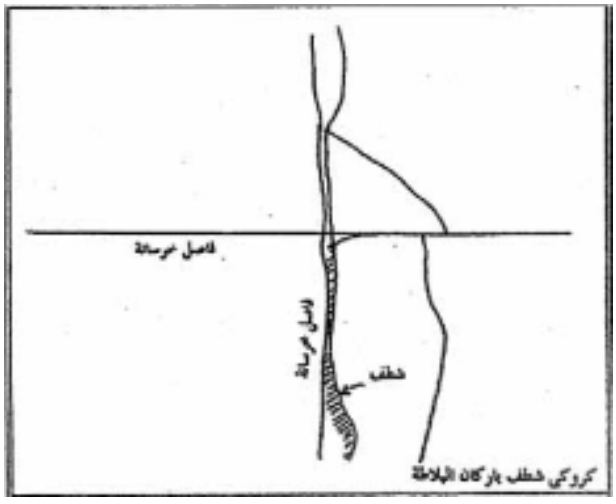
Sketch Spalling Corner



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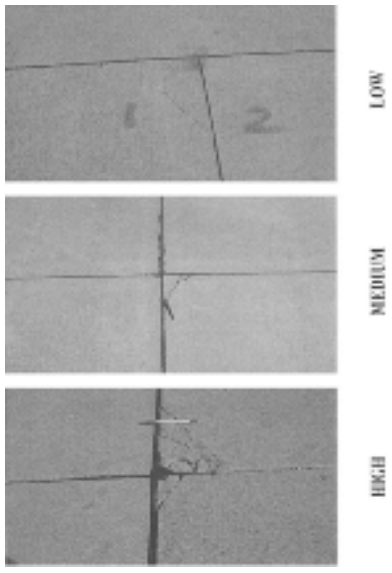
أبعاد الكسر / عمق الشطف	من(١٣سم×١٢سم) إلى (٣١سم×٣١سم)	أكبر من (٣١ × ٣١ سم)
أقل من ص٢ سم	قليل الشدة "L"	قليل الشدة "L"
أكبر من ص٢ سم إلى ١ر٥ سم	قليل الشدة "L"	متوسط الشدة "M"
أكبر من ١ر٥ سم	متوسط الشدة "M"	عالي الشدة "H"

95

Spalling Corner Severity Levels

- L— Spall is broken into one or two pieces defined by low-severity cracks
- M— Spall is broken into two or more pieces defined by medium-severity crack
- H— Spall is broken into two or more pieces defined by high-severity fragmented crack(s), with loose or absent fragments



96

- **How to Count:**

- If one or more corner spalls having the same severity level are located in a slab, the slab is counted as one slab with corner spalling. If more than one severity level occurs, it is counted as one slab having the higher severity level.
- **يقاس بعدد البلاطات التي بها عيب شطف الاركان وعادة اذا كان اكثر من عيب فناخذ الاعلى في الشدة**

- **Options for Repair**
- L—Do nothing.
- M—Partial-depth patch.
- H—Partial depth patch

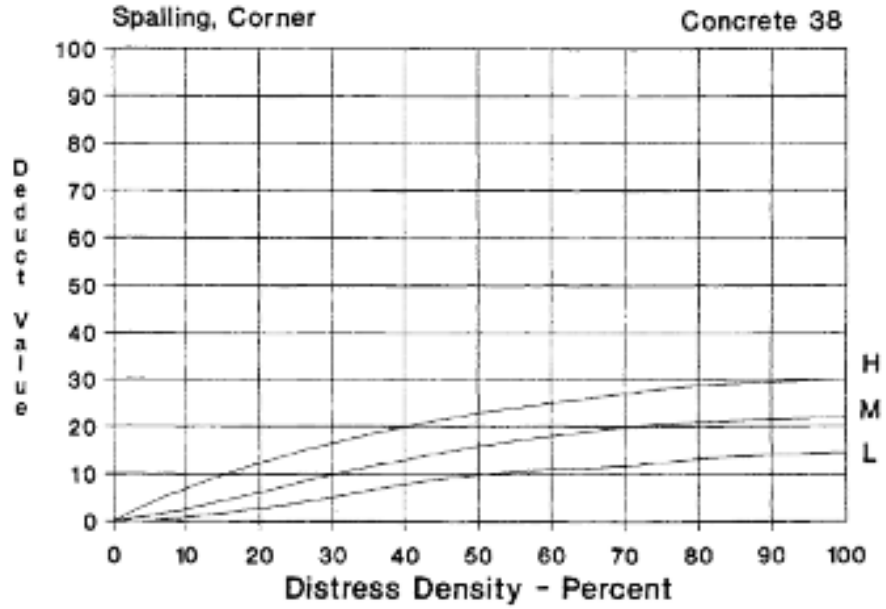
97

Example

During concrete pavement inspection of link (2*10) slabs, from airfield section, 6 slabs high, 4 slabs medium, spalling corner distress type. Determine deduct value for distress.

30
25
20
10

98



99

Asphalt Concrete Airfields: Distress Definitions and Deduct Value Curves

Jet Blast Erosion تأكل نتيجة شعلة الطائرة النفاثة

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 in.(12.7mm).

100

Severity Levels (Figure D-6)
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.
Options for Repair
Do nothing; Partial-depth patch; Apply rejuvenator

101

Figure D-6. Jet Blast Erosion.

102

Example

During flexible pavement inspection of link (100*30) m, from airfield section, 300 m^2, Jet Blast Erosion distress type. Determine deduct value for distress.

30

25

20

10

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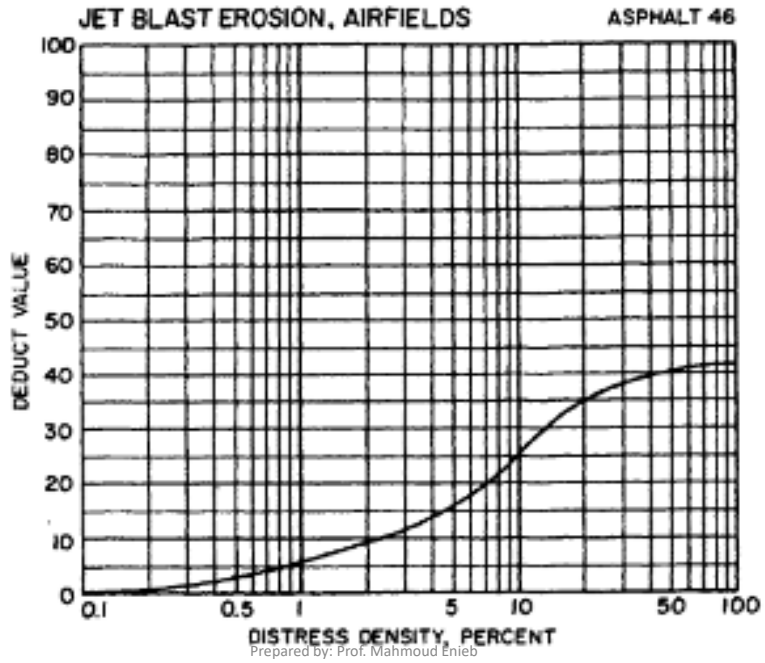

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Oil Spillage

Description

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

Severity Levels (Figure D-9)

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.

Options for Repair

Do nothing; Partial or full-depth patch.

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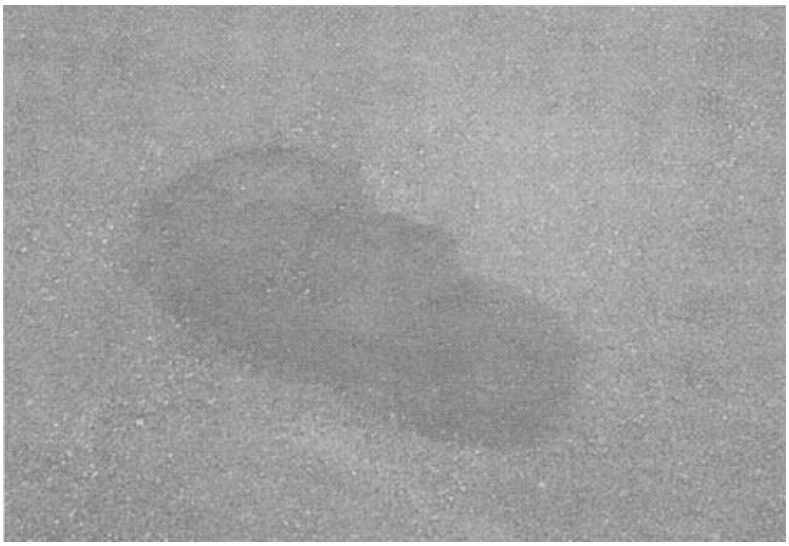
Oil Spillage



106

Example

During flexible pavement inspection of link (100*30) m, from airfield section, 300 m^2, Oil Spillage distress type. Determine deduct value for distress.

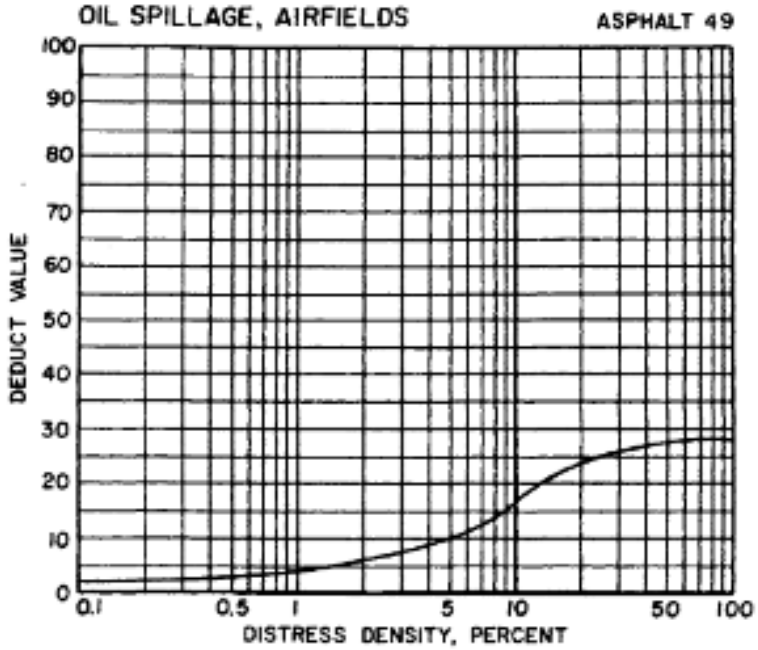
30

17

20

10

107



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Unsurfaced Roads: Distress Definitions And Deduct Value Curves

Improper Cross Section المقطع العرضي غير مناسب

Description

An unsurfaced road should have a crown with enough slope from the centerline to the shoulder to drain all water from the road's surface. No crown is used on curves because they are usually banked عادة مائلة. Unsurfaced Roads, The cross section is improper when the road surface is not shaped or maintained to carry water to the ditches.

يكون المقطع العرضي غير مناسب عندما لا يتم تشكيل أو الحفاظ على سطح الطريق لنقل المياه إلى قنوات الصرف.

9-Sep-24 Prepared by: Prof. Mahmoud Enieb 109

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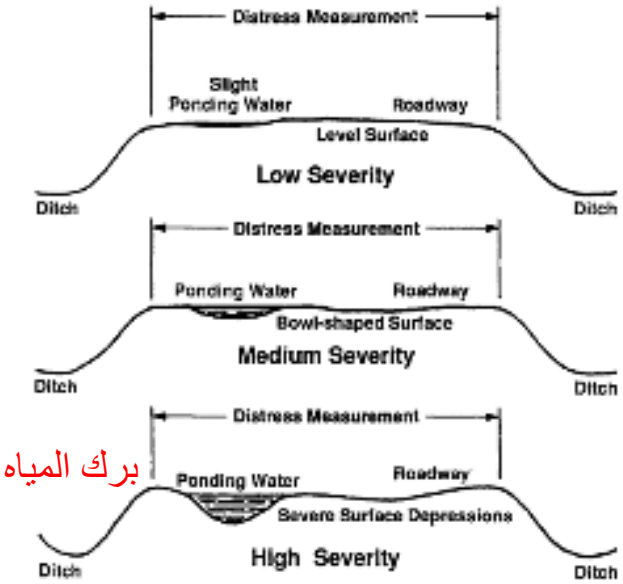
IMPROPER CROSS SECTION



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Severity Levels

L—Small amounts of ponding water or evidence of ponding water on the road surface;
or the road surface is completely flat (no cross slope).
M—Moderate amounts of ponding water or evidence of ponding water on the road surface;
or the road surface is bowl shaped. شكل الوعاء
H—Large amounts of ponding water or evidence of ponding water on the road surface;
or the road surface contains severe depressions.

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How to Measure

Improper cross section is measured in linear feet per sample unit (along the centerline or
parallel to the centerline).
The cross section runs from the outside shoulder break on one side of the road to the outside shoulder break on the other side.
Different severity levels may exist within the sample unit.
For example, there could be 60 ft with medium severity and 40 ft with low severity. The maximum length would be equal to the length of the sample units.

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يوضح اولويات الصيانه :

مجموعه	قيم معامل حاله الرصف	نوعيه الصيانه
١	صفر – ٢٥	صيانه شامله – اعاده انشاء للرصف
٢	٢٦ – ٥٥	صيانه شامله – تغطيه وتقويه للرصف
٣	٥٦ – ٧٠	صيانه دوريه – صيانه جاريه أو صيانه طارئه
٤	٧١ – ١٠٠	صيانه دوريه – صيانه روتينيه

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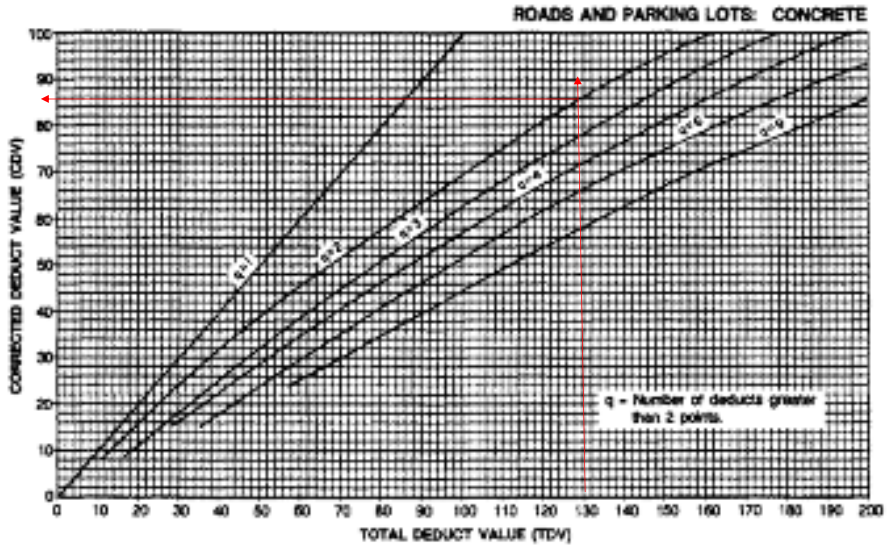

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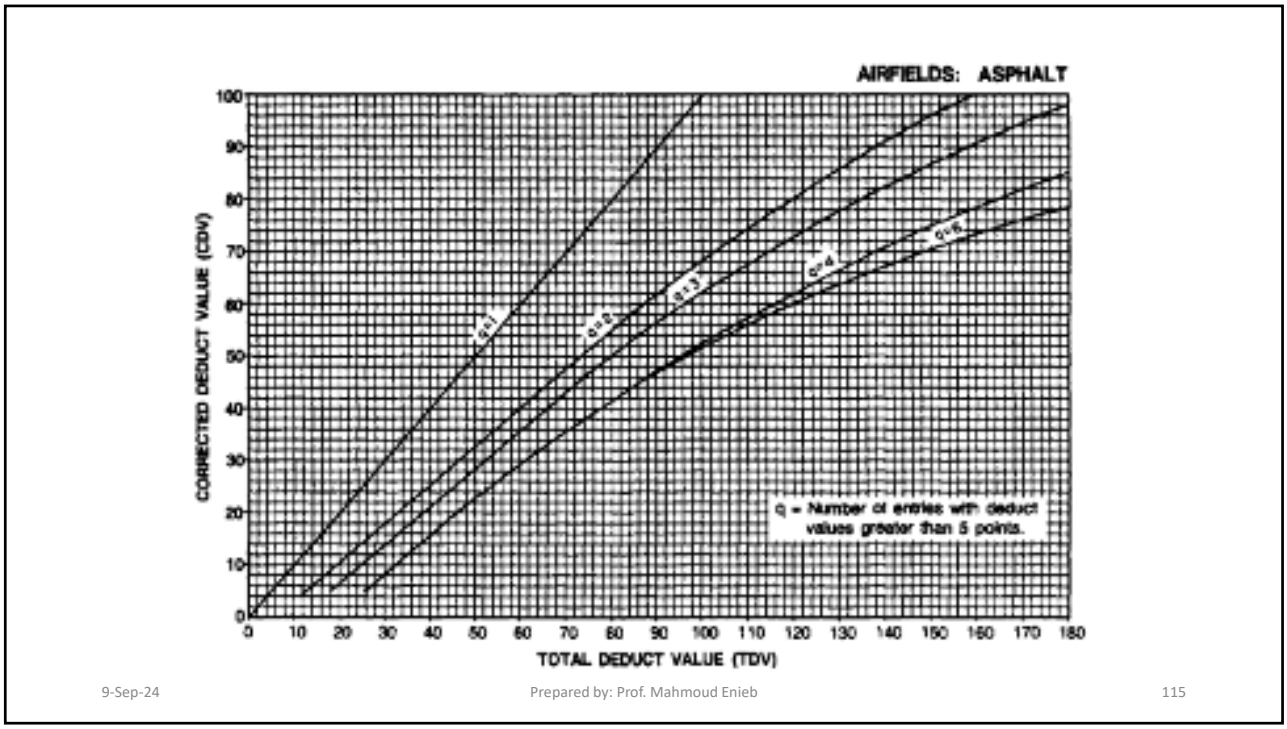
AIRFIELDS: ASPHALT
CORRECTED DEDUCT VALUE (CDV)
TOTAL DEDUCT VALUE (TDV)
q = Number of entries with deduct values greater than 5 points.
q=1
q=2
q=3
q=4
q=5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180

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