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NATIONAL TRANSPORT RESEARCH CENTRE

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CONDITION SURVEY
OF
ISLAMABAD RUNWAY PAVEMENT

NTRC-230

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1. Introduction

Visual inspection is the oldest form of pavement condition evaluation. Engineers have been evaluating pavement by this method since shortly after the first pavement was constructed. The method is considered subjective because no precise distress measurements are involved.

National Transport Research Centre was asked by the FIA vide their letter No.FIA/ENG/C/NAB/5/2000 dated December 02, 2000 to conduct a visual condition survey of the Islamabad Airport runway in order to evaluate the physical condition of the existing pavement surface at present.

A detailed evaluation of the runway pavement in question was carried out by NTRC on the request of Civil Aviation Authority in 1997 (Report No.NTRC-207).

2. Inspection Team

The following officers of NTRC were deputed by the Senior Chief, NTRC to carry out the visual condition survey of runway pavement at Islamabad airport :-

- 1) Mr. Bashir Ahmed, DC
- 2) Mr. Tahir Sharif, DC
- 3) Mr. M. Feroz Akbar, DC
- 4) Mr. Hameed Akhtar, RO

The condition survey of the runway was carried out by the NTRC team in the presence of CAA and FIA officers on 5th and 6th December, 2000.

3. Methodology Adopted

The visual inspection of the runway pavement in question was carried out by NTRC experts using the procedure based on condition survey and independent rating of distress with the varying level of severity.

Following five types of distresses were observed on the existing runway pavement (Table 1) :-

- Longitudinal/transverse cracks
- Patching
- Ravelling/weathering
- Rutting
- Slippage cracks

The runway pavement was divided into equal segment of sample units of 100x150 feet from 0+00 (3-0 end) to 9000+00 (1-2 end). The pavement was rated by the NTRC experts independently using the standard data sheets (Appendix A) developed by the United States Army Corps of Engineers for Federal Aviation Administration (FAA) and the US Air Force. Types of distresses as mentioned above were visually observed and their severity were rated relatively for a total of 90 sample unit of the main runway (Appendix B). The extended portions of the runway and overruns on both ends of the main runway were also inspected visually by the team.

4. Results of Visual Inspection

Based on the visual inspection of the runway pavement in question, the results are as follows:-

- a) Longitudinal cracks of high severity were found in 2000 feet of the main runway length whereas 3400 feet falls in the medium severity and 3500 feet were rated as low severity distress.
- b) Patching of the pavement was observed in 4800 feet of pavement length out of which 1600 feet was rated as high and 1200 feet was rated as low severity.
- c) Almost 60 percent of the main runway pavement length was found with medium severity of ravelling/ weathering whereas only 1500 feet was observed with high severity.
- d) Half of the main runway pavement length was found with the low severity of rutting, however almost 2000 feet of runway length was identified with medium to high severity level of rutting.
- e) Slippage cracks on 500 feet length of runway with medium to high severity level was also notice.
- f) The 1100 feet length of the extended pavement at the 1-2 end of the main runway was reportedly constructed using 4" asphaltic concrete layer over compacted brick ballast base course shows some sign of distresses.
- g) The 900 feet of runover pavement surface on the 1-2 end does not show any serious signs of distresses. However, the surface has been weathered and is of rough textured. The section presently has not been in use as reported by the CAA officials.
- h) The extension of main runway (1100 feet) on 3-0 end is constructed using cement concrete. The surface appears to be in good condition. Six slabs of size 12'x12' had developed cracks which have run through the concrete surface possibly due to the subsidence of the underlying layer and than seepage of water through these cracks. It was also observed that concrete slabs reportedly casted on 29-5-1995 had shown fine surface shrinkage cracks which were partially repaired.

- i) The runover portion on 3-0 end of the runway has length of nearly 900 feet. The surface is asphaltic concrete and does not show any significant distress.
- j) Photographs 1 to 14 taken on 5th and 6th December, 2000 during inspection show various type of distresses on runway pavement in question (see appendix).

5. Conclusion

- a) The overall condition of the main runway pavement (9000 feet) was found to be fair to poor.
- b) Runway pavement from chainage 8+000 to 9+000 shows medium to high severity of slippage cracks. Severity of longitudinal cracks and raveling/ weathering were found to be on the lower side in this section.
- c) No cracks were found in the new extended portion of pavement on 1-2 end having 1100 feet of length. However medium severity of raveling/ weathering was observed in this section. Severity of patching in this portion was on the higher side.
- d) The extension of the runway on the 3-0 end of main runway made of cement concrete was good except that the concrete reportedly placed on 29-5-1995 was found with surface cracks, which has partially been repaired. Also six slabs of size 12'x12' have been completely failed and need replacement.

APPENDIXES

RUNWAY.XLS

Chainage (feet)		Sample Unit Number	Pavement Distress				
From	To		Longitudinal Cracks	Patching	Ravelling / Weathering	Rutting	Slippage Cracking
0	100	1	medium		low		
100	200	2	medium		medium		
200	300	3	medium				
300	400	4	low		low		
400	500	5	low		low	low	
500	600	6	low		low		
600	700	7	medium		low		
700	800	8	medium		low		
800	900	9	high		medium	low	
900	1000	10	medium		high	low	
1000	1100	11	medium		high		
1100	1200	12	medium		medium		
1200	1300	13	low		low	low	
1300	1400	14	high		medium	low	
1400	1500	15	high	medium	high	low	
1500	1600	16	high		medium	medium	
1600	1700	17	high	medium	medium	high	
1700	1800	18	high		medium	high	high
1800	1900	19	high		medium	medium	
1900	2000	20	medium	high	medium		
2000	2100	21	medium		medium	high	
2100	2200	22	high	medium	medium	high	
2200	2300	23	high		high	high	
2300	2400	24	high		high	high	
2400	2500	25	high		high	high	
2500	2600	26	medium		medium	medium	
2600	2700	27	medium		medium	medium	
2700	2800	28	low		medium	medium	
2800	2900	29	medium		high	high	
2900	3000	30	low	low	high	low	
3000	3100	31	low		high	low	
3100	3200	32	low		medium	low	
3200	3300	33	low	low	medium	low	
3300	3400	34	medium	low	medium	low	
3400	3500	35	medium		medium	low	
3500	3600	36	low		low	low	
3600	3700	37	low	low	low	low	
3700	3800	38	medium	medium	medium	low	
3800	3900	39	low	medium	low	low	
3900	4000	40	medium		low	low	
4000	4100	41	low		low		
4100	4200	42	low		high		
4200	4300	43	low	low	medium	low	
4300	4400	44	low	low	low	low	
4400	4500	45	medium	high	high	medium	
4500	4600	46	high	high	high	medium	

RUNWAY.XLS

Chainage (feet)		Sample Unit Number	Pavement Distress				
From	To		Longitudinal Cracks	Patching	Ravelling / Weathering	Rutting	Slippage Cracking
4600	4700	47	low	high	high	low	
4700	4800	48	low	high	high	low	
4800	4900	49	low	high	medium	low	
4900	5000	50	low	medium	medium	low	
5000	5100	51	low	high	medium		
5100	5200	52	medium			low	
5200	5300	53	medium	low	medium	low	
5300	5400	54	medium	medium	medium	low	
5400	5500	55	medium	medium	medium	low	
5500	5600	56	low	low	medium		
5600	5700	57	medium	high	medium	low	
5700	5800	58	high	medium	medium	medium	
5800	5900	59	high		low	low	
5900	6000	60	high	low	medium	low	
6000	6100	61	medium	high	medium	low	
6100	6200	62	medium	low	medium	medium	
6200	6300	63	high	high	medium	medium	
6300	6400	64	medium	medium	medium	low	
6400	6500	65	medium	high	medium	low	high
6500	6600	66	medium	low	medium	low	medium
6600	6700	67	high	medium		low	
6700	6800	68	low	low	medium	low	
6800	6900	69	high	high	medium	low	
6900	7000	70	low	low	low		
7000	7100	71	x		low		
7100	7200	72	high	low	high	low	
7200	7300	73	low	low			
7300	7400	74	medium	low	medium	low	
7400	7500	75	medium	high	medium	low	
7500	7600	76	low	low	medium	high	
7600	7700	77	high	high	medium	low	
7700	7800	78	low	low	medium	low	
7800	7900	79	medium		medium		
7900	8000	80	low	high	medium		
8000	8100	81	low	low	medium	low	
8100	8200	82	low	medium	medium	low	
8200	8300	83	medium	low	medium	low	
8300	8400	84	low		medium		
8400	8500	85	medium		medium		
8500	8600	86	medium		medium		
8600	8700	87	low	high	medium		medium
8700	8800	88	low		low		
8800	8900	89	low		low		
8900	9000	90	low		medium		medium

Table 1: SUMMARY OF THE CONDITION OF ISLAMABAD RUNWAY PAVEMENT

Pavement Distress Distribution by Length (feet)					
Distress Severity	Longitudinal cracks	Patching	Ravelling/ Weathering	Rutting	Slippage cracking
Low	3500	2000	1800	4500	-
Medium	3400	1200	5300	1000	300
High	2000	1600	1500	900	200

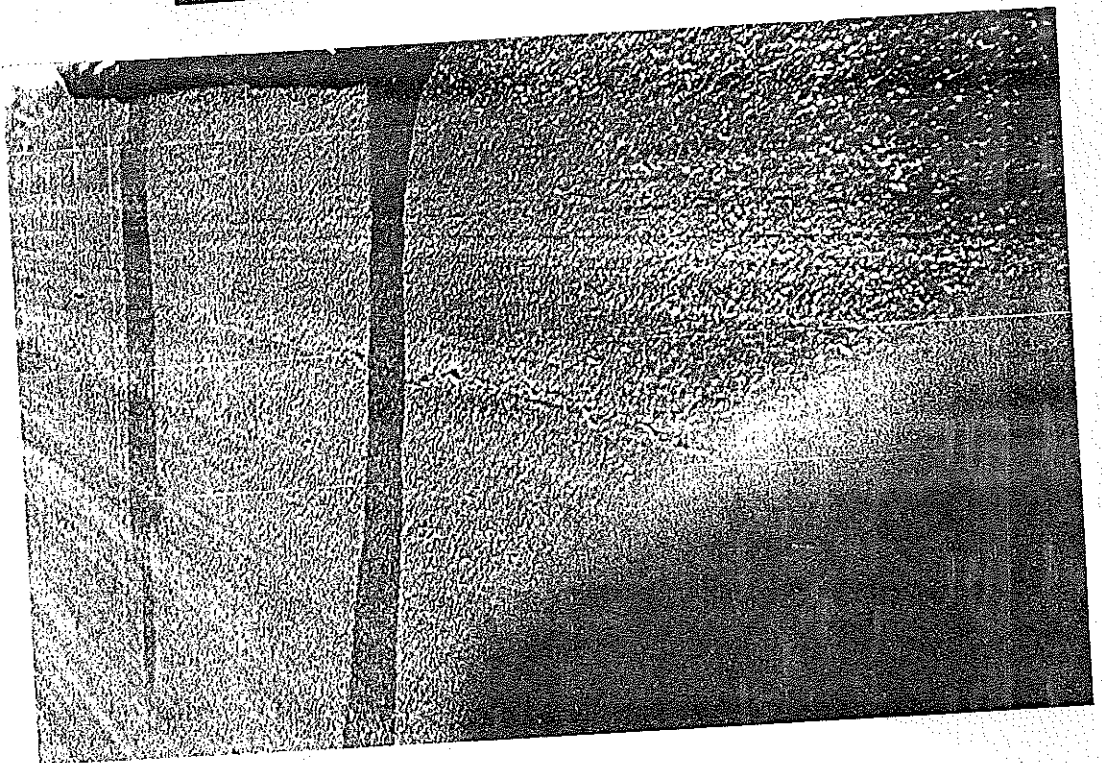
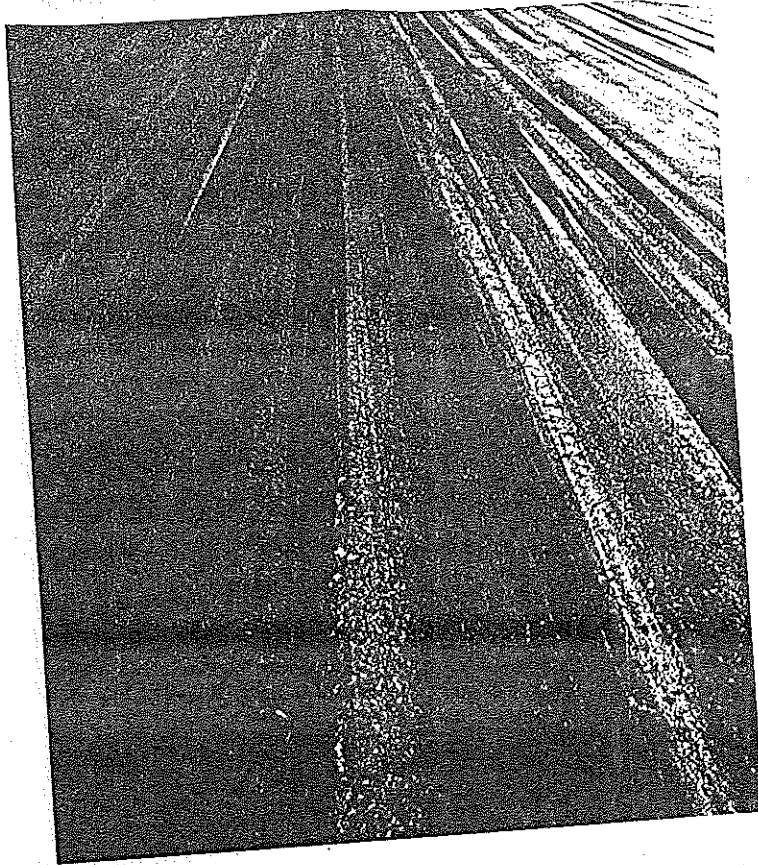


Photo 1 - 2 : Longitudinal Cracks in the Pavement

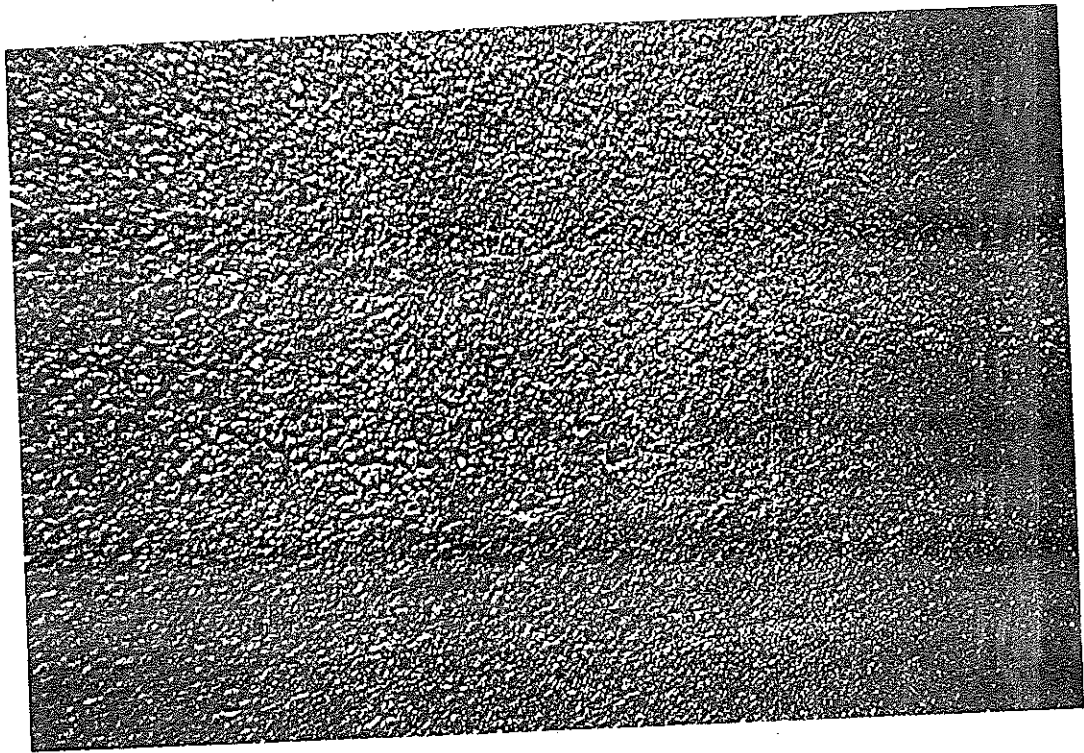
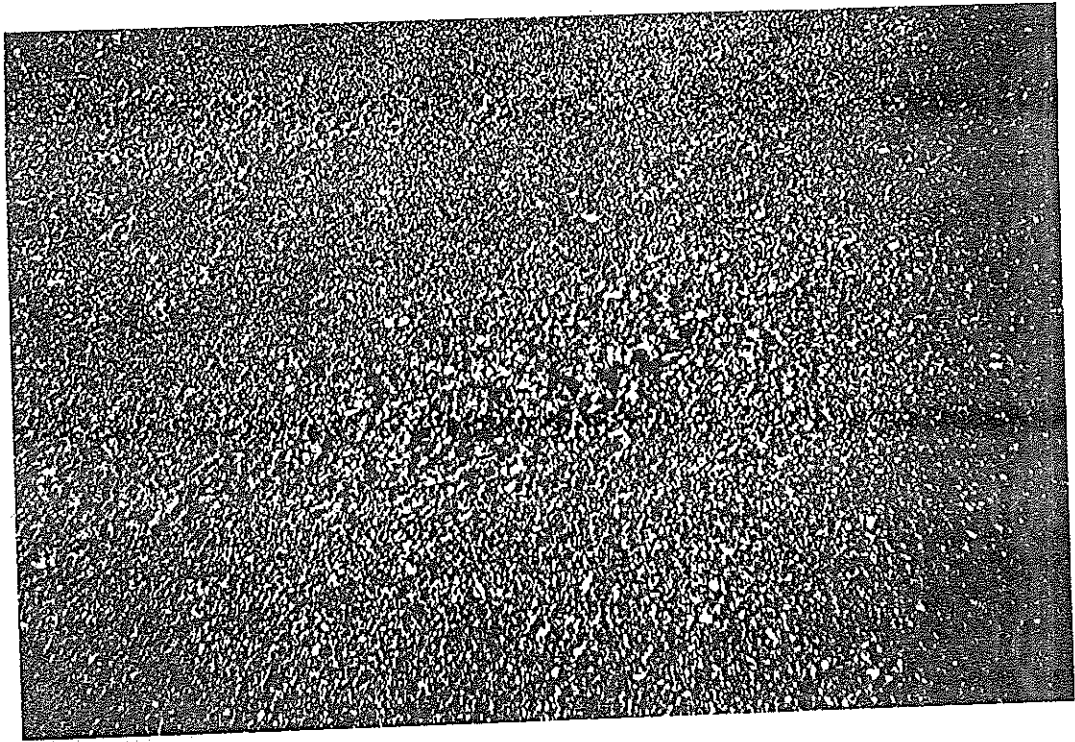


Photo 3 - 4 : Longitudinal Cracks with Raveled Surface

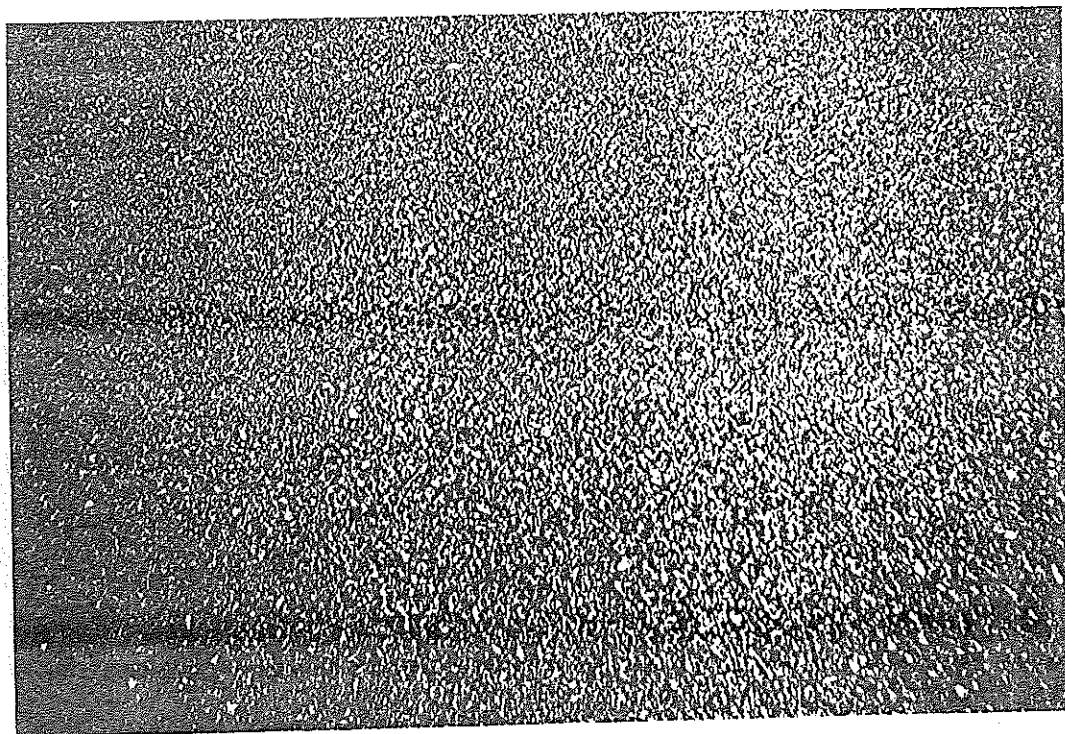


Photo 9 : Typical Weathered and Raveled Surface

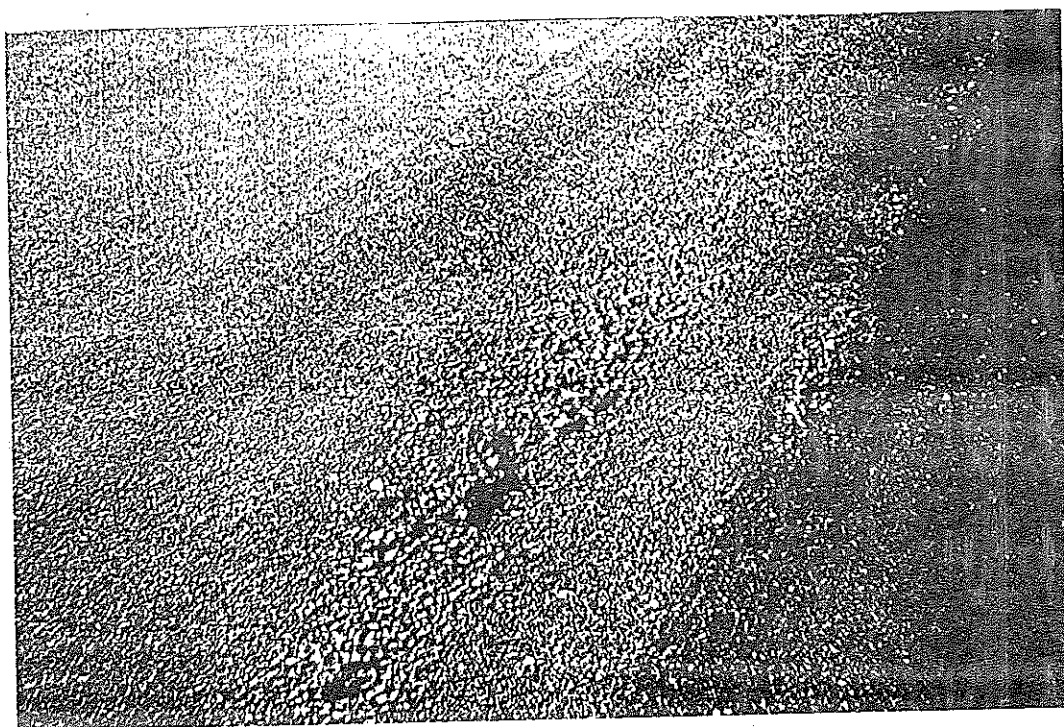


Photo 10 : Raveled Surface with Sign of Longitudinal Cracks

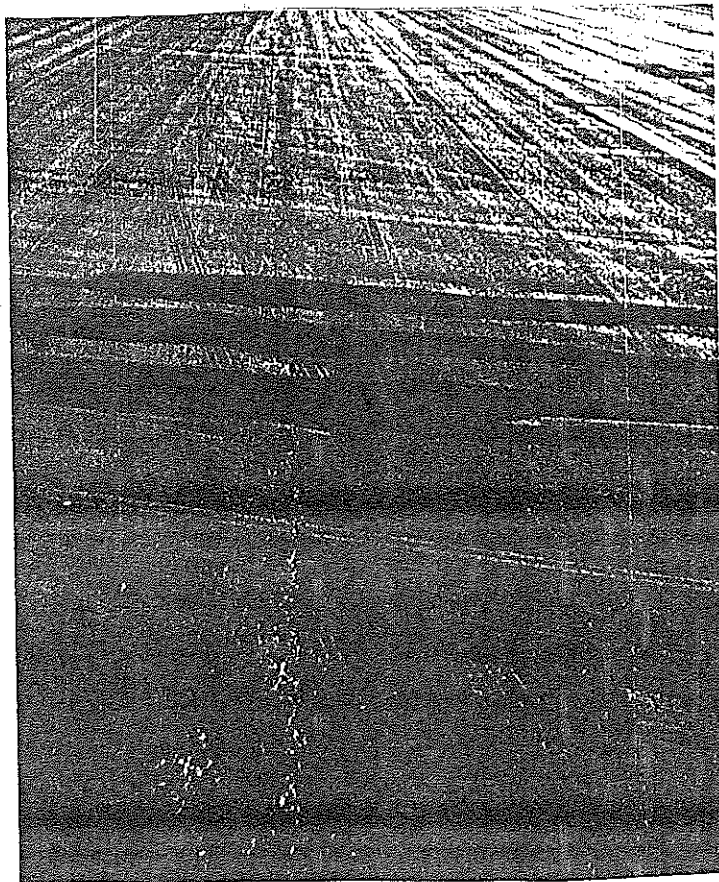
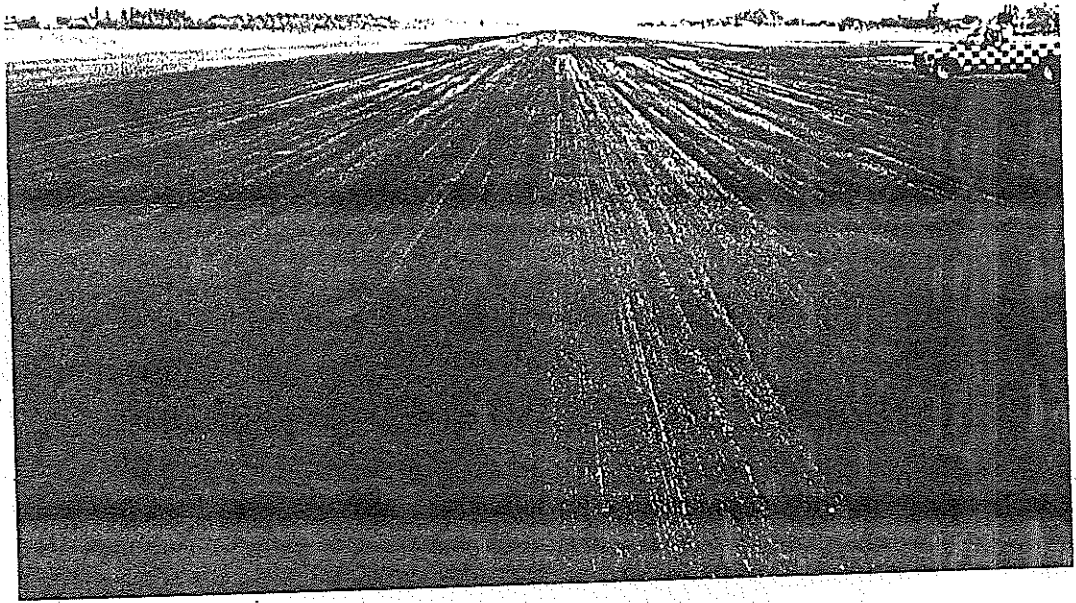


Photo 11 - 12 : Pavement with Sign of Rutting

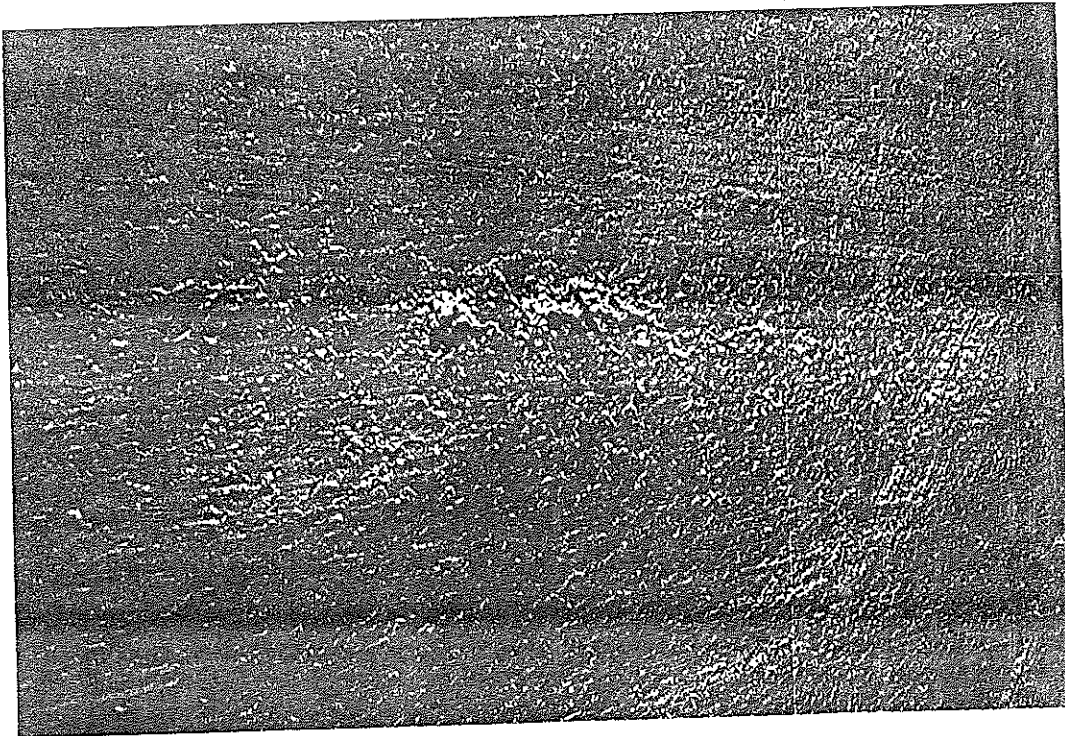
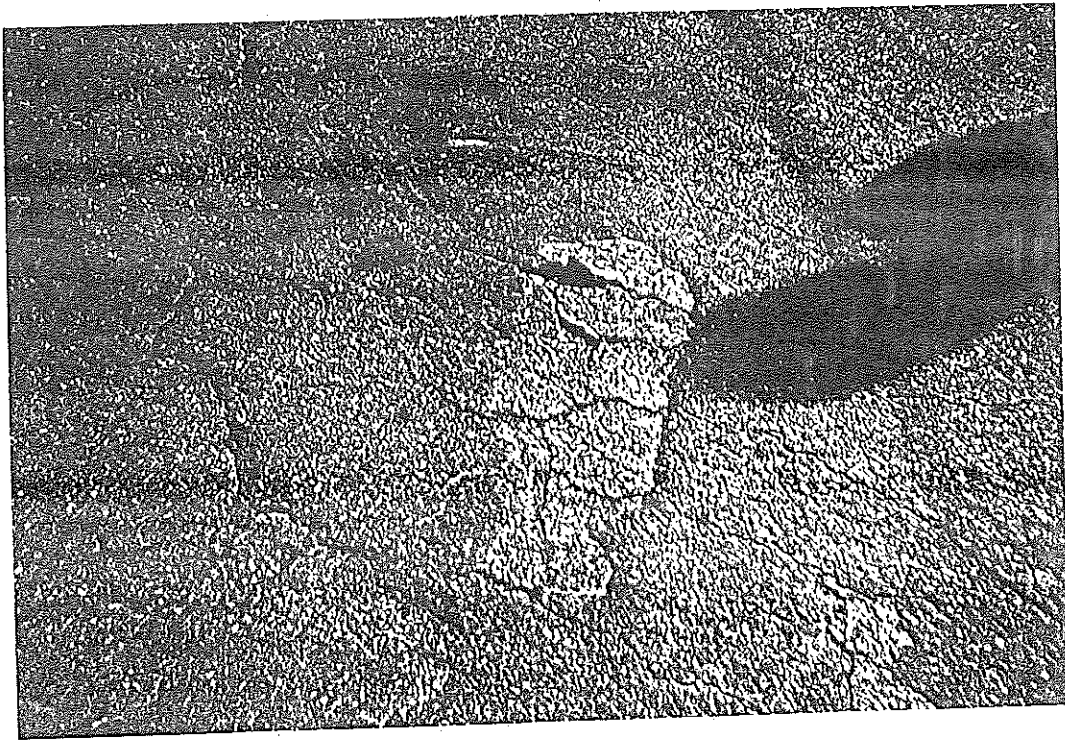


Photo 13 - 14 : Typical Slippage Crack