APPENDIX II-4

Results of Shoulder Inspection

Table Results of the Shoulder Visual Inspection

Section (km)	Rating	Condition Description	% to the area
1. "Samara - Shymkent" Road, "Karabutak - Irgiz" sec. 965-1153 km			
965-1009	bad	Poor junction	90
		Adverse gradient up 20%	10
1010-1022	fair	Poor junction	20
1023-1027	bad	Poor junction	40
		Sliding	10
1028-1035	bad	Poor junction	70
1036-1077	fair	Poor junction	15
		Adverse gradient	10
1078-1098	fair	Sliding	10
1099-1112	fair	Poor junction	10
1113-1135	bad	Poor junction	20
		Adverse gradient	10
1136-1153	bad	Rutting, sliding	20
2. "Samara - Shymkent" Road, "Irgiz - Kzyl-Ordinskaya oblast" 1154-1240 km			
1154-1176	bad	Washboards	10
		Depressions	20
		Rutting	20
1177-1190	fair	No deformations	
1191-1194		Repair	
1195-1225	bad	Rutting	20
		Washboards	20
		Sliding	30
		Depressions	10
1226-1230	fair	No deformations	
1231-1232	fair	No deformations	
1233-1240	fair	Poor junction	5
3 "Atyrau - Uralsk" Road Atyrau - Makhambet sec. 0-85 km			
1-4	fair	No deformations	
5-35	bad	Depressions	20
36-42	fair	No deformations	
43-52	bad	Poor junction	30
53-62	fair	No deformations	
63-85	bad	Depressions	10
		Rutting	20
		Poor junction	20

Data Source: JICA Study Team, 1996

APPENDIX II-5

Road Condition Chart

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 965-976 km.

Number of kilometer stations				965	966	967	968	969	970	971	972	973	974	975	976
Carriageway width (in m.)				6.3	6.0	6.3	6.4	6.7	7.5	7.1	7.3	6.4	6.2	6.4	5.7
Shoulder width (in m.)			R	4.1	4.0	3.4	5.0	3.4	2.8	3.6	4.4	6.2	4.9	6.2	4.3
			L	3.2	4.0	4.3	3.0	2.5	3.8	2.6	4.4	5.7	5.0	5.2	4.6
Embankment	Slope			1 : 3	1 : 3	1 : 2	1 : 2	1 : 2	1 : 2	1 : 2	1 : 3	1 : 3	1 : 3.5	1 : 3	1 : 1.5
	Road edge height			1.9	1.9	1.9	1.9	1.9	1.9	1.9	0.5	0.5	0.5	0.5	0.5
Number of heavy vehicles				175	175	175	175	175	175	175	175	175	175	175	175
Parameters of a surface condition				5	5	5	6	5	5	5	3	5	5	5	5
Roughness (June 1996) cm/km	Bad	IRI≥9	>160	427	469	330	320	294	327	165	133	195	192	204	264
	Poor	7≤IRI<9	125-160												
	Fair	4<IRI<7	105-125												
	Good	IRI≤4	<105												
Existing Pavement Strength	Deflection (June 1996) x 0.01mm		>200	← 184 →											
			>150												
			100-150												
			50-100												
	K=E (actual) / E (required)		>1.00												
			0.85-1.00												
			0.55-0.85												
			<=0.55	← 0.47 →											
	CBR	Base													
		Subbase													
		Subgrade													
Pavement Quality Index				← Q5 →							← Q5 →				
Flood area, occurred in 1993, 1994															
Existing Pavement Structure (1996 test pits result and Existing Data)															

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section

Road Condition Chart

Section km 977-994 km.

977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994
7.2	6.3	6.3	6.3	6.4	6.4	6.3	6.1	6.3	7.3	6.2	7.1	6.6	8.2	7.8	6.5	7.7	7.2
4.4	3.4	2.6	3.5	3.8	3.1	2.7	3.4	3.0	2.8	3.3	2.2	3.0	2.9	2.7	2.1	2.8	2.8
3.0	3.7	2.9	2.7	2.75	2.7	2.7	3.0	2.8	2.3	3.7	2.6	4.0	2.6	2.6	2.6	2.6	3.0
1 : 2.5	1 : 2	1 : 2	1 : 2	1 : 2.5	1 : 2.5	1:03	1 : 2.5	1 : 2.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 3.5	1 : 2
0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
3	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5
305	205	235	142	339	168	281	323	205	206	211	304	228	297	263	295	211	202

184

0.47

10

Q4

Black Stone stone + sand 4 22

Grav. Black + stone Stone stone + sand 4.5 8 18

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 995-1012 km.

995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012
7.1	7.2	7.0	7.9	7.6	7.0	7.0	7.5	7.8	7.0	8.0	7.0	7.9	7.0	8.0	7.7	7.0	7.6
3.0	3.1	3.0	2.0	3.0	3.0	2.7	3.0	3.0	2.7	3.8	2.9	2.7	3.0	2.8	2.7	3.5	3.9
3.3	3.3	3.3	3.9	3.1	3.2	3.8	2.8	2.7	4.2	3.2	2.9	2.7	2.6	3.8	3.3	3.2	3.9
1 : 2	1 : 2	1 : 1.5	1 : 1.5	1 : 1.5	1 : 3	1 : 2	1 : 2	1 : 1.5	1 : 2	1 : 2	1 : 2.5	1 : 3.5	1 : 3.5	1 : 3.5	1 : 3.5	1 : 3	1 : 3
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
4	4	4	4	4	4	4	4	6	6	6	5	4	4	6	4	3	3
122	198	207	219	187	184	190	226	295	234	280	176	137	173	249	192	167	158

184

0.47

Q4

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section

Road Condition Chart

Section km 1013-1030 km.

1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030
7.0	7.2	6.4	6.0	7.0	7.2	7.8	7.0	7.0	7.3	7.6	7.6	8.1	7.2	7.0	7.5	7.2	7.1
3.0	2.8	3.1	3.0	3.8	3.0	2.0	3.2	3.2	2.6	4.0	4.0	3.9	2.7	2.8	2.0	3.0	3.1
2.9	3.0	3.6	3.2	3.6	3.0	2.0	3.0	3.4	2.7	4.2	4.2	5.2	5.0	3.5	3.3	3.2	3.4
1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3.5	1 : 3.5	1 : 3.5	1 : 2.5	1 : 2.5	1 : 2.5	1:1.5	1 : 3	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
3	3	3	3	4	3	3	3	3	3	6	6	6	5	5	3	3	3
173				171				225	176	137	365	318	351	327			256
	118		124		120	119										121	
		108					94								107		
			144									139					
			0.59									0.62					
								Q4									

Black stone 8
Stone + sand 15

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1031-1048 km.

1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048
7.2	7.3	6. 4	6.2	6.0	Unpaved	8.0	7.5	7.0	7.2	8.2	8.0	Unpaved	6.8	8.3	8.0	8.4	7.3
3.6	3.1	3.6	3.8	2.3		2.8	2.6	3.1	2.6	2.4	2.9		3.9	2.8	3.5	4.3	3.7
3.8	4.1	3.5	2.8	2.1	15.7	2.7	2.9	3.1	3.2	2.8	2.3	13.6	3.8	2.6	2.8	3.7	1.8
1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 3	1 : 3.5	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3.5	1 : 3	1 : 3	1 : 3
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
4	5	3	3	3	5	5	5	5	5	5	5	6	5	6	5	4	4
536	279		310	273	511	269	193	228	325	294	368	258	281	297	195	390	138
		100															
109						129											
0.79						0.67											
						12											
						10											
						Q4											

Black	stone	6
Soil +	stone	8

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1049-1066 km.

1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066
Unpaved	8.0					7.5	7.5	5.6	7.5	6.6	7.6	7.5	6.5	6.7	Unpaved		8.0
	3.0					4.0	4.0	3.8	4.3	4.0	3.9	3.0	3.4	3.0			3.0
14.7	3.8					5.0	5.0	4.7	3.2	4.6	3.0	4.5	4.5	4.4	15.0	14.7	3.2
1 : 3	1 : 3.5	missing of the stations				1 : 2.5	1 : 2.5	1 : 3	1 : 3.5	1 : 3	1 : 2.5	1 : 2.5	1:4	1 : 2.5	1 : 3	1 : 3	1 : 3
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
175	175					175	175	175	175	175	175	175	175	175	175	175	175
6	5					5	5	5	5	5	5	4	4	5	6	6	6
318	340					344	364	263		154	116				409	372	366
									123								
												100		99			
													58				
	129																
	0.67																
	Q4																

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1067-1084 km.

1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084
Unpaved		7.5	7.5	Unpaved	7.2	Unpaved	7.2	6.0	6.4	Unpaved	Unpaved	Unpaved	8.0	7.6	8.3	8.4	8.0
		4.7	4.0		4.0		2.8	4.2	4.0				3.0	3.0	2.7	3.8	3.4
15.5	15.5	4.0	6.0	17.2	3.2	15.2	3.2	3.5	2.6	15.0	14.7	14.5	2.6	3.0	2.7	3.3	3.7
1 : 3	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 3	1 : 3	1 : 3	1 : 3.5	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 2	1 : 1.5	1 : 1.5
0.7	0.7	0.7	1.1	1.1	1.1	1.1	1.1	1.1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
6	6	6	6	5	5	5	5	4	5	5	5	5	5	5	3	3	3
360	268	244	152	252	400	446	279		395	209	431	463	358				
														123			
								107								100	
															56		85
139										129							
0.62																	
		12															
Q4													Q4				

Black Stone	stone	6
	+ sand	8

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1085-1102 km.

1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102
9.0	8.0	8.0	Unpaved	8.3	8.5	Unpaved	7.1	6.5	7.15	7.1	7.1	7.2	7.1	7.8	7.5	8.0	8.0
2.8	3.0	4.0		3.3	3.8		4.7	3.8	3.0	2.6	2.8	2.2	1.9	2.9	3.1	2.1	2.1
3.5	3.2	3.6	16.6	2.3	3.8	16.2	3.3	3.5	2.6	2.9	2.6	2.2	2.1	2.1	2. 8	2.6	2.7
1 : 1.5	1 : 1.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2	1 : 2	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2	1 : 2	1 : 2.5	1 : 3.5	1 : 2.5	1 : 3	1 : 3
0.4	0.4	0.4	0.4	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
3	3	5	5	5	4	5	4	5	4	4	3	5	5	5	4	4	4
		660	657	178	225	489	182	172			127	141		207	171	141	
													124				123
51	65								84	72							
145	→							←		145		→		←			
0.59	→							←		0.59		→		←			
														12			
														8			
	Q4	→		←						Q4		→					

5	Black	stone	
18	Gr. +	st. +	sand

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1103-1120 km.

1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120
7.3	8.1	7.8	8.0	7.3	9.0	8.0	7.5	7.8	7.6	8.0	7.4	6.8	7.2	7.7	6.0	6.3	8.0
2.9	4.3	2.7	2.1	3.5	2.8	2.6	4.3	4.6	3.4	2.0	3.0	2.8	2.3	3.7	2.6	3.4	2.8
2.9	3.9	3.8	3.0	5.4	2.8	3.0	3.5	2.4	4.3	3.4	3.0	3.4	3.0	2.7	3.7	3.1	3.2
1 : 2.5	1 : 1.5	1 : 2	1 : 2.5	1 : 2	1 : 2	1 : 2	1 : 2	1 : 1.5	1 : 2.5			1 : 2.5	1 : 3	1 : 3	1 : 3	1 : 3	1 : 2.5
1.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.9	1.9	1.9
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
3	4	4	5	5	6	6	5	5	4	3	3	4	3	3	3	3	3
224	130	135	155	190	405	135			129		142	140	129				
							112										
								107							109	90	110
										67				73			

136 — 138 — 125

0.62 — 0.62 — 0.69

Q4

6 Black stone
12 St. + sand

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1121-1138 km.

1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138
7.8	6.4	7.2	7.2	7.2	7.2	7.2	7.6	8.2	7.0	7.5	7.5	6.3	6.1	6.2	6.1	6.2	6.0
4.1	3.6	2.5	2.8	3.0	5.0	4.0	4.0	3.2	3.6	3.5	4.4	3.2	2.7	2.6	2.0	3.0	3.0
3.6	3.6	4.1	2.8	3.5	3.4	2.7	3.5	2.8	3.0	2.4	3.0	2.7	2.8	3. 0	3.2	3.0	2.8
1 : 2.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 2.5	1 : 3	1 : 3	1 : 3	1 : 2.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	-	-
1.9	1.9	1.9	1.9	1.9	1.9	0.64	0.64	0.64	0.64	0.64	3.2	3.2	3.2	3.2	3.2	0.3	0.3
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
3	4	4	4	4	3	33	3	3	3	3	3	3	3	3	5	5	6
		177							180					224			277
			119		118												
						91				91	98	93	99		92	105	
71	85			66			79	83									
									126								
									0.69								
								10									
								10									
Q4						Q4				Q4							

stone
sand

4 Black stone
12 Gr. + st. + sand

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1139-1156 km.

1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156
5.9	5.3	6.8	6.7	7.0	7.0	7.0	7.0	7.0	7.1	7.0	7.0	7.2	7.5	7.1		Unpaved	
2.0	5.0	4.0	3.5	4.0	3.5	3.0	4.7	4.5	3.0	4.5	3.8	3.5	3.8	4.2			
3.0	3.3	2.5	2.1	3.0	3.0	3.4	4.0	3.5	4. 8	2.8	1.8	2.0	2.2	3.3	20.0	16.0	17.8
1 : 3	---	---	1 : 2.5	1 : 4	1 : 4	1 : 4	1 : 4	1 : 2.5	1 : 2.5	1 : 3	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 1.5	1 : 1.5	1 : 1.5
0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.2	1.2	1.2	1.2	0.6
175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175	175
5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	6	6	6
173	179	144	138	142		153	150	149		205			175	136	562	461	685
									118								
					90						107	89					
←					162									→			
←					0.53									→			
←						Q5						→	←		Q5	→	

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1157-1174 km.

1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174
Unpaved																	
18.2	19.6	20.0	15.7	16.7	16.7	16. 0	15.6	16.1	16.4	17.4	16.1	16.1	16.1	17.4	17.0	17.0	18.2
1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 2.5	1 : 2	1 : 1.5	1 : 1.5	1 : 1.5	1 : 2	1 : 2
0.6	0.6	0.6	0.6	0.6	0.6	1.2	1.2	1.2	1.2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
567	551	615	581	679	476	761	579	514	452	678	656	423	540	570	605	591	431
225																	
0.46																	
Q5						Q5								Q5			

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1175-1192 km.

1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192
Unpaved																	
19.5	19.0	19.0	18.2	17.8	17.8	18.0	18.5	16.0	15.8	19.8	20.0	19.3	18.2	16.4	18.4	16.5	14.3
1 : 2.5	1 : 2.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 3	1 : 3.5	1 : 1.5	1 : 1.5	1 : 1.5	1 : 1.5
0.7	0.7	0.7	0.7	1.0	1. 0	1.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	1.0	1.0
191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
6	6	4	4	4	7	7	7	4	4	4	4	4	4	4	4	7	7
775	622	511	266	368	1726	507	434	377	479	425	385	370	229	231	271	588	1021
		245												233	233		
		0.36												0.36	0.36		
																10	
																4	
				Q5													
																15	Soil +

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1193-1210 km.

1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210
Unpaved																	
16.7	18.8	19.2	16.9	17.2	17.4	16.8	17. 0	16.5	17.5	19.5	17.5	16.0	16.0	16.5	16.8	17.7	20.0
1 : 1.5	1 : 1.5	1 : 1.5	1 : 2	1 : 2.5	1 : 2.5	1 : 2	1 : 2	1 : 2	1 : 3.5	1 : 2	1 : 2	1 : 2.5	1 : 2.5	1 : 2.5	1 : 3	1 : 1	1 : 1
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
954	1492	864	702	843	853	924	839	879	802	733	852	1231	1097	965	850	551	542
															200		
															0.42		
								Q5									
stone																	

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1211-1228 km.

1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228
Unpaved										11.6	Unpaved			10.8	8.2	8.1	8
										1.8				2.5	3.5	3.4	2.8
15.0	12.5	17.0	17.8	14.0	14.0	17.0	14.0	13.9	13.8	3.4	16. 5	15.2	14.8	2.6	4.0	4.2	3.4
1 : 2	1 : 2	1 : 2	1 : 3.5	1 : 2	1 : 2	1 : 2	1 : 2	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 3	1 : 2	1 : 3.5	1 : 3.5	1 : 3.5	1 : 2.5
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191
7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	3	3	2
648	508	761	699	829	1020	520	529	959	654	612	606	632	797	725			
																115	
															76		48
																	99
																	0.85
							Q5										Q3
										16 Gr. + st. + sand						4 24	Black Gr. +

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Samara-Shymkent Road
Karabutak-Kzyl Orda Border Road Section **Road Condition Chart**

Section km 1229-1240 km.

1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240
7.9	Unpaved		8.25	7.6	7.2	7.3	8.4	8.3	8.5	6.6	6.9
3.5			3.9	4.4	3.4	3.8	4.6	4.0	4.0	3.9	3.8
3.2	15.0	14.0	3. 0	3.8	3.9	4.0	4.2	3.6	4.2	4.2	4.0
1 : 2.5	1 : 3	1 : 2	1 : 2.5	1 : 2	1 : 2	1 : 2	1 : 2	1 : 2.5	1 : 1.5	1 : 2.5	1 : 3
1.0	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
191	191	191	191	191	191	191	191	191	191	191	191
2	6	7	7	5	5	3	3	3	3	5	5
	584	515	523		152						205
				115							
									107	100	
55						72	49	64			
		240	240								
				100							
				0.84							
		0.35									
	Q5			Q3							
stone st. +	sand										

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table **Road Condition Chart**

Atyrau-Uralsk Road
Atyrau-Mahambet Road Section

Road Condition Chart

Section km 1-12 km.

Number of kilometer stations				1	2	3	4	5	6	7	8	9	10	11	12
Carriageway width (in m.)				10	10.5	8.3	7.0	7.5	7.1	6.5	7.2	7.1	7.5	7.0	7.0
Shoulder width (in m.)			R	6.1	7.5	4.0	2.5	6.0	5.0	6.5	7.2	6.3	7.0	4.3	3.7
			L	8.35	7.0	5.3	1.2	6.3	5.3	4.8	7.3	7.7	6.15	3.0	3.0
Embankment	Slope			1 : 2	1 : 2	1 : 2	1 : 1.5	1 : 2.5	1 : 2.5	1 : 3	1 : 2.5	1 : 2.5	1 : 2	1 : 3.5	1 : 2.5
	Road edge height			0.8	1.3	1.8	3.5	1.5	1.5	1.3	1.5	1.0	1.2	0.5	0.7
Number of heavy vehicles				206	206	206	206	206	206	206	206	206	206	206	206
Parameters of a surface condition				2	2	2	2	5	3	4	4	4	4	4	5
Roughness (June 1996) cm/km	Bad	IRI≧9	>160	205	261	221	236	239	367	409	284	330	311	323	338
	Poor	7≦IRI<9	125-160												
	Fair	4<IRI<7	105-125												
	Good	IRI≦4	<105												
Existing Pavement Strength	Deflection (June 1996) x 0.01mm		>200	← 217 →				← 322 →							
			>150												
			100-150												
			50-100												
	K=E (actual) / E (required)		>1.00												
			0.85-1.00												
			0.55-0.85												
			<=0.55	← 0.35 →				← 0.24 →							
	CBR	Base													
		Subbase													
		Subgrade													
Pavement Quality Index				← Q5 →											
Flood area, occurred in 1993, 1994															
Existing Pavement Structure (1996 test pits result and Existing Data)															

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Atyrau-Uralsk Road
Atyrau-Mahambet Road Section **Road Condition Chart**

Section km 13-30 km.

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
7.0	7.0	6.2	6.8	6.6	6.8	7.0	6.8	6.7	6.7	6.8	6.7	7.0	6.7	6.8	6.7	7.0	7.4
3.0	2.8	3.0	3.8	2.0	2.5	3.0	3.8	3.0	3.5	3.3	3.2	4.4	3.2	3.1	4.4	3.1	3.6
3.5	3.8	3.0	2.8	2.2	3.0	2.2	3.0	2.0	2.8	2.7	3.0	2.2	1.2	2.0	2.0	3.1	4.4
1 : 1.5	1 : 3	1 : 3	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 3	1 : 3	1 : 2.5	1 : 2	1 : 2	1 : 2	1 : 3	1 : 4	1 : 4	1 : 4	1 : 3
0.7	1	1.2	1.3	2.5	1.3	1.2	1.2	1.0	1.1	1.0	1.3	0.8	0.8	0.8	1.0	0.7	1.0
206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
5	5	5	5	5	5	5	5	5	5	5	4	4	5	5	4	5	4
288	291	410	304	499	324	233	299	284	298	304	347	283	309	229	319	354	373

322

0.24

Q5

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Atyrau-Uralsk Road
Atyrau-Mahambet Road Section **Road Condition Chart**

Section km 31-48 km.

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
6.6	6.7	6.4	6.7	6.4	6.0	6.1	6.4	7.0	7.0	6.8	6.4	6.7	6.9	6.5	6.7	6.5	6.7
3.7	3.2	3.2	3.0	4.7	2.8	3.7	1.8	3.0	2.7	3.0	3.2	3.0	3.7	3.5	4.2	3.0	4.1
2.7	2.2	2.8	2.8	4.0	3.0	3.0	2.1	3.5	3.8	3.0	2.6	2.0	3.3	3.3	4.4	2.6	4.5
1 : 1.5	1 : 2	1:1.5	1 : 2	1 : 2	1 : 1.5	1 : 2.5	1 : 1.5	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 3	1 : 1.5
1.1	0.5	0.5	0.8	1.1	1.0	1.1	1.0	1.1	1.1	1.1	1.2	1.2	1.3	0.9	1.3	0.6	0.5
206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
4	4	4	4	4	4	4	6	6	6	5	4	4	4	5	5	5	5
208	198	193	220	167	177	162	195	299	353	394	325	297	166	266	407	368	295

322 200

0.24 0.45

6

6

Q5

Gr. + Black st. + Stone sand 19 4

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Atyrau-Uralsk Road
Atyrau-Mahambet Road Section

Road Condition Chart

Section km 49-66 km.

49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
6.4	7.0	6.1	6.6	6. 7	6.1	6.1	6.0	6.1	6:1	6.3	6.8	6.1	6.3	6.8	6.5	6. 6	6.4
4.1	3.3	3.5	3.5	3.8	3.5	4.4	3.4	3.7	4.0	5.1	4.5	2.8	3.5	3.5	3.0	4. 4	4.7
4.4	2.2	2.8	2.8	3. 0	3.5	4.3	4.4	4.3	4.0	3.8	4.5	3.3	3.4	4. 0	3.5	4. 3	3.0
1 : 1.5	1 : 5	1 : 2	1 : 4	1 : 3	1 : 2	1 : 2.5	1 : 2	1 : 2.5	1 : 3	1 : 2.5	1 : 3	1 : 2	-	1 : 3	-	1 : 4	1 : 5
0.5	0. 6	0.9	1.1	1.1	1.0	1.0	0.8	1.1	1.1	0.6	0.5	1.5	0	1.0	0	0.5	0.3
206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
5	6	5	5	5	5	5	5	5	5	5	5	4	4	4	4	4	3
387	376	410	332	342	323	254	268	205	260	280	217	212	290	273	312	255	272
← 200																	200 →
← 0.45																	0.45 →
6									6								
Q5																	
+									+								
15 / 24 Black Gr. +	stone st. +	sand							12 / 4 Black Gr. +	stone st. +	sand						

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

Table Road Condition Chart

Atyrau-Uralsk Road
Atyrau-Mahambet Road Section **Road Condition Chart**

Section km 67-83 km.

67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83
6.3	6.4	5. 8	5.6	5.5	5.7	5.9	5.7	5.6	5.5	5.6	5.5	5.6	5.4	5.6	5.5	5.6
3.7	4.4	4.4	3.7	3.2	2.7	2.7	2.6	2.7	2.7	2.6	2.5	2.4	2.4	2.4	2.4	2.4
4.3	3.1	3.6	3.5	3.0	3.2	3.0	3.1	3.0	2.8	2.4	2.3	2.5	2.3	2.2	2.3	2.2
1 : 3	1 : 3	1 : 2.5	1 : 3	1 : 2.5	1 : 2.5	1 : 2	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5	1 : 2.5
0.3	0.3	1. 0	1.5	1.4	1.5	1.5	1.4	1.3	1.3	1.4	1.5	1.3	1.4	1.3	1.2	1.3
206	106	106	106	106	106	106	106	106	106	106	106	106	106			
4	3	3	3	4	4	4	4	4	3	3	3	3	3	3	3	3
211	313	145	313	182	157	314	222	342	330	236	283	294	186	224	348	348

200 200

0.45 0.38

Q5

Legend : 1. Surface condition parameter : 1=Good; 2-3=Fair; 4-5=Poor; 6-7=Bad.
2. Pavement structure condition : K>=1.00:Good; 0.85<=K<1.00:Fair; 0.55<K<0.85:Poor; K<=0.55:Bad
3. Pavement quality Index : Q1-Q2 : Limited pavement damage; Q4-Q5 : Heavy pavement damage; Q3 : Uncertain damage

APPENDIX II-6

Results of Visual Culvert Inspection

Table 3. Results of a Visual Inspection of Culverts

No	Location	Culvert condition					
		Dimensions				Description of culvert condition	Necessity of repair
		num. of orifises	diame-ter,m	length ,m total	sect.		
1	2	3	4	5	6	7	8
Samara-Shymkent motor road "Karabutak-Irgiz"sec.965-1153 km							
1	968+100	2	1.5	16	/	culvert slots are not filled.Partially destroyed headwalls	Required: concrete-0.5 m³ mortar-0.2 m³ strengthening: grave sand-3 m³ concrete -1 m³
2	972+100	1	1	14	/	very good	
3	974+200	2	1.5	14	/	good	plastering: mortar-0.1 m³
4	975+500	3	1.5	14	/	very good	
5	978+100	1	1.5	14	/	good	plastering: mortar-0.1 m³
6	978+980	2	1.5	15	/	good	plastering: mortar-0.1 m³
7	982+600	2	2.5*2	17	/	destroyed low bottom No headwalls.Bad	Strengthening: sand gravel-5 m³ concrete-3 m³
8	983+500	1	1.5	18	/	good	plastering: mortar-0.3 m³
9	985+700	1	1.5	18	/	good	plastering: mortar-0.3 m³
10	985+900	1	1.5	14	/	good	plastering: mortar-0.4 m³
11	988+700	1	1.0	17	/	good	plastering: mortar-0.3 m³
12	991+900	2	1.5	28	/	fair	concrete placement of headwalls: concrete-1 m³ mortar-0.5 m³
13	994+600	1	1.0	15	/	destroyed headwalls of blocks require assembling	plastering: mortar-0.5 m³
14	998+400	2	1.0	18	/	good	
15	1002+600	1	1.5	15	/	No headwall:small headwall at the outlet	construction of headwalls and wind wings: concrete-2.5-3.0 m³; mortar-1 m³;bottom strengthening: gravel-4 m³.
16	1002+800	1	1.5	16	/	silting for 1/3; small headwalls;no wingwalls; no strengthening;no plaster between rings.	concrete-3 m³; mortar-1.2 m³ ;strengthening: sand-gravels 10m³
17	1005+800	2	2.5*2	16	/	Small headwalls; no wings; no strengthening;no plaster between rings; washed and broken blocks of	Dismantling; construction of monolith foundation;

						foundation ; no plaster between tubings. .Bad.	erection.
18	1009+900	3	1.5	14	/	Bottom don't need strengthening. Headwalls need plaste ring. No pavement over culvert. Good.	Concrete-1.5 m ^{3}; mortar - 1 m ^{3}
19	1018+600	2	1.5	18	/	Headwalls need plastering.. Good	Plastering: mortar -1 m ^{3}
20	1025+500	3	1.5	16	/	Strengthened bottom. Water stagnation.No soil over the culvert.Ro-ad pavement on the culvert . Bad.	
21	1030+700	1	1.5	15	/	Broken right headwall.Was-hed out bottom.Walls bet-ween rings are not plastered. Fair.	Plastering: mortar-0.3 m ^{3}
22	1038+600	2	1.5	13	/	Water stagnation in culvert.Culvert is lowered. Fair	
"Samara-Shymkent"m.r."Irgiz-Kzyl-Ordinskaya obl."sec.1154-1240 km							
23	1057+500	2	1.5	13	/	Good condition	
24	1062+200	1	1.0	14	/	Silted bottom.Fair.	
25	1068+600	1	1.5	13	/		
26	1074+900	1	1.0	16	/	Destroyed headwalls;Silted culvert.Bad.	Concrete-1 m ^{3}; mortar-0.3 m ^{3} .
27	1081+700	3	1.0	13	/	Unstrengthened bottom. Fair.	
28	1085+960	3	1.0	13	/	Unstrengthened and washed out bottom. Fair.	
29	1089+050	3	1.5	13	/	Unstrengthened bottom. Fair.	
30	1090+700	2	1.0	13	/	Very low headwall.	The culvert or to raise headwall
31	1092+900	2	1.0	13	/	Unstrengthened bottom. Good	
32	1093+960	1	1.0	13	/	Unstrengthened bottom. Good	
33	1097+700	2	1.5	17	/	Old culvert.Very low head-walls.Very bad.	concrete-1.0m^3 mortar-0.4m^3
34	1099+100	3	1.5	14	/	Unstrengthened bottom. Good.	
35	1099+600	1	1.0	15	/	Good	
36	1100+100	1	1.5	13	/	Good	
37	1101+200	1	1.0	14	/	Good	
38	1104+600	2	1.5	15	/	Good	
39	1108+300	1	1.5	17	/	Good	
40	1109+800	1	1.0	14	/	Very good	
41	1110+400	1	1.0	18	/	bottom silting for 1/4	
42	1111+800	1	1.0	14	/	Broken outlet headwall is silted for 1/3	repair is required.
43	1114+900	1	1.0	15	/	Monolithic headwalls; Silting for 1/3	
44	1115+850	1	1.0	14	/	Monolithic headwalls; Silting for 1/2	
45	1116+900	2	1.5	14	/	Monolithic headwalls; Silting at 1/4.Unstrengthe-ned bottom.	
46	1121+000	3	1.5	16	/	Monolithic headwalls; Silting at 1/4.Bottoms are not strengthened	

47	1135+300	2	1.0	16	/	No culvert base; rings are not fixed; culvert is damaged.Bottoms are not strengthened and washed out.	Overhoul repair
48	1150+200	1	1.5	15	/	Monolithic headwalls ; bottoms are silted and unstrengthened	
49	1151+500	1	1.5	15	/	Monolithic headwalls ; bottoms are silted and unstrengthened	
50	1152+300	1	1.0	15	/	Normal headwalls; Monolithic headwalls ; bottoms are silted and unstrengthened	
51	1155+000	1	1.0	16	/	No headwall;broken wings; no strengthening	repair
52	1157+700	1	1.0	16	/	No headwalls.Wings are present	repair
53	1165+950	1	1.0	14	/	No headwalls;bottom are not strengthened;control point of bottom is too high	Construction of headwalls: covcrete-1m³ mortar-0.2m³
54	1167+300	2	1.0	13	/	Monolithic headwalls,silted bottom .Good	
55	1173+400	2	1.5	15	/	Silted bottoms are not strengthened.Good	
56	1176+600	1	1.0	13	/	Silted bottoms are not strengthened.Good	
57	1202+600	3	1.5	13	/	bottoms are overrun with weeds. outlet bottom is washed out.Good	bottom strengthening.
58	1206+450	2	1.0	13	/	Bottoms are not strengthened	bottom strengthening.
59	1207+400	1	1.0	13	/	Silted culvert;normal head-walls; unstrengthened bottoms	
60	1208+100	1	1.0	13	/	Silted culvert;normal head-walls; unstrengthened bottoms	
61	1222+600	2	1.5	13	/	Normal headwalls; unstrengthened bottoms; 6th ring is broken in the middle.Joints are not plas-tered.	ovehaul repair is required.
62	1228+700	2	1.5	14	/	Normal headwalls; unstrengthened bottoms; sagging of culvert in the middle in 20cm	
" Atyrau-Uralsk "in. r. "Atyrau-Makhambet"sec.0-83 km							
1	2+700	1	1.0	17	/	Culvert outlet and inlet are filled up for 1/2.Good .	
2	7+100	4.2	0.6	9.0	/	Rectangular culvert.Fair	To lengthen the culvert
3	11+700	2.0	1.2	12	/	Rectangular culvert.Fair	
4	13+350	4.0	1.5	12	/	Rectangular culvert.Fair	
5	15+050	5.0	1.5	12	/	Good condition	
6	16+100	2.2	1.0	12	/	Good condition	
7	18+500	3.2	2.1	12	/	Good condition	
8	19+400	3.2	2.1	12	/	Good condition	
9	20+400	3.2	2.6	12	/	Headwall with wings. Fair.	
10	21+850	3.2*2	1.8	11	/	Rectangular culvert.Good	
11	23+020	5.0	1.7	12	/	Rectangular culvert.Head-walls are broken .Fair .	repair is required: concrete 0.7m³

12	25+900	2	1.0	14	/	Circular culvert Very good	
13	31+500	2	1.5	14	/	Circular culvert .Good	
14	32+800	2	1.0	14	/	Circular culvert .Good	
15	36+100	5.0*2	2.0	12	/	Rectangular culvert with wings.Good	
16	40+100	1	1.0	20	/	Circular culvert is lengthened on 6m (3m in each side).Fair.	
17	41+050	1	1.0	18	/	Circular culvert .Good	
18	41+950	1	1.0	20	/	Circular culvert .Good	
19	47+100	1	1.0	17	/	Circular culvert is lengthened with concrete blocks.Fair	Is required to lengthen the culvert by 4 reinforced concrete rings with 1 m in diameter and to assemble the headwalls.
20	49+600	1	1.0	15	/	Good condition	
21	51+600	1	1.0	15	/	Good condition	
22	54+100	1	1.0	15	/	Cracks in headwalls.Fair	Headwall plastering

Data Source : JICA Study, 1996

APPENDIX II-7

Direct Improvement Cost of Culverts

Table 1 Direct Culvert Construction Cost

(Unit : Tenge)

Culvert Type	Size	Length (m)	Items	Scour Protection (m^3)	Barrel (m^3)	Aprons (m^3)	Headwalls, Wingwalls (m^3)	Total Quantites (m^3)	Unit Cost (m^3)	Cost Per Item (x 10^3)	Total Cost (x 10^3)
Pipe	1.5	16.0	Precast Reinforced Conc.		14		15	29	16,000	464	
			Lean Concrete			4		4	3,000	12	
			Sand/Gravel		18		16	34	1,500	51	
			Stone	5				5	1,000	5	532
Box	3(2.0 x 1.5)	17.0	Precast Reinforced Conc.		168		18	186	16,000	2,976	
			Lean Concrete		50	15	11	76	3,000	228	
			Sand/Gravel		36		64	100	1,500	150	
			Stone	18				18	1,000	18	3,372
Pipe	1.0	16.0	Precast Reinforced Conc.		6		8	14	16,000	224	
			Lean Concrete			2		2	3,000	6	
			Sand/Gravel		9		12	21	1,500	32	
			Stone	3				3	1,000	3	265
Box	3.5 x 1.5	12.0	Precast Reinforced Conc.		76		23	99	16,000	1,584	
			Lean Concrete		40	9	15	64	3,000	192	
			Sand/Gravel		13		51	64	1,500	96	
			Stone	12				12	1,000	12	1,884
Box	2(2.5 x 2.0)	17.0	Precast Reinforced Conc.		112		12	124	16,000	1,984	
			Lean Concrete		33	10	7	50	3,000	150	
			Sand/Gravel		24		43	67	1,500	102	
			Stone	12				12	1,000	12	2,248

Data Source : JICA Study team, 1996

Table 2 Estimated Direct Cost of Culvert Improvement
(Karabutak-Kzyl Orda Border Road Section)

(Unit : 1000 Tenge)

Section (km-km)	Culvert Type	Dimension	Condition and Repair Cost						Total No. of Unit	Total Cost
			Fair			Bad				
			No. of Units	Unit Improve Cost	Total Improve Cost	No. of Units	Unit Improve Cost	Total Improve Cost		
965-1154	Pipe	1.0	7 (3)	27	189	5 (4)	265	1,325	12	1,514
		1.5	11 (5)	53	583	10 (5)	532	5,320	21	5,903
1154-1240		1.0	-	27	-	6 (6)	265	1,590	6	1,590
		1.5	-	53	-	4 (2)	532	2,128	4	2,128
965-1154	Box	(2.5x2)x2	-	337	-	2	2,248	4,496	2	4,496
									Total	15,631

Data Source : JICA Study Team, 1996

Table 3 Estimated Direct Cost of Culvert Improvement
(Atyrau-Mahambet Road Section)

(Unit : 1000 Tenge)

Section (km-km)	Culvert Type	Dimension	Condition and Repair Cost		
			Fair		
			No. of Units	Unit Improve Cost	Total Improve Cost
0-83	Pipe	1.0	3	27	81
	Box	3.5 x 1.5	5	188	940
				Total	1021

Data Source : JICA Study Team, 1996

Table 4 Estimated Direct Cost of New Culvert
(Atyrau-Mahambet Road Section)

(Unit : 1000 Tenge)

Section (km-km)	Culvert Type	Dimension	No. of Culvert	Unit Cost	Constructio
0 - 83	Box	3(2.0 x 1.5)	31	3,372	104,532

Data Source : JICA Study Team, 1996

APPENDIX II-8

Meteorological Data of Western Kazakhstan

Table Meteorological Data of the Meteorology station Karabutak for 1991~1992

(1991)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-12.1	-15.8	-9.4	9.1	16.7	13.3	23.3	18.5	14.7	8.2	-2.1	-12.5
Minimum temperature of air and hail (in degree)	-30.2	-29.6	-25.6	-4	-4.4	10.9	9.1	6.3	3.2	-5.6	-12.8	-31.5
Maximum temperature (in degree)	-1.9	-3	5.1	28.7	31.9	37.4	38.1	32.2	19.7	24.5	7.3	0.9
Amount of rainfalls (in mm)	-/ 11	-/ 3.9	5.5/1.4	16.9/-	1.9 /-	16.3/-	20.8/-	26.6/-	3.1 /-	3.6 /-	13.5/3 8	-/16.8
Height of snow coat (in cm)	42	43.5	47	-	-	-	-	-	-	-	5	25

(1992)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-10.5	-13.1	-11.3	6.6	12.7	18	19.8	16.9	15	3.9	-2.2	-12.2
Minimum temperature of air and hail (in degree)	-28.0	-32.3	-29	-4.0	-6.6	-0.9	7.6	4.2	-2.3	-7.8	-13.8	24.6
Maximum temperature (in degree)	1.2	-0.5	2.2	22.7.	30.4	34.4	33.2	30.5	30.7	19.6	8.4	-2
Amount of rainfalls (in mm)	17.6	-/28.9	1.6/4.4	7.0/-	29.0/-	45.6/-	24.8/-	104/-	-	29.5/-	43.0/18.4	-/7.0
Height of snow coat (in cm)	25	30	35	-	-	-	-	-	-	-	15	25

Data : Actybinsk Meteorological Center, 1996, Jun 4

Table Meteorological Data of the Meteorology station Karabutak for 1991~1992

(1993)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-10.0	-18.3	-8.0	3.5	13.5	17.5	21.8	21.0	10.3	15.5	-14.8	-14.5
Minimum temperature of air and hail (in degree)	-28.3	-26.8	-23.7	-10.7	-3.4	5.8	8.3	7.9	-3.7	-10.6	-29.3	-30.7
Maximum temperature (in degree)	2.9	-5.5	2.5	17.3	27.7	37.8	33.3	35.6	24.7	23.9	0.5	1.4
Amount of rainfalls (in mm)	-/12.5	-/0.0	-/20.5	38.5/-	14.4/-	12.5	18.7	24.2	8.2	12.1	-/13.7	-/9.0
Height of snow coat (in cm)	28	22	22	-	-	-	-	-	-	-	12	12

(1994)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-14.8	-20.5	-11.7	5.9	14.3	20.8	18.5	18.6	14.0	6.4	-4.5	-12.4
Minimum temperature of air and hail (in degree)	-31.9	-41.0	-29.8	-15.1	2.6	8.9	9.6	3.8	-2.2	-7.1	-29.3	-30.2
Maximum temperature (in degree)	0.8	-2.8	3.7	28.2	28.3	33.3	31.3	33.0	32.9	25.2	13.4	-0.6
Amount of rainfalls (in mm)	-/25.3	-/17.6	27.0/2.9	8.3/-	72.0/-	75.7/-	48.0/-	49.3/-	4.0/-	12.4/-	23.4/28.5	-/24
Height of snow coat (in cm)	24	29	-	-	-	-	-	-	-	-	15	35

Data : Actybinsk Meteorological Center, 1996, Jun 4

Table Meteorological Data of the Meteorology station Ergiz for 1991~1992

(1991)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-10.7	-15.7	-7.6	11.2	18.9	25.5	25.7	21.8	16.9	10.1	0.1	-10.2
Minimum temperature of air and hail (in degree)	-29.0	-31.6	-24.1	-2.8	0.0	11.0	10.1	8.7	4.4	-3.8	-9.6	-28.3
Maximum temperature (in degree)	2.4	3.1	11.6	29.4	33.0	39.6	38.0	34.2	35.0	26.3	9.6	2.9
Amount of rainfalls (in mm)	-/6.0	-/1.6	-/5.1	8.6/-	0.9/-	17.2/-	4.2/-	25.3/-	1.4/-	0/-	-/8.8	-/276.0
Height of snow coat (in cm)	4.5	7	4	-	-	-	-	-	-	-	-	9

(1992)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-9.9	-12.0	-10.5	8.2	14.8	20.6	23.2	19.3	15.8	3.3	-1.1	-9.3
Minimum temperature of air and hail (in degree)	-27.5	-28.2	-25.3	-5.4	-3.2	2.2	10.5	7.7	0.1	-6	-9.8	-24.3
Maximum temperature (in degree)	2.0	-0.5	2.4	25.2	30.3	32.2	37.4	34.1	32.2	14.0	11.5	0.4
Amount of rainfalls (in mm)	-/17.2	-/21.1	-/1.4	5.2/-	242.0/-	25/-	0.0/-	16.3/-	2.3/-	13.3/0	31.2/0.8	-/12.4
Height of snow coat (in cm)	17	37	30	-	-	-	-	-	-	-	2.5	25

Data : Actybinsk Meteorological Center, 1996, Jun 4

Table Meteorological Data of the Meteorology station Ergiz for 1991~1992

(1993)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-9.1	-12.5	-7.1	6.4	15.1	22.1	24.5	22.9	13.0	6.4	-13.5	-14.1
Minimum temperature of air and hail (in degree)	-27.6	-26.9	-23.3	-7.6	-1.4	9.0	11.4	10.1	-3.6	-8.8	-26.8	-27.4
Maximum temperature (in degree)	2.1	2.0	4.9	22.6	29.0	38.7	35.6	38.4	28.0	25.0	1.4	0.2
Amount of rainfalls (in mm)	-/13.4	-/3.8	12.8/6.8	37.3/-	1.7/-	26.5/-	1.4/-	36.2/-	0.5/-	13.9/7.8	-/6.3	-/7.4
Height of snow coat (in cm)	32	28	14	-	-	-	-	-	-	4	11	14

(1994)

Name of Meteorological Data	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
Average monthly temperature of air and hai (in degree)	-14.2	-19.1	-9.6	8.7	17.6	23.9	22.3	21.8	16.4	8.4	-2.2	-11.9
Minimum temperature of air and hail (in degree)	-29.6	-35.6	28.0	-6.9	6.0	13.3	10.7	4.5	0.2	-7.9	-21.6	-26.4
Maximum temperature (in degree)	-0.2	-0.4	12.4	29.0	30.7	35.9	35.5	37.0	30.9	29.8	13.8	-0.2
Amount of rainfalls (in mm)	5.0	67.0	10.0	5.3	16.8	19.6	7.8	5.5	0.0	3.8	41.4	26.4
Height of snow coat (in cm)	15	17	13	-	-	-	-	-	-	-	11	10

Data : Actybinsk Meteorological Center, 1996, Jun 4

Table Average Monthly Temperature at the Meteorological Station of Karabutak for 1991 - 1995

Year	Temperature (degree)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	-12.1	-15.8	-9.4	9.1	16.7	13.3	23.3	18.5	14.7	8.2	-2.1	-12.5
1992	-10.5	-13.1	-11.3	6.6	12.7	18.0	17.8	16.9	15.0	3.9	-2.2	-12.2
1993	-10.0	-18.3	-8.0	3.5	13.5	17.5	21.8	21.0	10.3	15.5	-14.8	-14.5
1994	-14.8	-20.5	-11.7	5.9	14.3	20.8	18.5	18.6	14.0	6.4	-4.5	-12.4
1995	-17.6	-11.8	-6.0	12.5	15.2	22.6	24.5	21.6	13.8	6.5	-7.4	-11.3

Data Source: Aktybinsk Meteorological Centre, June 4, 1996

Table Average Monthly Amount of Rainfalls at the Meteorological Station of Karabutak for 1991 - 1995

Year	Amount of Rainfalls (mm)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	11.0	3.9	5.5	16.9	1.9	16.3	20.8	26.6	3.1	3.6	13.5	6.8
1992	17.6	28.9	4.4	7.0	29.0	45.6	24.8	104	-	29.5	43.0	7.0
1993	12.5	0.0	20.5	38.5	14.4	12.5	18.7	24.2	8.2	12.1	13.7	9.1
1994	25.3	17.6	27.0	8.3	72.0	75.7	48.0	49.3	4.0	12.4	28.5	24.0
1995	2.3	10.4	6.7	8.9	84.2	1.2	6.8	10.8	23.2	14.9	9.1	36.9

Data Source: Aktybinsk Meteorological Centre, June 4, 1996

Table Average Monthly Temperature at the Meteorological Station of Irgiz for 1991 - 1995

Year	Temperature (degree)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	-10.7	-15.7	-7.6	11.2	18.9	25.5	25.7	21.8	16.9	10.1	0.1	-10.2
1992	-9.9	-12.0	-10.5	8.2	14.8	20.6	23.2	19.3	15.8	3.3	-1.1	-9.3
1993	-9.1	-12.5	-7.1	6.4	15.1	22.1	24.5	22.9	13.0	6.4	-13.5	-14.1
1994	-14.2	-19.1	-9.6	8.7	17.6	23.9	22.3	21.8	16.4	8.4	-2.2	-11.9
1995	-16.5	-11.2	-4.7	14.6	17.4	25.5	26.9	24.1	15.6	7.9	0.3	-10.3

Data Source: Aktybinsk Meteorological Centre, June 4, 1996

Table Average Monthly Amount of Rainfalls at the Meteorological Station of Irgiz for 1991 - 1995

Year	Amount of Rainfalls (mm)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	6.0	1.6	5.1	8.6	0.9	17.2	4.2	25.3	1.4	0.0	8.8	27.6
1992	17.2	21.1	1.4	5.2	24.2	25.0	0.0	16.3	2.3	13.3	31.2	12.4
1993	13.4	3.8	6.8	37.3	1.7	26.5	1.4	36.2	0.5	13.9	6.3	7.4
1994	5.0	67.0	10.0	5.3	16.8	19.6	7.8	5.5	0.0	3.8	41.4	26.0
1995	2.3	1.3	7.2	7.0	21.0	0.0	0.6	6.9	10.6	24.9	24.7	8.1

Data Source: Aktybinsk Meteorological Centre, June 4, 1996

Table Average Monthly Temperature at the Meteorological Station of Atyrau for 1991-1995

Year	Temperature (degree)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	-4.8	-6.8	0.7	13.0	19.1	25.7	27.8	23.5	17.0	12.4	1.0	-5.6
1992	-4.5	-5.2	1.5	10.0	16.8	23.4	24.8	21.8	18.4	8.0	2.7	-4.4
1993	-5.1	-6.6	-1.5	9.6	17.2	24.8	37.0	24.1	16.6	7.7	-8.0	-6.5
1994	-6.2	-15.9	-4.2	8.9	17.7	32.0	24.1	23.2	18.8	11.0	2.8	-6.6
1995	-5.7	-2.0	-4.8	16.3	19.9	26.5	26.6	24.6	18.6	10.1	5.4	-5.2

Data Source: Atyrau Meteorological Centre, June 12, 1996

Table Average Monthly Amount of Rainfalls at the Meteorological Station of Atyrau for 1991-1996

Year	Amount of Rainfalls (mm)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	36	12	1	11	27	20	7	24	1	1	3	18
1992	18	17	4	10	9	32	3	25	41	23	31	12
1993	25	2	12	13	8	13	8	37	23	18	7	14
1994	26	27	2	0	16	47	2	14	0	13	16	13
1995	4	6	6	29	31	6	23	1	1	16	25	6

Data Source: Atyrau Meteorological Centre, June 12, 1996

Table Average Monthly Temperature at the Meteorological Station of Mahambet for 1991-1995

Year	Temperature (degree)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	-5.6	-7.7	0.1	12.5	18.7	25.2	26.9	27.9	16.5	11.7	0.7	-7
1992	-5.5	-7	-2.9	9.4	16.6	22.9	24.2	21.4	17.4	7.1	1.8	-5.8
1993	-5.1	-8.1	-2.6	9.1	16.7	21.7	25	23.3	14.1	7.5	-8.7	-7.5
1994	-7.5	-17.6	-5.4	10.7	17.2	21.6	23.1	22.4	17.6	10	-0.1	-7.5
1995	-6.8	-2.2	2.1	15.7	19.3	25.9	26.1	24.1	17.7	9.6	4.4	-6.3

Data Source: Atyrau Meteorological Centre, June 12, 1996

Table Average Monthly Amount of Rainfalls at the Meteorological Station of Mahambet for 1991-1996

Year	Amount of Rainfalls (mm)											
	Months											
	1	2	3	4	5	6	7	8	9	10	11	12
1991	33	7	1	14	39	35	55	5	2	5	7	17
1992	21	21	4	8	13	26	14	57	54	28	29	18
1993	25	2	13	14	10	65	14	36	16	24	6	12
1994	26	23	8	0	32	47	0	13	1	23	27	12
1995	6	7	8	14	22	14	10	11	20	15	14	17

Data Source: Atyrau Meteorological Centre, June 12, 1996

APPENDIX II-9

Resource Capabilities of Contractors

Table Resource Capabilities of Contractors on the Atyrau Road Section

Name of Contoractors	Soat of Contractors	Equipment Resources											
		Status (See foot note)	Back Hoe or Tractor Shavel	Buldozer	Motor Graders	Loader	Load Rollers	Vibration Rollers	Tire Rollors	Asphalt Paver (Asphalt Finisher)	Bitumen Distributers	Trucks	Water trucks
Joint Stock Company "Atyrau Zholdavy"	Atyrau	1	10	6	8	7	-	4	-	-	4	13	2
		2	4	7	8	4	-	2	-	1	6	12	8
		3	-	1	9	-	-	-	-	-	-	6	2
Leasing from Atyrau Aktdor	#	1	-	10	2	8	-	1	-	-	-	6	-
		2	-	4	1	6	-	-	1	-	-	16	4
		3	-	6	-	4	-	-	-	-	-	4	-
Total		1	10	16	10	15	-	5	-	-	4	19	2
		2	4	11	9	10	-	2	1	1	6	28	12
		3	-	7	9	4	-	-	-	-	-	10	2

Note : Status 1 - Not working requires major overhaul
2 - Working but needs overhaul
3 - Good working order

Data Source : Atyrau Aktdor (Akyrauskaya, Department of Roadds), 1996

Table Resource Capabilities of Contractors on the Karabutak Road Section

Name of Contoractors	Soat of Contractors	Equipment Resources											
		Status (See foot note)	Back Hoe or Tractor Shavel	Buldozer	Motor Graders	Loader	Load Rollers	Vibration Rollers	Tire Rollors	Asphalt Paver (Asphalt Finisher)	Bitumen Distributers	Trucks	Water trucks
Joint Stock Company "Zholdavy"	Aktybinsk	1	1	-	-	2	-	-	-	-	-	21	-
		2	3	6	-	3	-	-	2	-	-	20	-
		3	1	1	3	1	-	-	-	-	-	-	-
Joint Stock Company "Afzen"	Almaty	1	-	1	-	1	-	-	1	-	-	1	-
		2	2	2	4	2	2	-	3	-	-	6	1
		3	2	3	2	4	1	1	2	1	2	4	2
Joint Stock Company "Ananzhol"	//	1	-	-	1	-	-	-	-	-	-	-	-
		2	2	4	5	2	2	-	2	-	-	2	1
		3	3	5	19	2	2	1	2	1	3	8	1
Joint Stock Company "Magistral"	//	1	1	3	10	2	2	-	-	-	-	10	-
		2	7	3	-	5	4	1	2	1	1	15	5
		3	6	11	5	3	4	-	-	2	3	5	-
Joint Stock Company "UMSN6"	//	1	-	2	3	1	-	-	-	-	-	-	-
		2	2	2	2	2	-	-	-	-	-	4	-
		3	4	5	4	3	5	-	3	2	4	7	4
Total		1	2	6	1	6	2	-	1	-	-	32	-
		2	16	17	3	14	8	1	9	1	1	47	7
		3	16	25	18	13	12	2	7	6	12	24	7

Note : Status 1 - Not working requires major overhaul
2 - Working but needs overhaul
3 - Good working order

Data Source : 1. Department of Roads, Ministry of Transport and Communication, 1996
2. Aktobe Aktdor (Akyubinskaya, Department of Roads), 1996

APPENDIX III-1

Investigation of Bridges on Priority Projects

1 Investigation of Bridges

In the beginning, it should be made clear that for any drawings of the existing bridges have not been found, further detailed investigation on the existing bridges for the detailed betterment project design should be executed in the next stage in addition to this investigation.

1.1 From Karabuta to Border of Aktybinsk

1.1.1 Bridge Number 26

(1) Location from Beginning Point: 969.9 km

(2) Type of Structure:

- Superstructure: PC T Type Concrete Girder
- Substructure:

  Abutment: Pilebent Type

  Pier: RC Precast Concrete Block Stacking Type

(3) Bridge Length:

Span; 5@21.0 m

Length; 110.0 m

(4) Total Width: 11.4 m + 2.0 m = 13.4 m

(5) Completed Year: 1984

(6) Traffic Regulation for Bridge Management:

There is nothing in particular.

(7) Visual Inspection Result:

For the reason that it has been passed no long period after completion of the bridge, there are a few remarkable defective places.

- The soil slope sliding at both sides of the bridge were observed. The facts divide the side walks into some pieces and prevent pedestrians' passing through.

- Because the corner of the main beams of the concrete had been broken while building, the reinforcing bars and PC wires become open.

However, there are some structural defects mentioning in the following paragraph.

(8) Structural Defects:

- On account of using the pilebent type structure for the bridge abutments, soil movements from behind to forward of them are observed.

The phenomenon causes the limitless sinking of the roadway surface just behind the parapet of the abutments and the rise of the ground in the front of the abutments.

To avoid the phenomenon, the pilebent type structure should not have been constructed for the abutments of the bridge.

- Though the reinforcing bars have been arranged, some parts of the wing walls are left without casting the concrete.

- There are concrete barriers between the walkway and the roadway on the bridge, even if they are taken into consideration, the handrails on the bridge is, however, too poor considering from the structural viewpoint.

- The piers are composed of the precast concrete blocks and cast in place concrete. As a logical consequence, the reinforcing bars connecting between blocks or places of cast-in-place concrete are not always inserted with necessary length and not tightly fixed into the other blocks, also the main reinforcing bars and transverse reinforcing bars have not connected each other.

For example, the web and main reinforcing bars inside the beams or columns are not linked each other, hence they would not perform their functions to face to the shear force, and the stress acts on the structure would not be transmitted to the other members of the structure.

- For this bridge has no transverse beams of tying the main beams at all, lateral load distribution due to the live load act on the longitudinal beam would not be distributed to the other longitudinal beams.

- Cast-in-place concrete for the substructures are insufficient in strength. The cause why the strength of cast-in-place concrete became weak can think of getting frost damage or repeating of freeze and melting of the moisture to contain in it by the change of the temperature.

(9) Measure of Improvement:

- Considering a lot of structural defects have been pointed out, it could be concluded that the bridge should be renewed. However, taking the following facts into account, this bridge was decided to be improved.

(a) relatively new one

(b) long bridge

(c) big amount of renewing cost

(d) enough width

(10) Places of Improvement

(a) Concrete approach boards of both sides of the bridge near to the parapets should be more longer and strengthen.

(b) Wing walls of the abutments should be renovated.

(c) Guardrails on the bridge should be replaced to strong ones instead of old ones.

(d) The connections between blocks are to be strengthen.

(e) Transverse beam should be set up for tying each beam rigidly.

(f) Insufficient cast-in-place concrete should be removed and new concrete should be cast.

(g) The breaking places where the corner of the main beams should be repaired.

1.1.2 Bridge Number 27

(1) Location from Beginning Point: 1,125.4 km

(2) Type of Structure:

- Superstructure: PC Hollow Slab Concrete Girder
- Substructure:

  Abutment: RC Cast in Place Concrete Block Stacking Type

(3) Bridge Length:

  Span; Simple 18 m

  Length; 22.0 m

(4) Total Width: 10.2 m + 1.5 m = 11.7 m

(5) Completed Year: 1981

(6) Traffic Regulation for Bridge Management:

  There is nothing in particular.

(7) Visual Inspection Result:

  - This bridge has been comparatively newly constructed but the decrepit-ization is in the intense condition. In it, especially, the decrepit-ization of the abutments are extreme.

  The big reason which the abutments decrepit-ized extremely is considered that the bridge length is too short and the abutments are always in the lake water. Consequently, the walls of the abutments are always wet with the lake water which contains a lot of salinity. As a result, the lake water which acts on the concrete walls makes their strength weak. Moreover, the repeat of the freeze and the melting of the moisture which is contained in the abutments' walls by the change of the temperature promotes the degradation of concrete. Gradually the concrete which degraded in this way is peeled off from the walls.

  - The wing wall destruction of both abutment sides can be observed.

  - The reinforcing bars or PC wires appear in the surface with insufficient covering.

  - The handrails are considerably destroyed.

  - The PC wires arranged in the curve are observed. Judging from this fact, it is found that there is no prestress in this PC wire.

  Breaking places of the corner of the main beams are observed.

(8) Structural Defects:

  - The same as Bridge No. 26, no transverse beam was observed.

  - In regard to the abutments, the stacked blocks without using supporting

piles has caused an unbalanced settlement.

- To avoid the abutment walls always touching a lake water, the length of this bridge should be made longer.

(9) Measure of Improvement:

The indispensable condition of this bridge improvement is as follows.

- Because the lake water contains a lot of salinity, it should be made that the abutments of the bridge would not always be in the lake water making a bridge length longer.

This means an exchange for new superstructure and substructure.

- To oppose damage from salt water, protective covering for the abutments should be bigger.

Taking the above into consideration, it would be recommended to be renewed.

1.1.3 Bridge Number 28

(1) Location from Beginning Point: 1,132.1 km

(2) Type of Structure:

- Superstructure: PC T Type Concrete Girder
- Substructure:

  Abutment: Pilebent

  Pier: Precast Concrete Block and Cast in Place Concrete Composed Type

(3) Bridge Length:

Span; 8@22.6 m

Length; 180.0 m

(4) Total Width: 7.0 m + 2.0 m = 9.0 m

(5) Completed Year: 1974

(6) Traffic Regulation for Bridge Management:

The passing prohibition on the bridge section

The weight limitation

(7) Visual Inspection Result:

- Because this bridge is old, a lot of degradation parts are observed.

For example:

(a) The guardrails

(b) The retaining walls

(c) The main girders

(d) The slab

- The road surfaces near to the abutments' parapet of both sides of the bridge are settled and the soil slope in front of the abutments are destroyed.

- Insufficient beam connection with transverse beams brought about longitudinal clacking of the slab.

(8) Structural Defects:

- Though the transverse beams for the main beams were observed, the connections of each transverse beam is insufficient.

- In spite of high embankment of the approach road, the pilebent abutments are used the same as the bridge number 26.

- When the deluge of the river of the bridge occurred in 1991, a pier was drifted slightly by the water flow pressure of the flood. Movement quantity was, according to the authority concerned, about 0.7 m right side and 0.5 m downward in parallel. As a matter of course, the superstructure of the

bridge was fallen down to the river bed. Then the temporary repairs was made on the bridge as follows:

Owing to the changing of supporting positions of the superstructure on the pier both horizontally and vertically, the left span fallen down beams were made longer with cast-in-place concrete while the right span beams were shortened and set on the steel foundation. On the other hand, transverse beams which had not been connected were welded together on the adjacent lower corner plates.

Thinking flood moved the pier, it would be possible to say that the foundation of this pier is weak and there is possibility that to install the pier in this place is not suitable.

Moreover, the repair would not be able to be called safety, for in spite of the increase of the moment which acts on the central span section with the increase of the span length, the reinforcement of the section has not been accomplished.

- The bridge which needs the high embankment approaching road should avoid using the pilebent type abutments.
- Width of this bridge is insufficient.

(9) Measure of Improvement:

The main improvement at this bridge becomes as follows.

- The position of the pier which was moved by the flood should be changed to the place with the better condition and moreover the foundation of the pier should be reinforced.
- As for the superstructure, it should be completely exchanged, judging from the destruction situation of the superstructure.
- Existing abutments should be replaced with different-type of new abutments, such as buttress type abutments.
- The width of this bridge should be made equal to or more than 10 meters which are the same as other bridges.

Therefore, it is proposed that this bridge is constructed newly to meet above-mentioned conditions.

1.1.4 Bridge Number 29

(1) Location from Beginning Point: 1,164.1 km

(2) Type of Structure:

- Type of Superstructure: PC Hollow Slab Concrete Girder
- Type of Substructure:

  Abutment: Large-Sized Round Shape Columns Type (with Precast Concrete Plate Retaining Wall in Front)

  Pier: Large-Sized Round Shape Columns Type

(3) Bridge Length:

Span; 2@18 m

Length; 45.0 m

(4) Total Width: 10.5 m + 2.0 m = 12.5 m

(5) Completed Year: 1982

(6) Traffic Regulation for Bridge Management:

There is nothing in particular.

(7) Visual Inspection Result:

- The large-sized round shape pillar which is not in the place and hanging from horizontal member was observed.
- An earth collapse was observed in both sides of the bridge.
- The approaching concrete plates on both sides are destroying plainly.
- Because of insufficient thickness of covering of the concrete, some reinforcing bars of the beams are exposed to the surface.
- Guardrails are seriously deteriorated.
- On the roadway surface of the PC hollow slab of the bridge, a lot of holes which are due to the traffic abrasion are formed.

(8) Structural Defects

- Because the large-sized round shape pillars do not have enough insert length, the effluent which is flowing under the pillar scour off the base ground of the pier and easily to make space during the ground and the pier basis. To make matters worse, they have no footings nor piles. The facts cause the unequal sinking of the pillar or hanging of the pillar.
- Also the insufficiency with the insert depth of the abutments causes the movement of soil by their earth pressure.
- No transverse beam is found for the PC hollow slab beams.
- As reinforcing bars are not included in the retaining walls on both sides of the abutments, they would not be endured to the earth pressure from

behind of them.

(9) Measure of Improvement:

As shown in the above, the facilities of this bridge which is possible to use by repairing are only the horizontal beam and pillars of the pier.

To take warning to the above, it will become a wise policy that this bridge is newly constructed.

1.1.5 Bridge Number 30

(1) Location from Beginning Point: 1,188.1 km

(2) Type of Structure:

- Type of Superstructure: PC Hollow Slab Concrete Girder
- Type of Substructure:

  Abutment: Composed of Precast Concrete Wall and Cast in Place Type

(3) Bridge Length:

Span; Simple 18 m

Length; 23.1 m

(4) Total Width: 10.0 m + 2.0 m = 12.0 m

(5) Completed Year: 1982

(6) Traffic Regulation for Bridge Management:

There is nothing in particular.

(7) Visual Inspection Result:

- Landslides at both sides of the bridge are observed.
- The approaching concrete plates of both sides of the bridge are destroyed seriously.
- Some reinforcing bars of beams are exposed due to insufficient thickness of protective covering of the concrete.
- Guardrails are seriously deteriorated.
- Beams of the superstructure are greatly destroyed.

(8) Structural Defects:

- Insufficient soil retaining and using of non-reinforcing bar structure for the retaining walls makes the slope destroyed.
- The abutments are consisted of only parapets, shoe support horizontal members and vertical concrete plates without footings nor piles, the same as Bridge No. 29. This type of the structure apt to lead the soil sliding of both sides of the bridge due to the live load of carriageway.
- Because slab thickness is very thin, upper side of the beams are worn away.
- No transverse beam bridge will expedite destroying of the beams.

(9) Measure of Improvement:

In conformity with the above situation, it should be renewed.

1.1.6 Bridge Number 31

(1) Location from Beginning Point: 1,192.0 km

(2) Type of Structure:

- Type of Superstructure: PC Hollow Slab Concrete Girder
- Type of Substructure:
  Abutment: Composed of Precast Concrete Wall and Cast in Place Type
  Pier: Large-Sized Round Shape Columns Type

(3) Bridge Length:
Span; 2@18 m
Length; 41.0 m

(4) Total Width: 10.0 m + 2.0 m = 12.0 m

(5) Completed Year: 1982

(6) Traffic Regulation for Bridge Management:
There is nothing in particular.

(7) Visual Inspection Result:
- The destruction situation of the pier is the same as the bridge number 29 completely. Therefore, the evaluation of this pier would be the same sentences as the bridge number 29.
- When judging from the following reasons described, it would be concluded that the quality of the beam is very poor.
(a) Some PC wires' arrangement are not straight line and are arranged in the curve. This fact shows that prestresses are not introduced into these PC wires.
(b) For concrete is peeled off in some places where the corner of the beam, some reinforcing bars and PC wires are bared from inside and they are rusty.
(c) Though the part where concrete was peeled off to the direction of the stretcher is observed, the web reinforcing bars are not be able to be discovered from the part, while the PC wires and the main reinforcing bars are noticed. It means that the wires and reinforcing bars are arranged outside of the web reinforcing bars.
- Some holes by the concrete destruction was observed in the slab at the walkway.

(8) Structural Defects:
The bridge has the same structural defects of Bridge No. 29.

(9) Measure of Improvement:

The destruction situation, the manufacturing year of this bridge, the bridge length and the type of the structure is the same as the bridge number 29 completely. Thus it would be recommended that the bridge should be newly constructed the same as the bridge number 29.

1.1.7 Bridge Number 32

(1) Location from Beginning Point: 1,212.2 km

(2) Type of Structure:

- Type of Superstructure: PC Hollow Slab Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Cast in Place Type

(3) Bridge Length:

Span; 2@18 m

Length; 41.0 m

(4) Total Width: 10.0 m + 2.0 m = 12.0 m

(5) Completed Year: 1982

(6) Traffic Regulation for Bridge Management:

There is nothing in particular.

(7) Visual Inspection Result:

- If excluding the fact that the type of the pier is different from the bridge number 31, the destruction situation, the manufacturing year of this bridge, the bridge length type of the structure and width is the same as the bridge. Therefore, the actuality, the degrees of the destruction of this bridge are the same as the bridge number 31 completely.

- But not finding the following reason that in spite of the length of right span and left span is the same and moreover the width is the same, the number of the beams which are used for right span and the number of the beams which are used for left span is different each other. Arranged beams of the left side span are 11 while the right span are 12.

(8) Structural Defects:

The same as Bridge No. 31.

(9) Measure of Improvement:

The same as the bridge number 31, the bridge should be renewed.

1.2 From Atyrau to Mahambet

1.2.1 Bridge Number 1

(1) Location from Beginning Point: 3.0 km

(2) Type of Structure:

- Type of Superstructure: PC T Type Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Pilebent Type

(3) Bridge Length:

Span; 4@16 m

Length; 64.0 m

(4) Total Width: 8.0 m + 2 x 0.75 m = 9.50 m

(5) Completed Year: 1982

(6) Traffic Regulation for Bridge Management:

Because the surface of approach road to the bridge is rough with the partial ground sinking, speed limitation about the road running near the bridge is put into operation. The speed limit is 5 km / hour.

(7) Visual Inspection Result:

This comparatively new bridge has not destruction parts too much. The remarkable defective places are the following:

- The soil slope sliding at both sides of the bridge were observed. The facts divide the side walks into some pieces and prevent pedestrians' passing through.

- Especially, the roughness of the roadway surface in the bridge both edges is terrible.

(8) Structural Defects:

- In view of earth moves from the back of abutment to the front and causes the sinking of the roadway surface, it should be avoided that to use the abutments of pilebent type for the place of high embankment.

- The joining of the horizontal member and the vertical members of the pier is incomplete because the vertical members are only inserted in the holes of the horizontal and filled up the concrete in the holes. In addition to that, it is too attenuate for vertical members to support a load by them.

- By reason of this bridge is the over-bridge for the railway, it would not permitted that the running vehicle is to be fallen on the railway track. Accordingly, the fall prevention fences of the vehicle should be fixed more

firmer ones.

- For this bridge has no transverse beams of tying the main beams at all, lateral load distribution due to the centralized load act on the longitudinal beam would not be distributed to the other longitudinal beams.

(9) Measure of Improvement:

Though some structural defects are pointed out for this bridge, it was concluded that it would be practicable by doing a partial repair without newly constructing the bridge.

(10) Places of Improvement

(a) The piers should be improved.

(b) Concrete approach boards of both sides of the bridge near to the parapets should be more longer and strengthen.

(c) Wing walls of the abutments should be renovated.

(d) Guardrails on the bridge should be replaced to strong ones instead of old ones.

(e) Transverse beam should be set up for tying each beam rigidly.

1.2.2 Bridge Number 2

(1) Location from Beginning Point: 10.0 km

(2) Type of Structure:

- Type of Superstructure: PC T Type Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Pilebent Type

(3) Bridge Length:

Span; 4@15 m

Length; 60.0 m

(4) Total Width: 8.0 m + 2 x 0.50 m = 9.0 m

(5) Completed Year: 1962

(6) Traffic Regulation for Bridge Management:

Because the decrepit-ization is intensely dangerous about this bridge, traffic on the bridge is blocked off.

(7) Visual Inspection Result:

On account of the long period has been passed after this bridge was constructed, the decrepit-ization is the intensest.

(8) Structural Defects:

To evade the traffic danger due to the decrepit-ization, the plan of the new construction of this bridge is under implement.

In case of detailed design of this bridge is executed, it is important to do after sufficiently understanding of the structural defects which are pointed out to this report.

(9) Measure of Improvement:

Detailed design for renewing of this bridge is now under execution by the authority concerned.

1.2.3 Bridge Number 3

(1) Location from Beginning Point: 17.0 km

(2) Type of Structure:

- Type of Superstructure: PC T Type Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Pilebent Type

(3) Bridge Length:

Span; 4@15 m

Length; 60.0 m

(4) Total Width: 8.0 m + 2 x 1.0 m = 10.0 m

(5) Completed Year: 1962

(6) Traffic Regulation for Bridge Management:

The same as the bridge number 2, traffic on the bridge is blocked off.

(7) Visual Inspection Result:

The decrepit-ization is the intensest.

(8) Structural Defects:

Since the structural defects like the other bridges are also contained in this bridge, when doing the detailed design of this bridge, it should be implemented for the structural defects to be conquered.

(9) Measure of Improvement:

The preparation for this bridge to be constructed newly at present is done.

1.2.4 Bridge Number 4

(1) Location from Beginning Point: 24.0 km

(2) Type of Structure:

- Type of Superstructure: PC Hollow Slab Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Pilebent Type

(3) Bridge Length:

Span; 3@16 m

Length; 48.0 m

(4) Total Width: 8.0 m + 2 x 1.0 m = 10.0 m

(5) Completed Year: 1983

(6) Traffic Regulation for Bridge Management:

There is nothing in particular.

(7) Visual Inspection Result:

This bridge was comparatively newly constructed, there are few degrees of the destruction excluding the destruction of the retaining wall which is in the both edges at the bridge.

(8) Structural Defects:

- The same as other bridges, however, there are not the transverse beams which ties the main beams in this bridge. What is worse, concrete is not filled between the beam and the beam at this bridge. Therefore, it would not distribute live load which acts on one main beam among the other beams.

- For beams of this bridge, the hollow slab concrete girders are to be used. However, the thickness of upper slab of the hollow slab girder is only 65 mm. This is insufficient to the frequent vehicle traffic.

- Because the height in the lower part of the beam of the bridge is low, there is not a difference with height in high water level in case of the flood and the lower part of the beam.

(9) Measure of Improvement:

Though the abutments of pilebent type are used for this bridge, the height of embankment of approach road is low, it is possible to use the existing abutments after repairing the retaining walls of the abutments.

(10) Places of Improvement

(a) The piers should be improved.

(b) Concrete approach boards of both sides of the bridge near to the parapets should be more longer and strengthen.

(c) Wing walls of the abutments should be renovated.

(d) Guardrails on the bridge should be replaced to strong ones instead of old ones.

(e) The beams at this bridge should be exchanged.

(f) The piers and the abutments should be made higher to secure clearance of this bridge.

1.2.5 Bridge Number 5

(1) Location from Beginning Point: 38.0 km

(2) Type of Structure:

- Type of Superstructure: PC T Type Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Pilebent Type

(3) Bridge Length:

Span; 2@16 m

Length; 32.0 m

(4) Total Width: 8.0 m + 2 x 1.0 m = 10.0 m

(5) Completed Year: 1969

(6) Traffic Regulation for Bridge Management:

The same as the bridge number 2, traffic on the bridge is blocked off.

(7) Visual Inspection Result:

The decrepit-ization is the intensest.

This bridge has the experience which encountered the damage of the flood before.

(8) Structural Defects:

Since the structural defects like the other bridges are also contained in this bridge, when doing the detailed design of this bridge, it should be implemented for the structural defects to be conquered.

(9) Measure of Improvement:

The preparation for this bridge to be constructed newly at present is done.

1.2.6 Bridge Number 6

(1) Location from Beginning Point: 60.0 km

(2) Type of Structure:

- Type of Superstructure: PC T Type Concrete Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Rigid Frame Type

(3) Bridge Length:

Span; 3@ 15 m

Length; 45.0 m

(4) Total Width: 8.0 m + 2 x 1.0 m = 10.0 m

(5) Completed Year: 1972

(6) Traffic Regulation for Bridge Management:

There is nothing in particular.

(7) Visual Inspection Result:

The destruction parts of the beams are conspicuous for this bridge. However, the destruction as shown in the following was discovered from this bridge.

- The parts where concrete is peeled off can be observed in the several places on the beams. In the parts, the reinforcing bars are bared and rust is observed.
- The collapse of wings in both sides of the abutments are observed.
- The destruction of masonry wall on the watercourse on the side of the upper stream can be observed.

(8) Structural Defects:

- The joining of the horizontal member and the vertical members of the pier is the incomplete one to have inserted a vertical members in the holes of the horizontal member and to have filled concrete in them. In addition to that, it is too attenuate for vertical members to support a load by them.
- For this bridge has no transverse beams of tying the main beams at all, lateral load distribution due to the centralized load act on the longitudinal beam would not be distributed to the other longitudinal beams.
- Though the abutments of pilebent type are used for this bridge, the height of embankment of approach road is low, it is possible to use the existing abutments after repairing the retaining walls of the abutments.

(9) Measure of Improvement:

This bridge should be improved.

(10) Places of Improvement

(a) The piers should be improved.

(b) Concrete approach boards of both sides of the bridge near to the parapets should be more longer and strengthen.

(c) Wing walls of the abutments should be renovated.

(d) Guardrails on the bridge should be replaced to strong ones instead of old ones.

(e) The beams at this bridge should be exchanged.

(f) The masonry wall on the watercourse on the side of the upper stream should be improved.

1.2.7 Bridge Number 7

(1) Location from Beginning Point: 74.0 km

(2) Type of Structure:

- Type of Superstructure: Reinforced Concrete T Girder
- Type of Substructure:

  Abutment: Pilebent Type

  Pier: Pilebent Type

(3) Bridge Length:

Span; 3@15 m

Length; 45.0 m

(4) Total Width: 8.0 m + 2 x 1.0 m = 10.0 m

(5) Completed Year: 1972

(6) Traffic Regulation for Bridge Management:

The same as the bridge number 6.

(7) Visual Inspection Result:

The same as the bridge number 6.

(8) Structural Defects:

The same as the bridge number 6.

(9) Measure of Improvement:

The same as the bridge number 6.

(10) Places of Improvement

The same as the bridge number 6.

APPENDIX III-2

Photographs of Bridges on Priority Projects

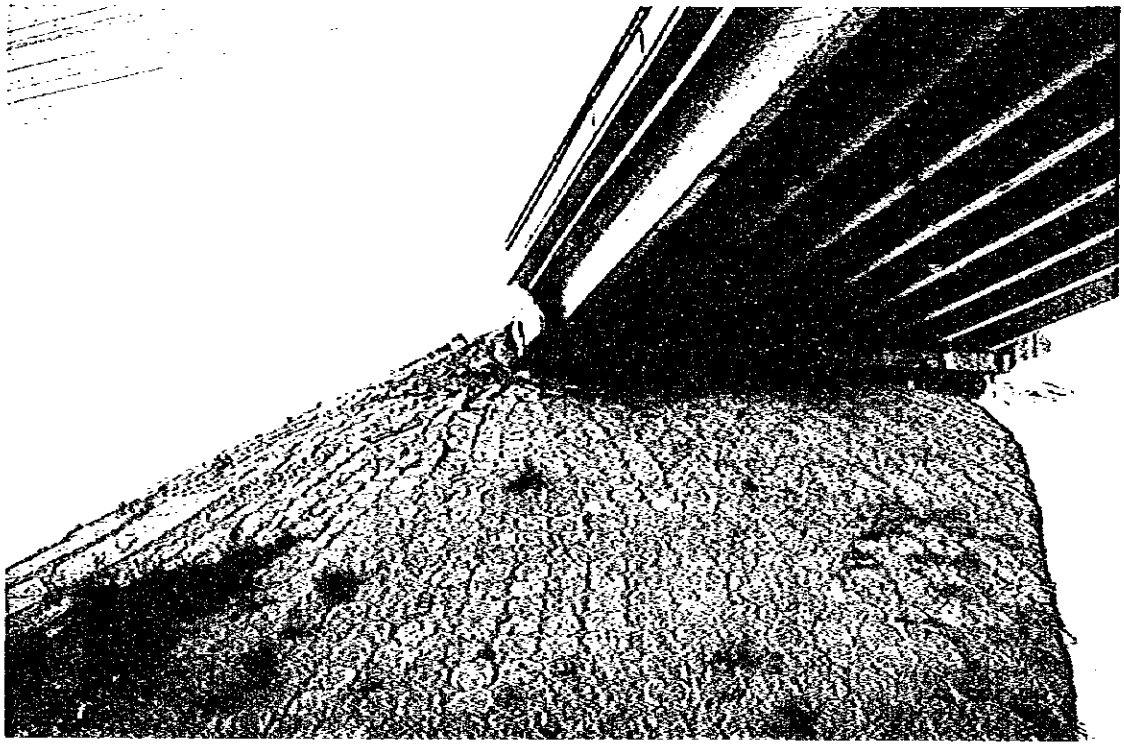

Photo III-1 : Bridge No.1 on the Atyrau ~ Mahambet Road Section
Condition of abutment

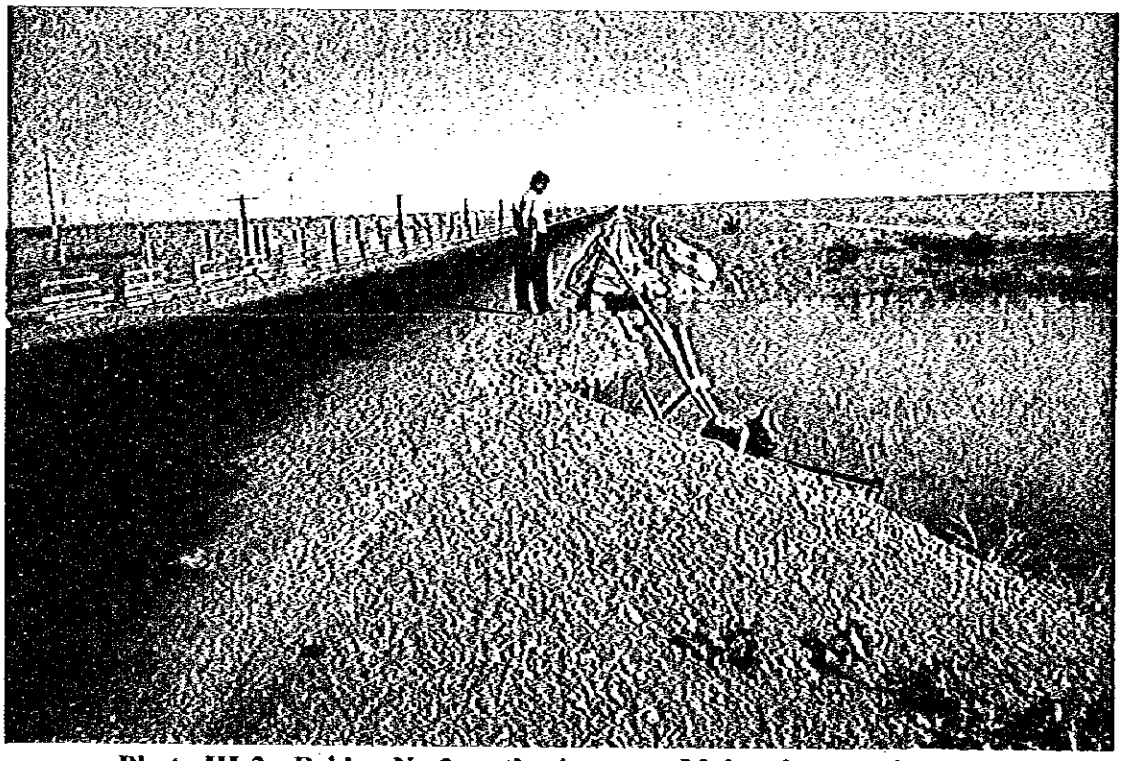

Photo III-2 : Bridge No.3 on the Atyrau ~ Mahambet Road Section
Condition of Handrail

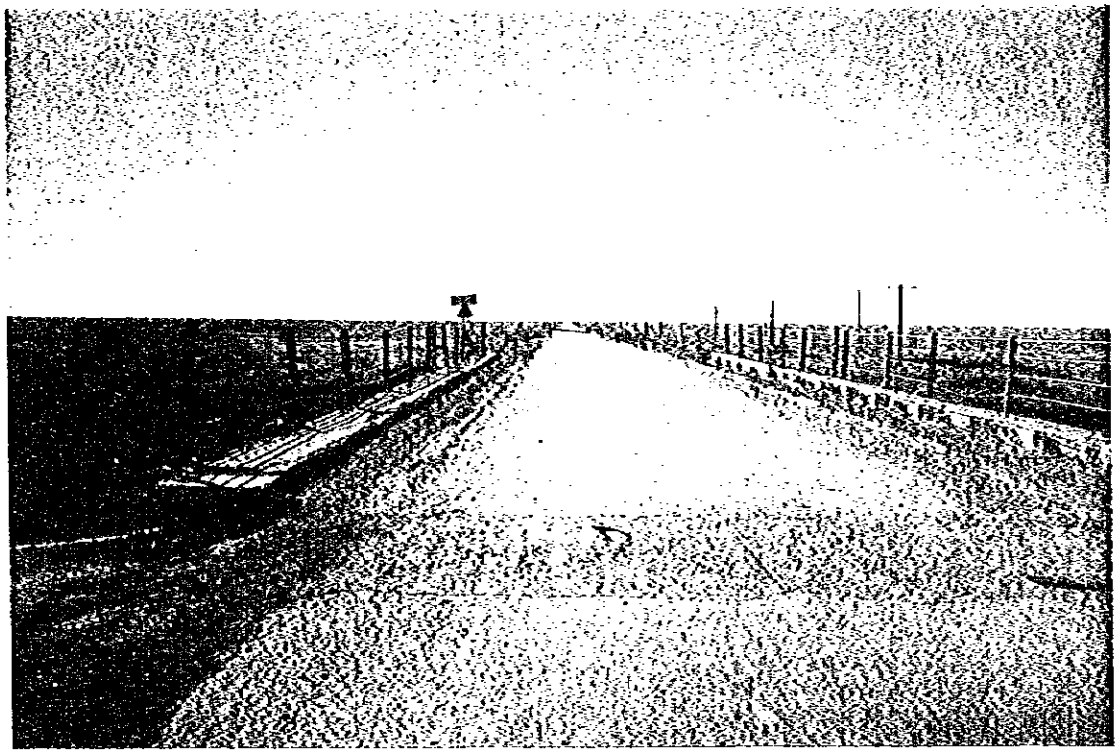

Photo III-3 : Bridge No.5 on the Atyrau ~ Mahambet Road Section
Condition of approach

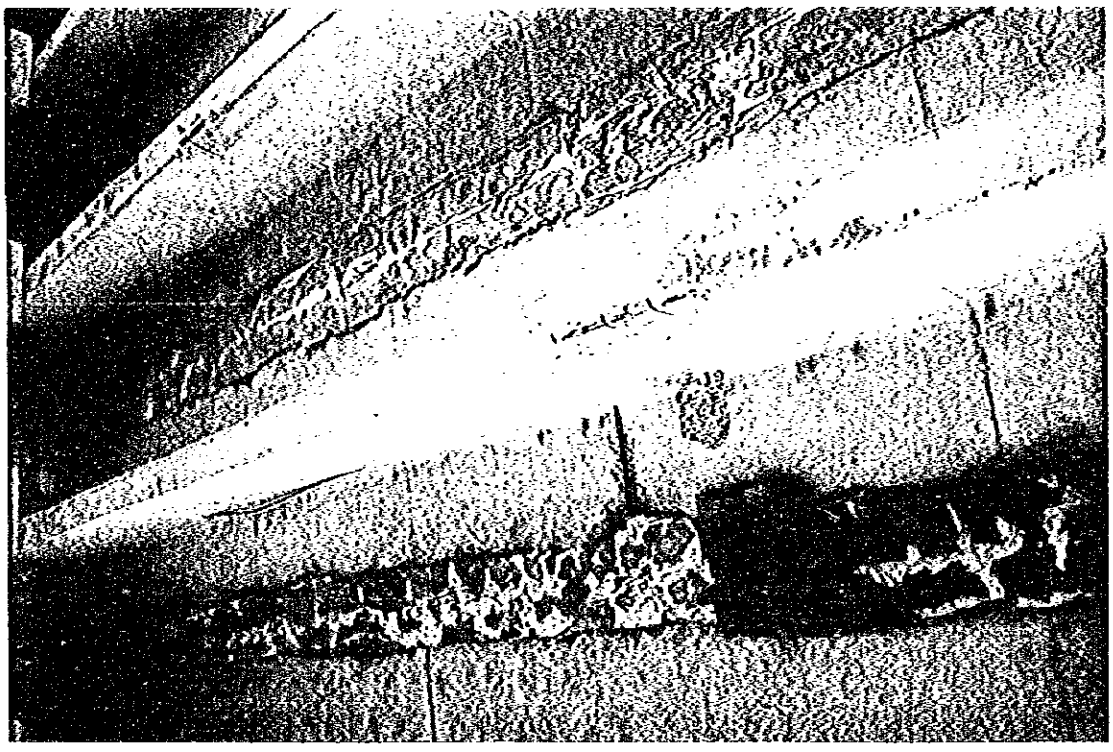

Photo III-4 : Bridge No.6 on the Atyrau ~ Mahambet Road Section
Back face of beam

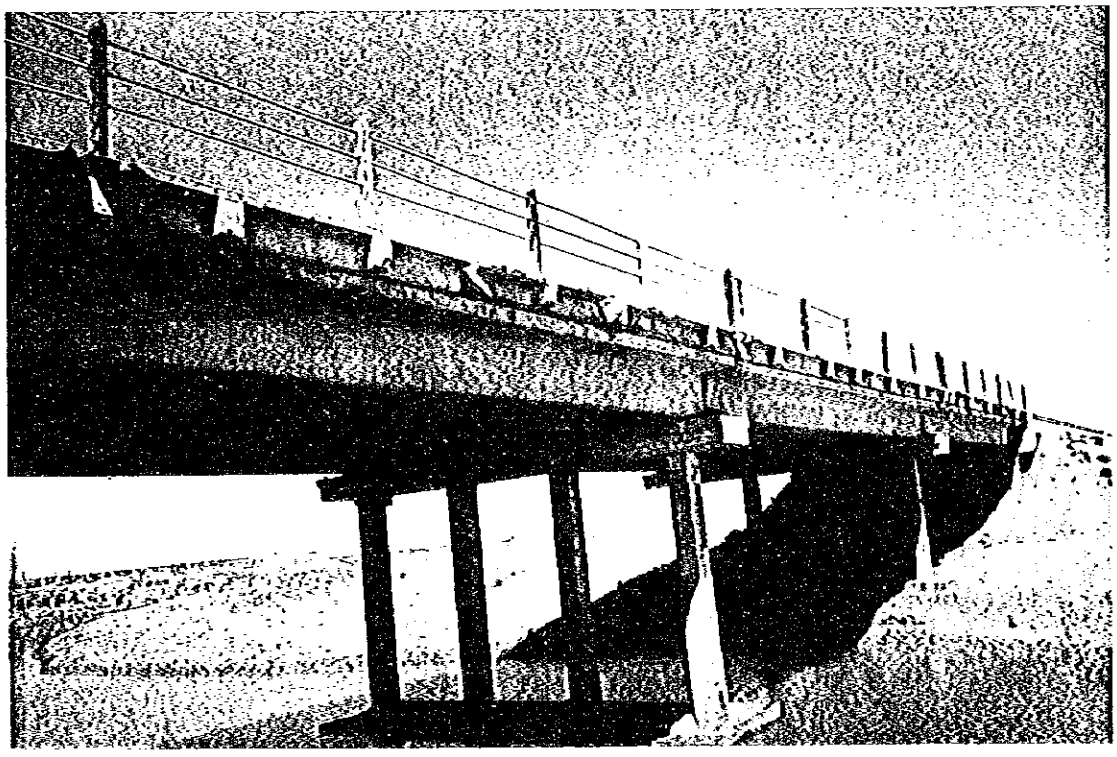

Photo III-5 : Bridge No.7 on the Atyrau ~ Mahambet Road Section
General view

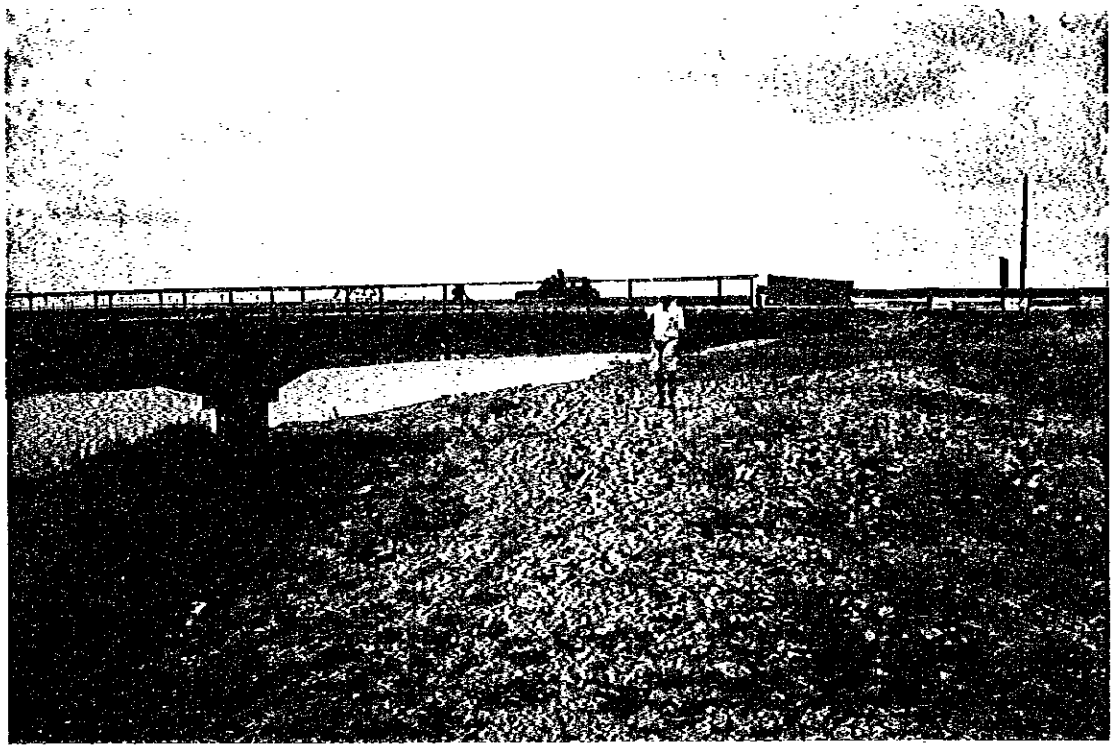

Photo III-6 : Bridge No.26 on the Karabutak ~ Kzyl Orda Boarder Road Section
Condition of approach

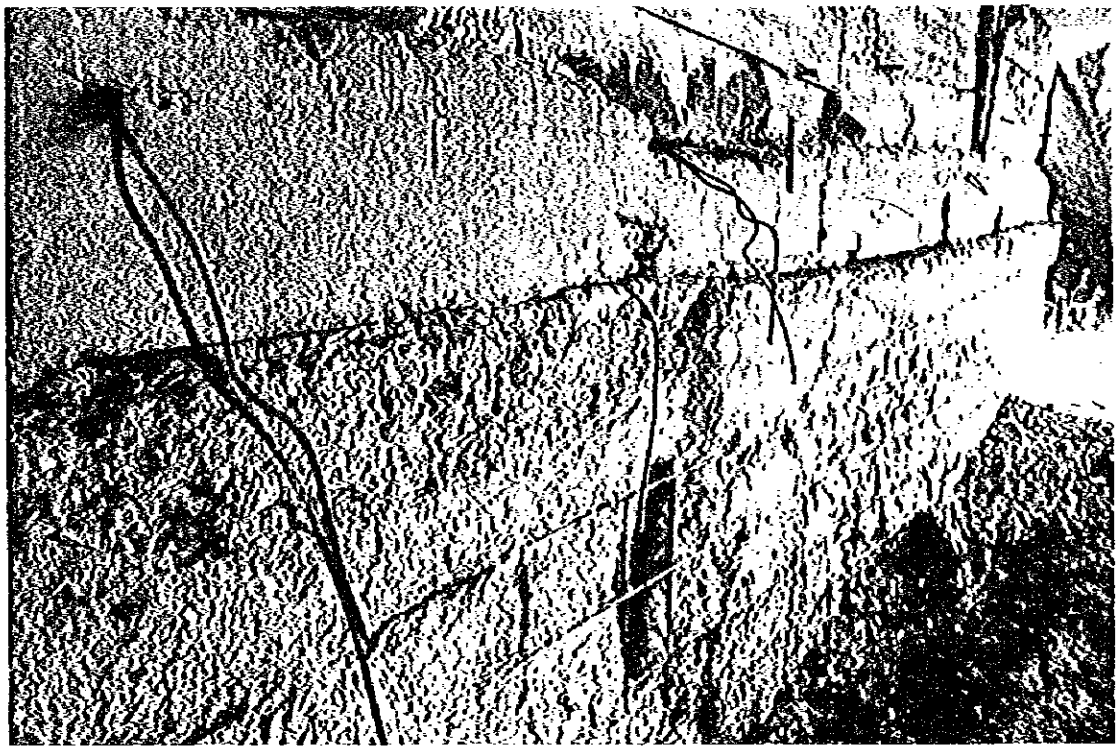

Photo III-7 : Bridge No.27 on the Karabutak ~ Kzyl Orda Boarder Road Section
Condition of worn-out abutment

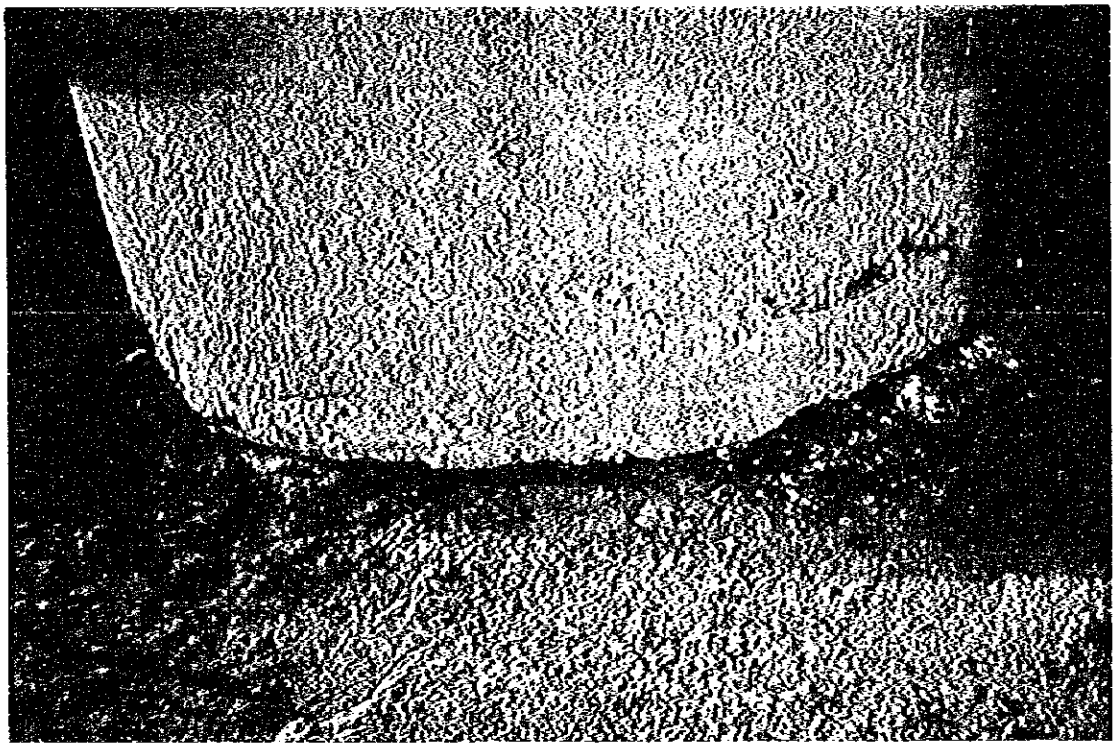

Photo III-8 : Bridge No.29 on the Karabutak ~ Kzyl Orda Boarder Road Section
Condition of washed out abutment

Photo III-9 : Bridge No.29 on the Karabutak ~ Kzyl Orda Boarder Road Section
Condition of broken slab

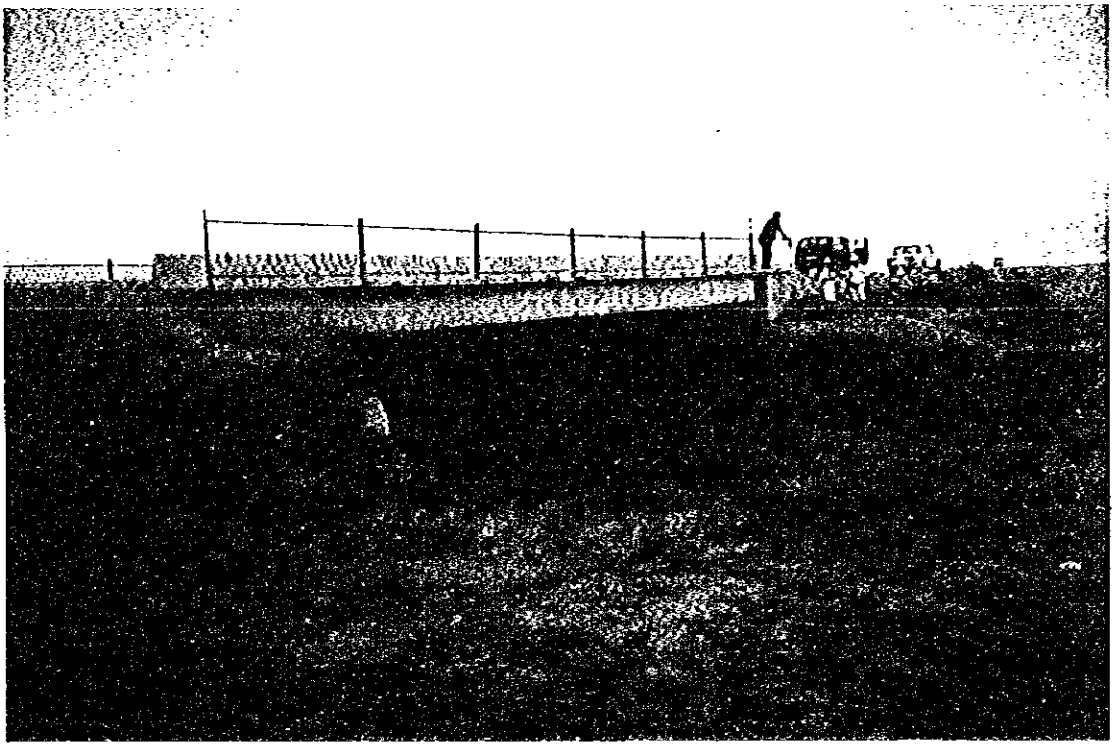

Photo III-10 : Bridge No.30 on the Karabutak ~ Kzyl Orda Boarder Road Section
General view

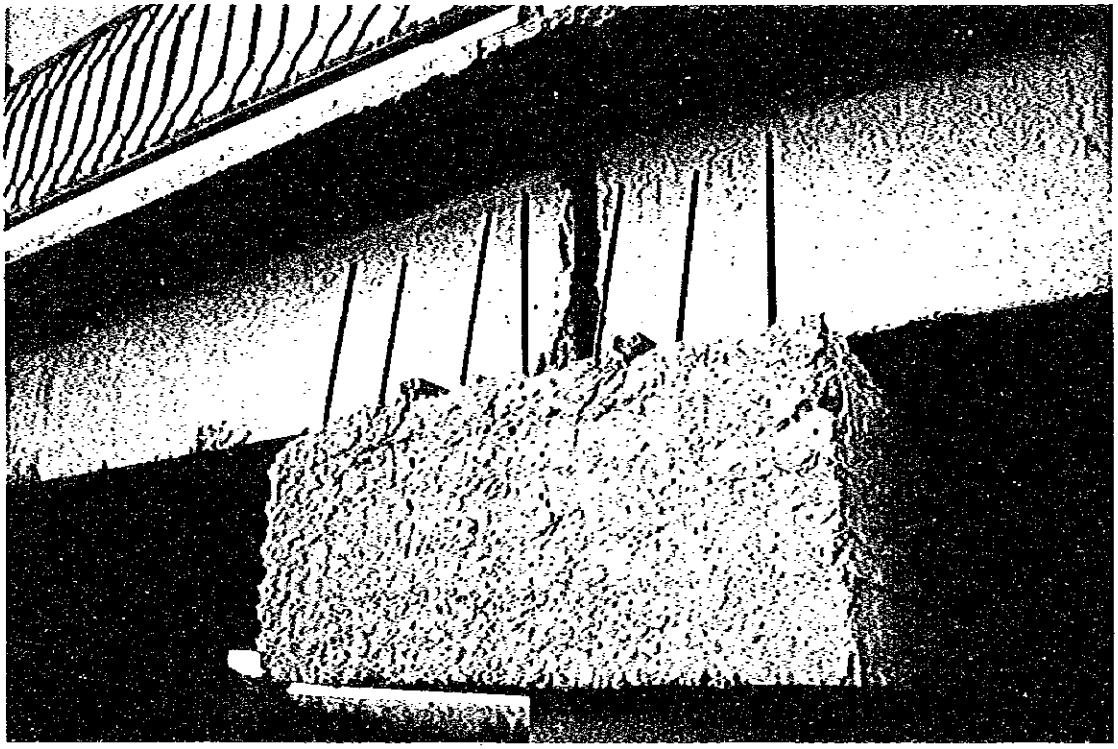

Photo III-11 : Bridge No.31 on the Karabutak ~ Kzyl Orda Boarder Road Section
Condition of in-completion of concrete work

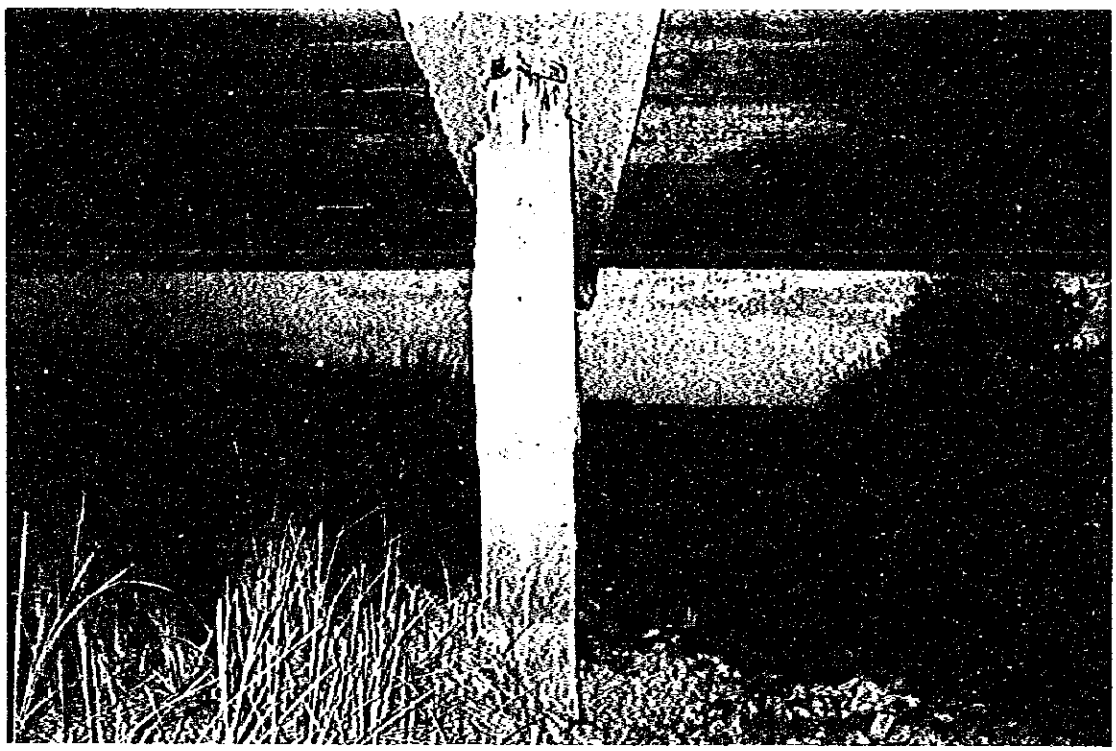

Photo III-12 : Bridge No.32 on the Karabutak ~ Kzyl Orda Boarder Road Section
Condition of broken pier