

The European Union's Tacis TRACECA programme
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Turkmenistan, Ukraine, Uzbekistan

Review of Railway Rehabilitation in Central Asia

for Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan

Module B - Feasibility Study of the rehabilitation measures for the Kungrad - Kazakh Border railway section (Uzbekistan)

Annexes

March 2005



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the European Union



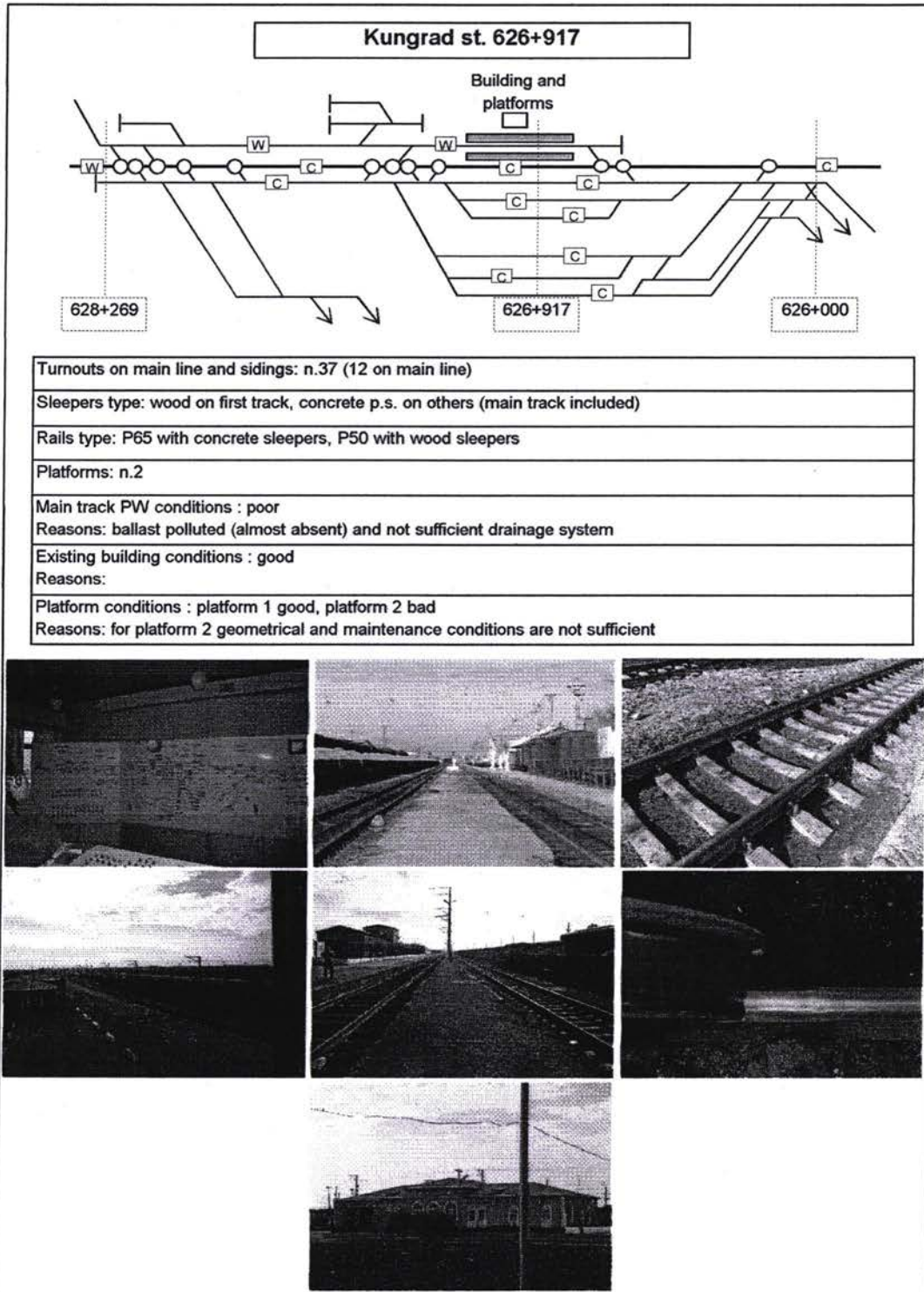
A project implemented by
Italferr S.p.A.

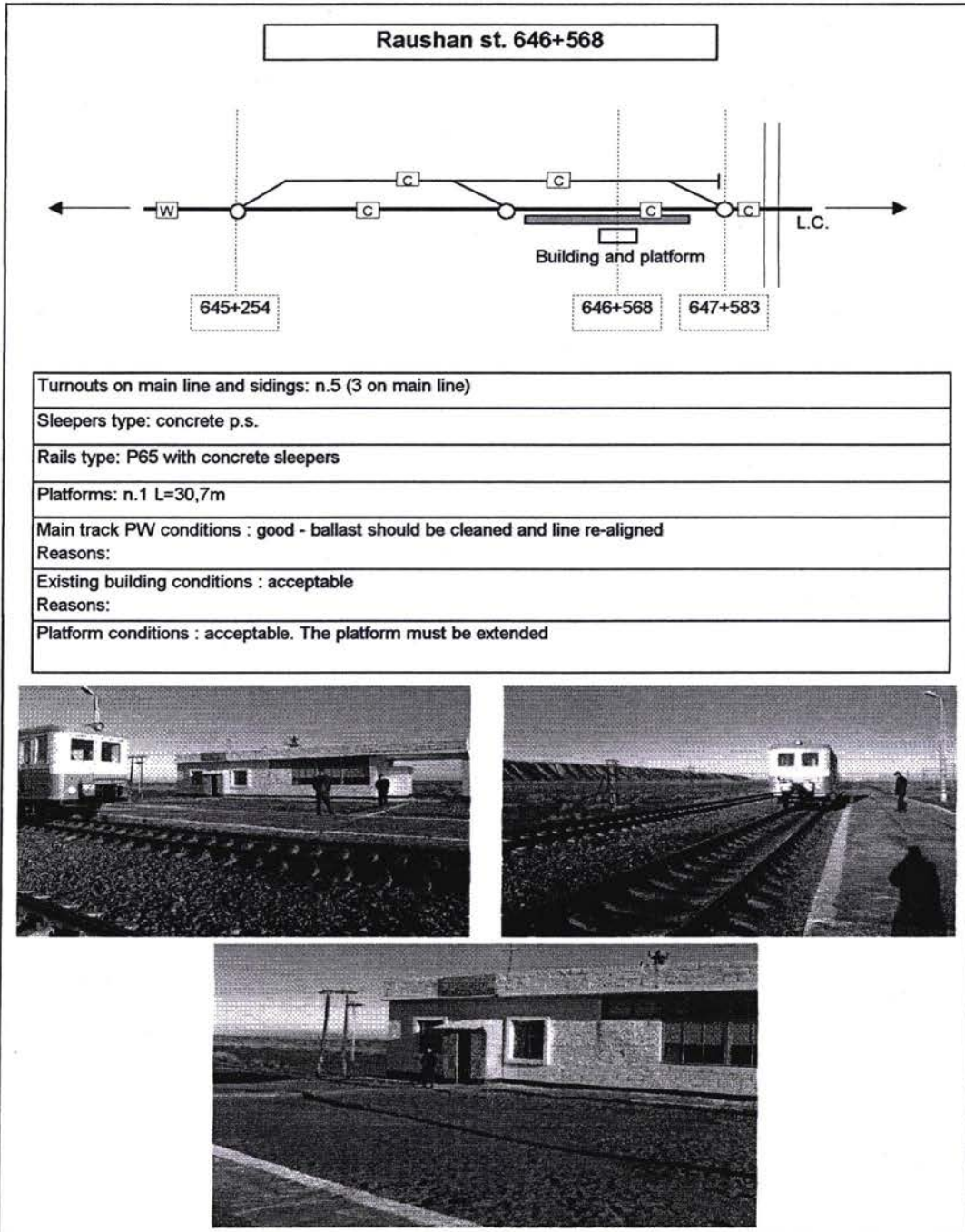
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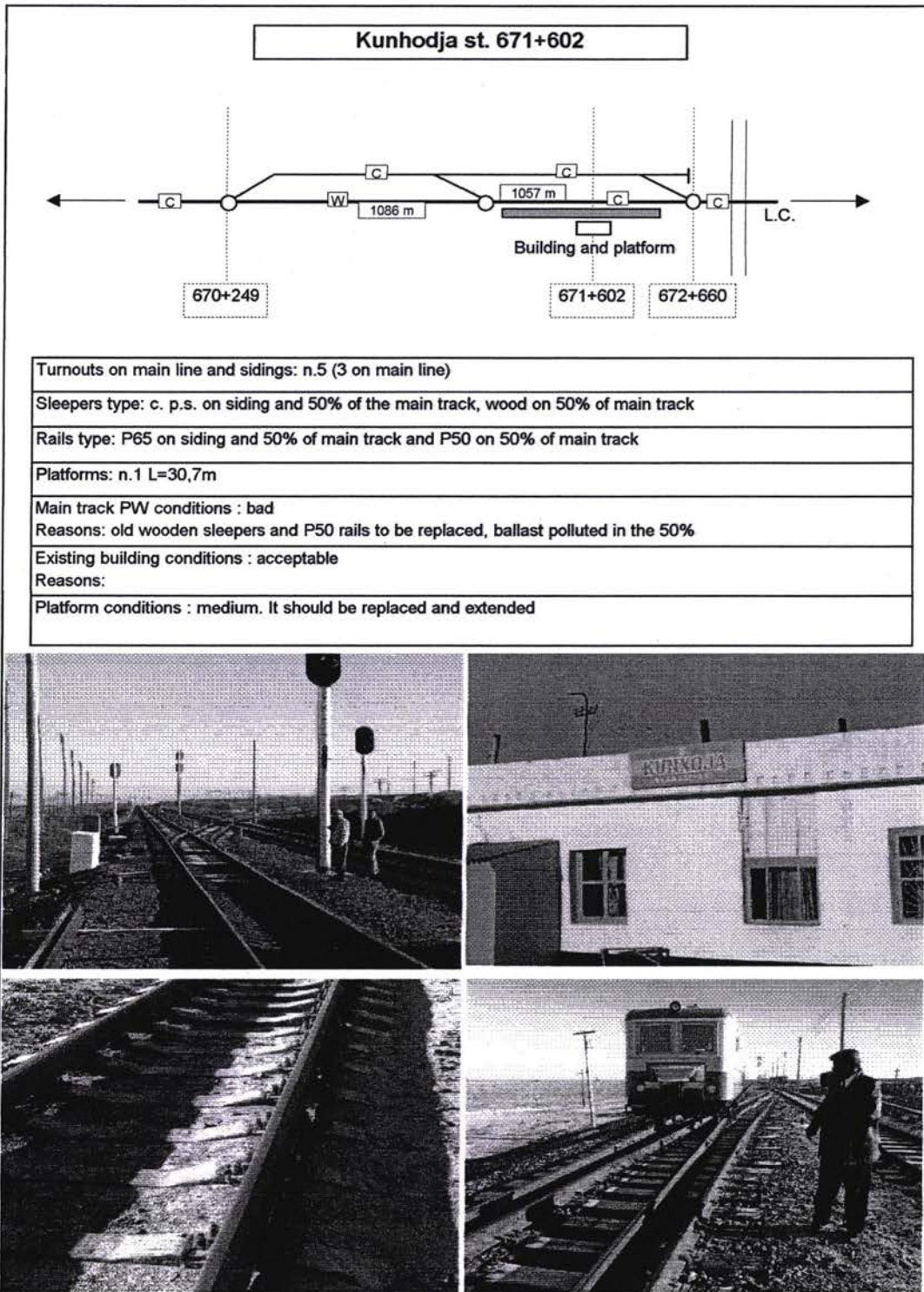
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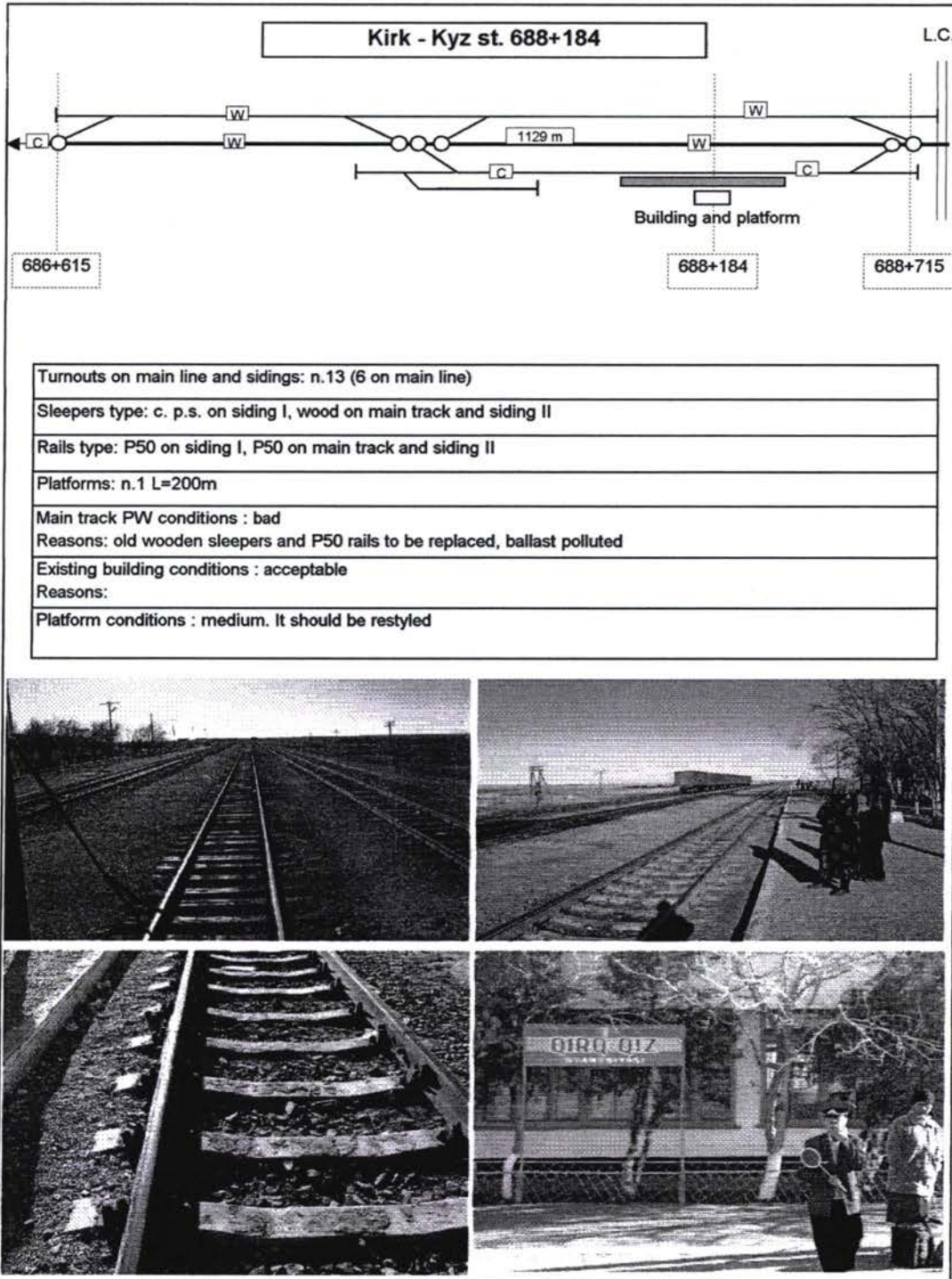
ANNEX I

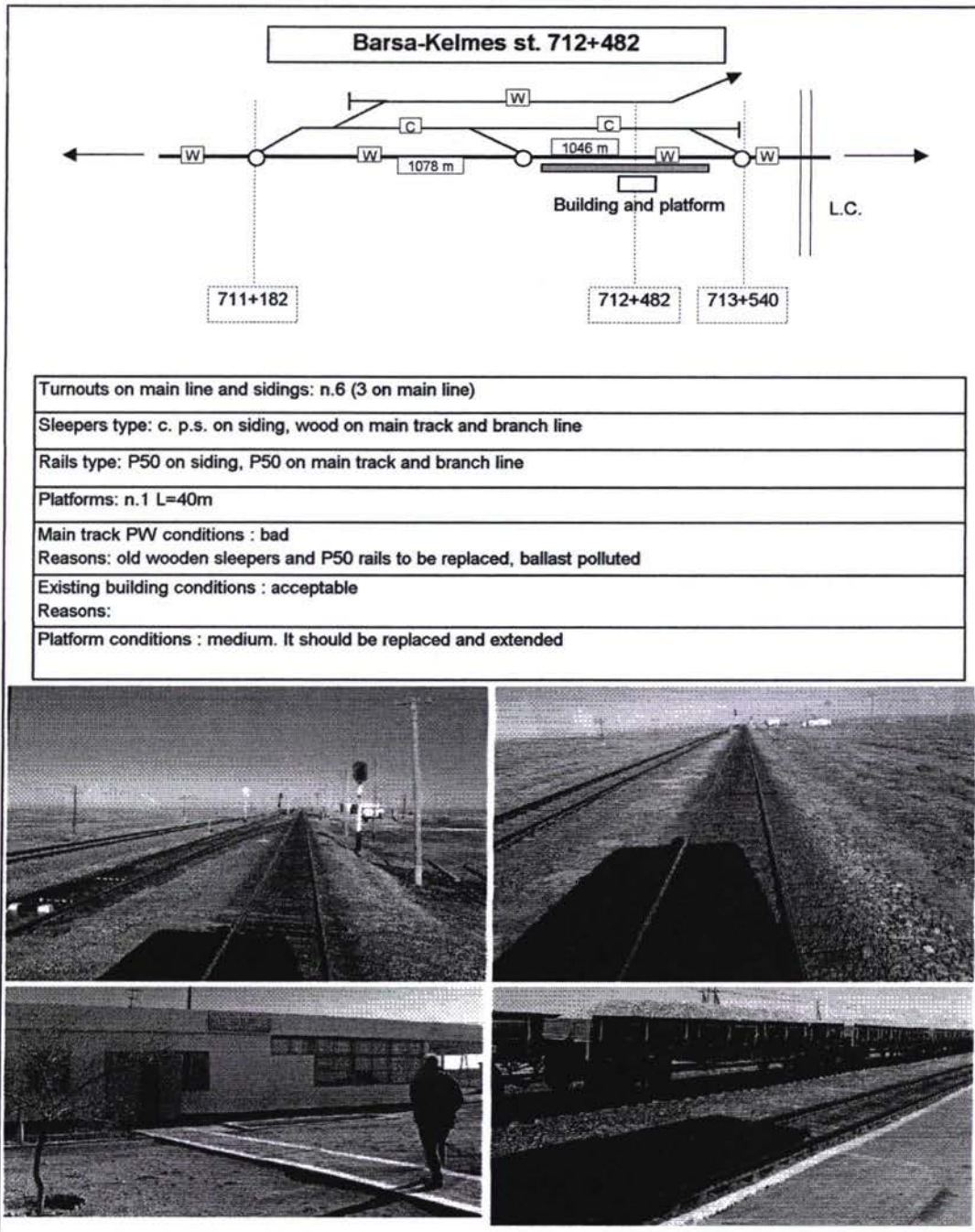
STATION PHOTO COLLECTION

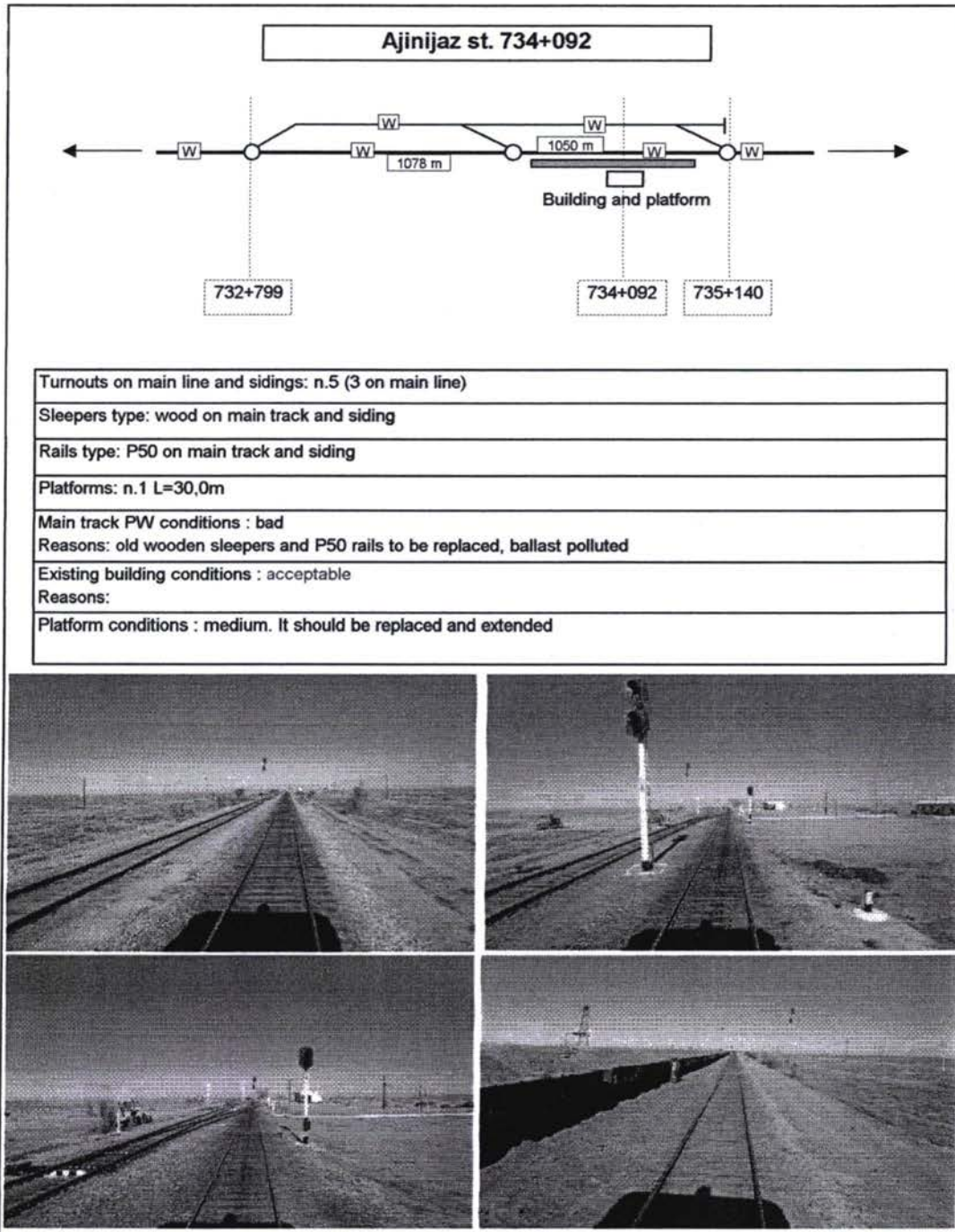


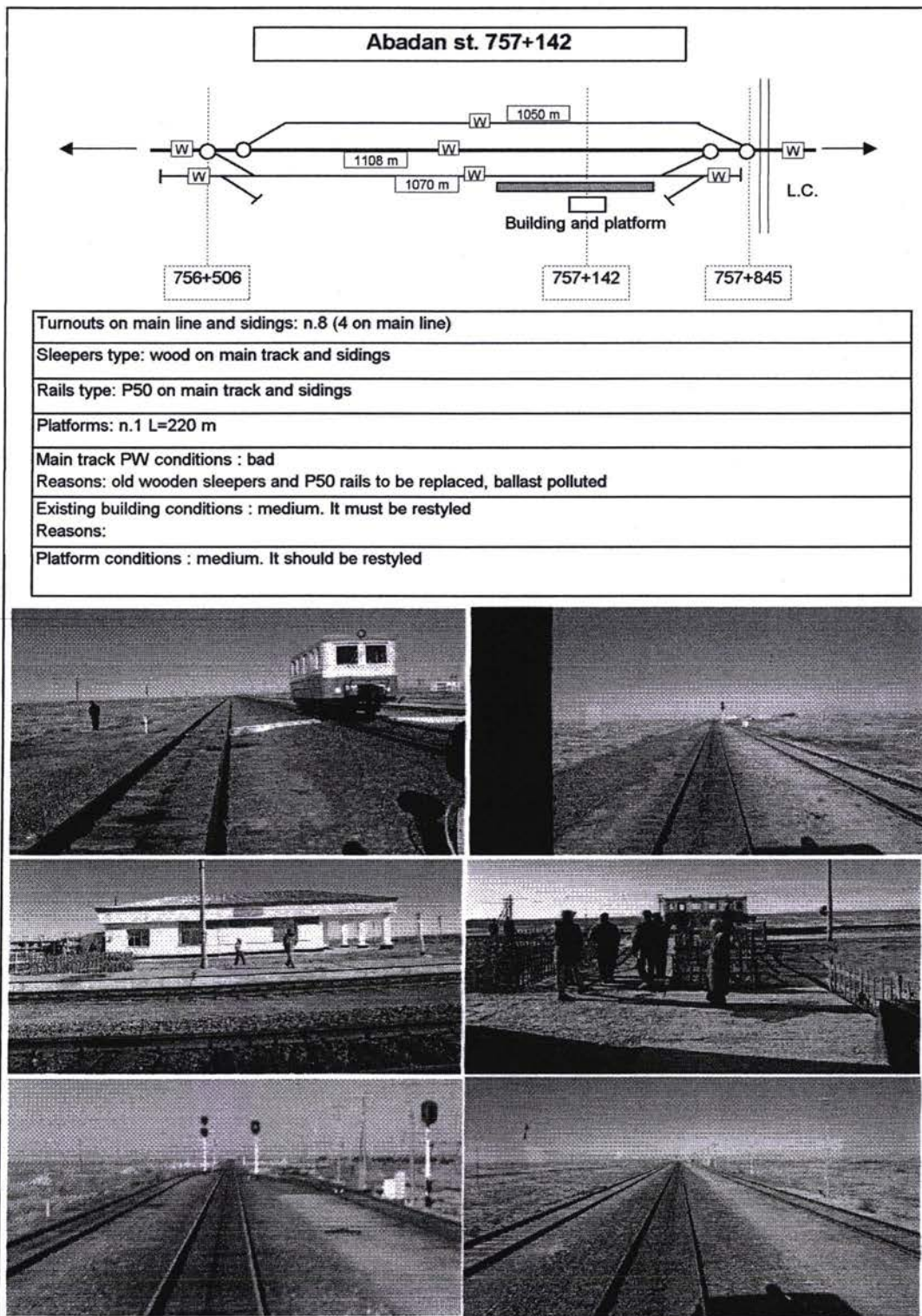


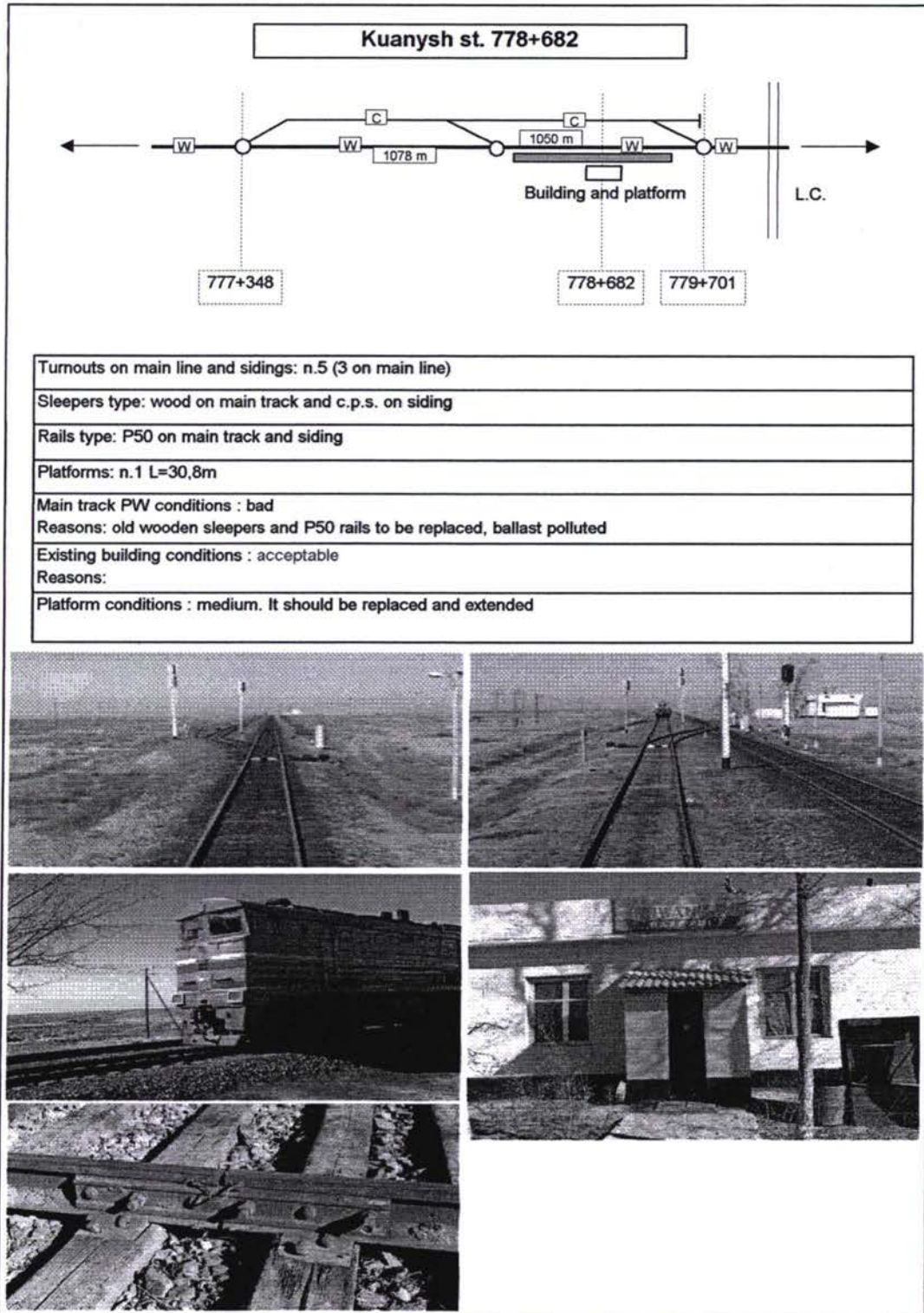


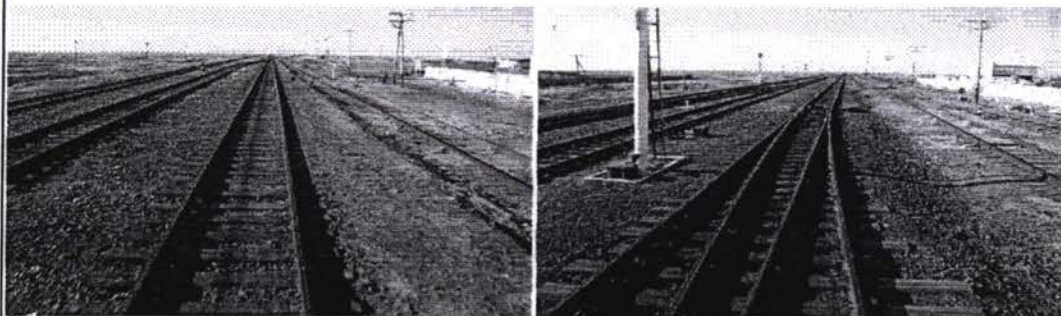
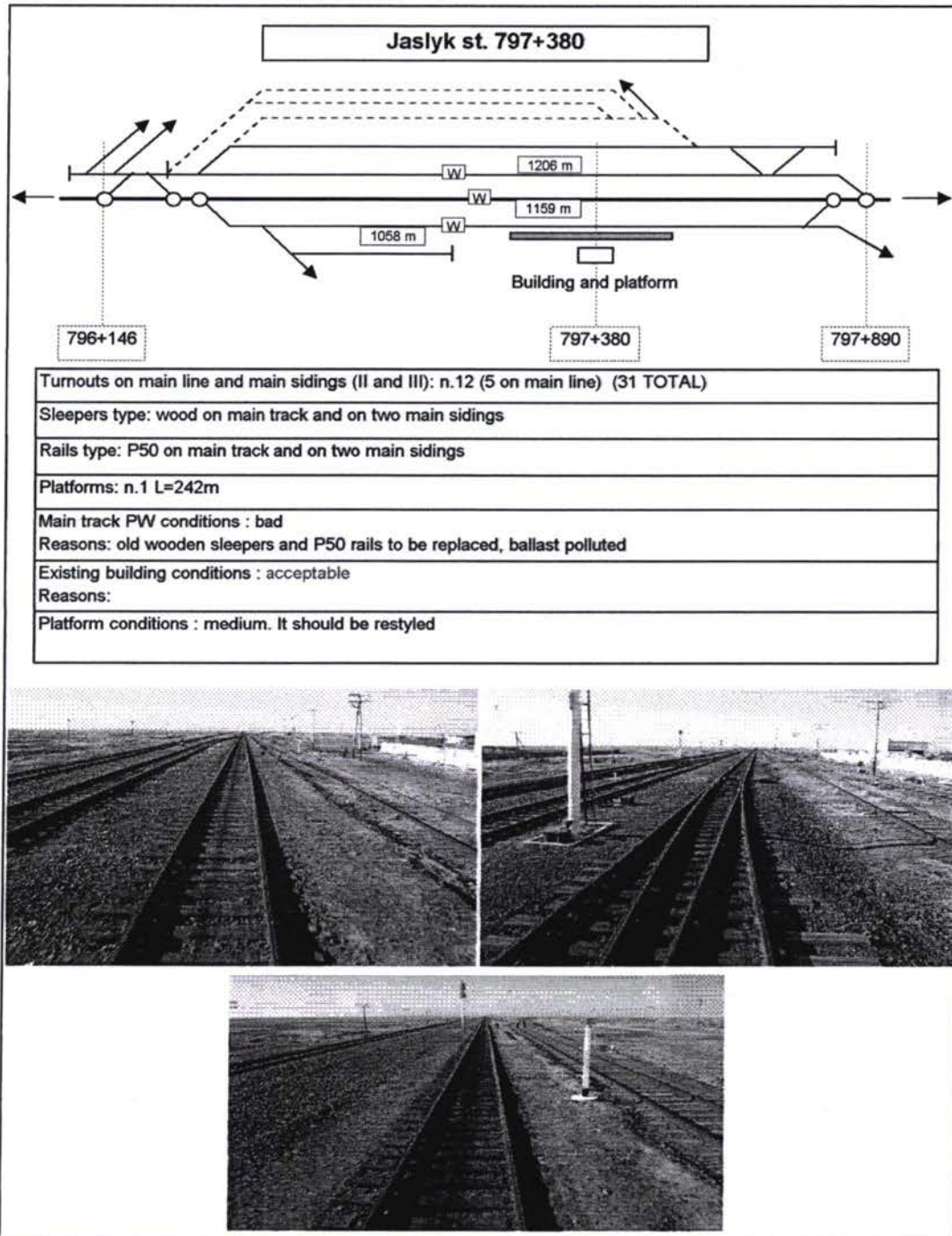


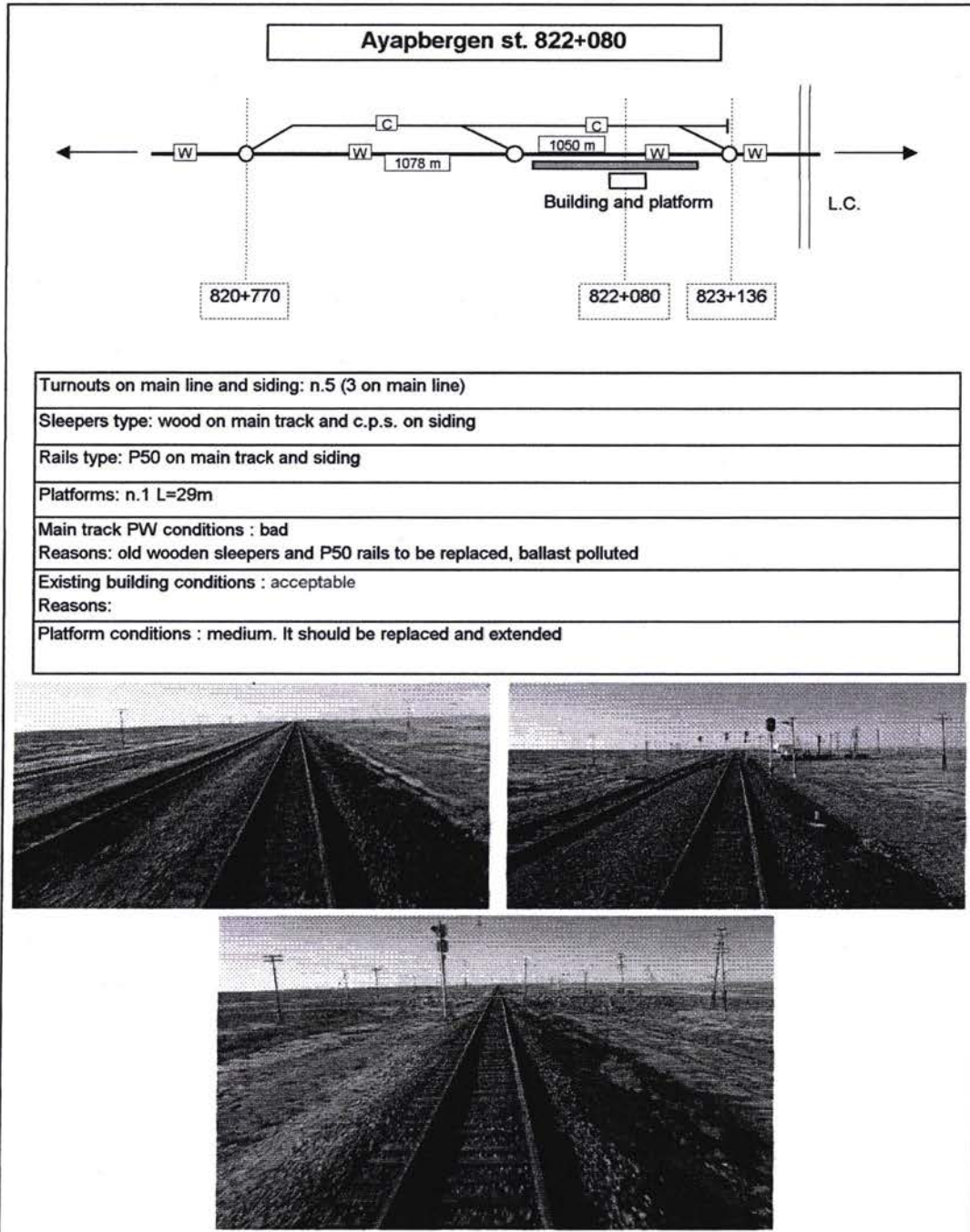


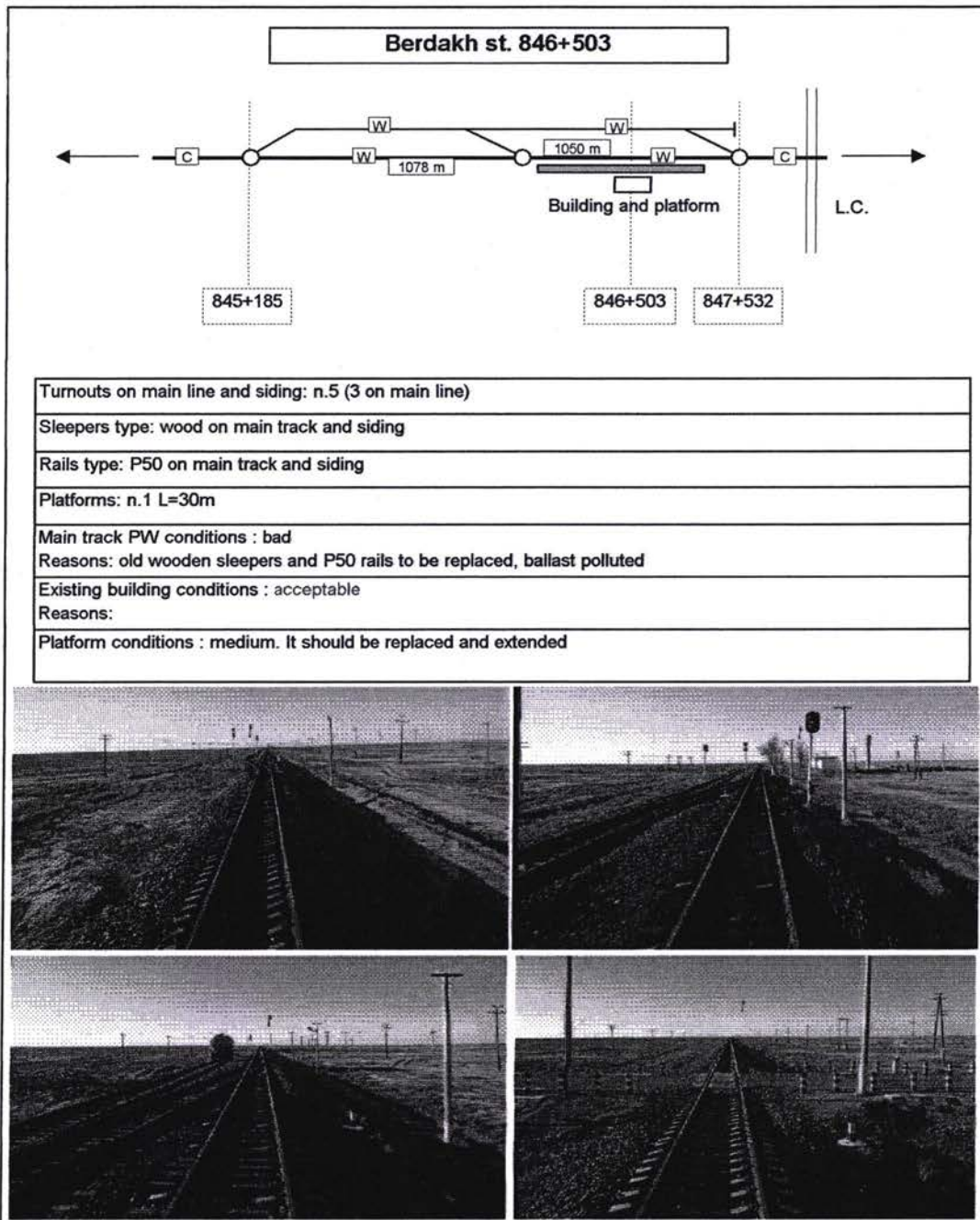


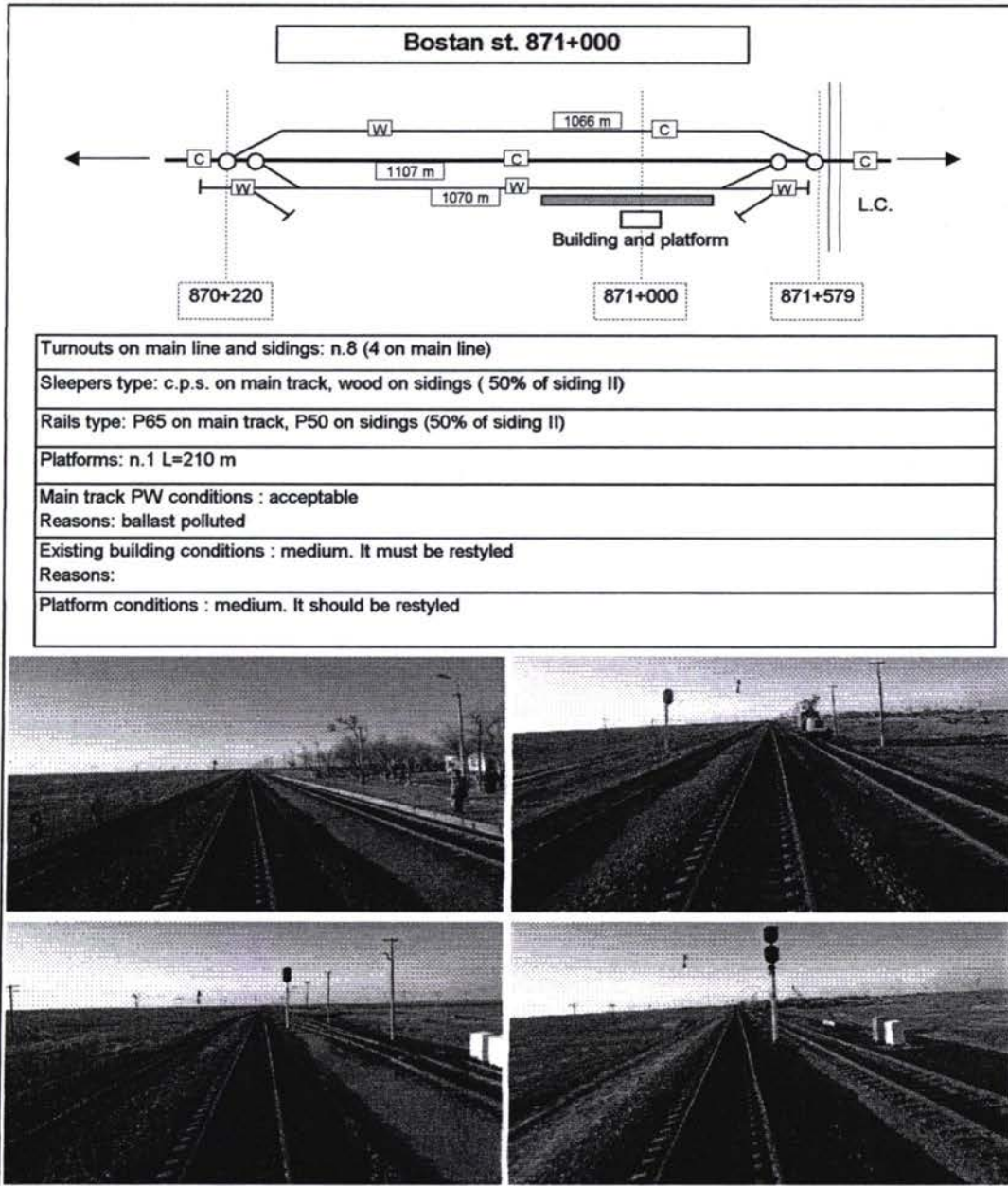


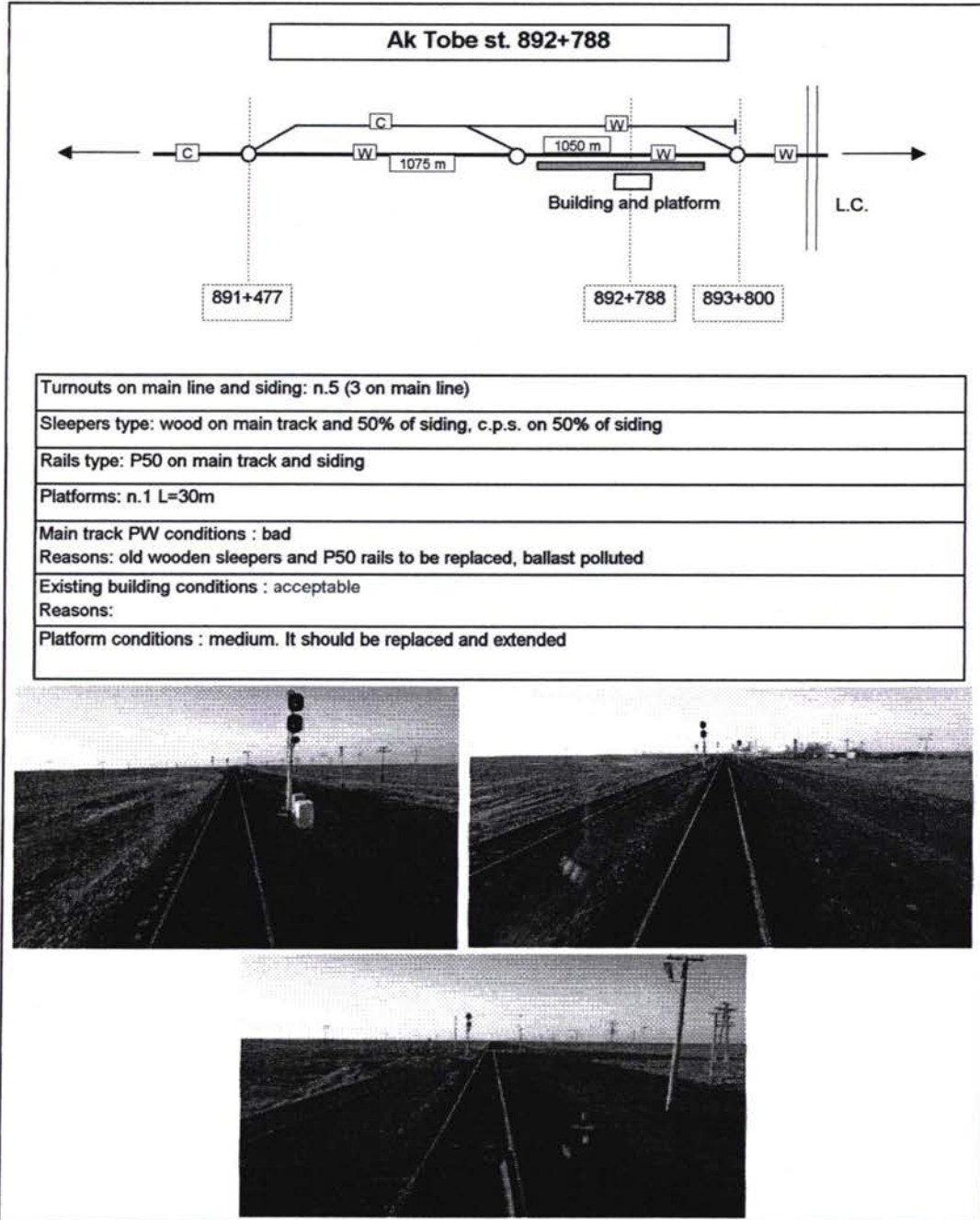


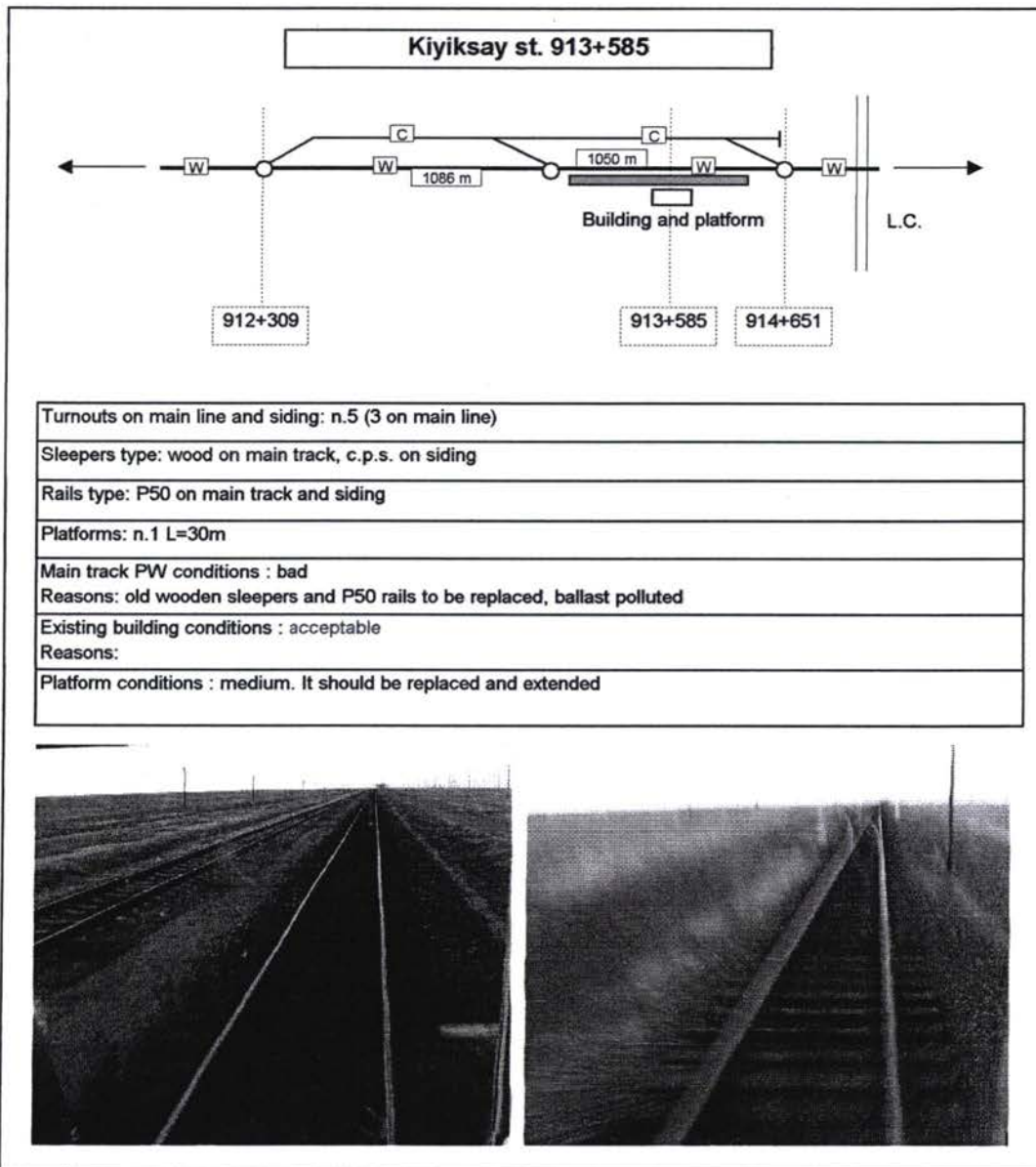


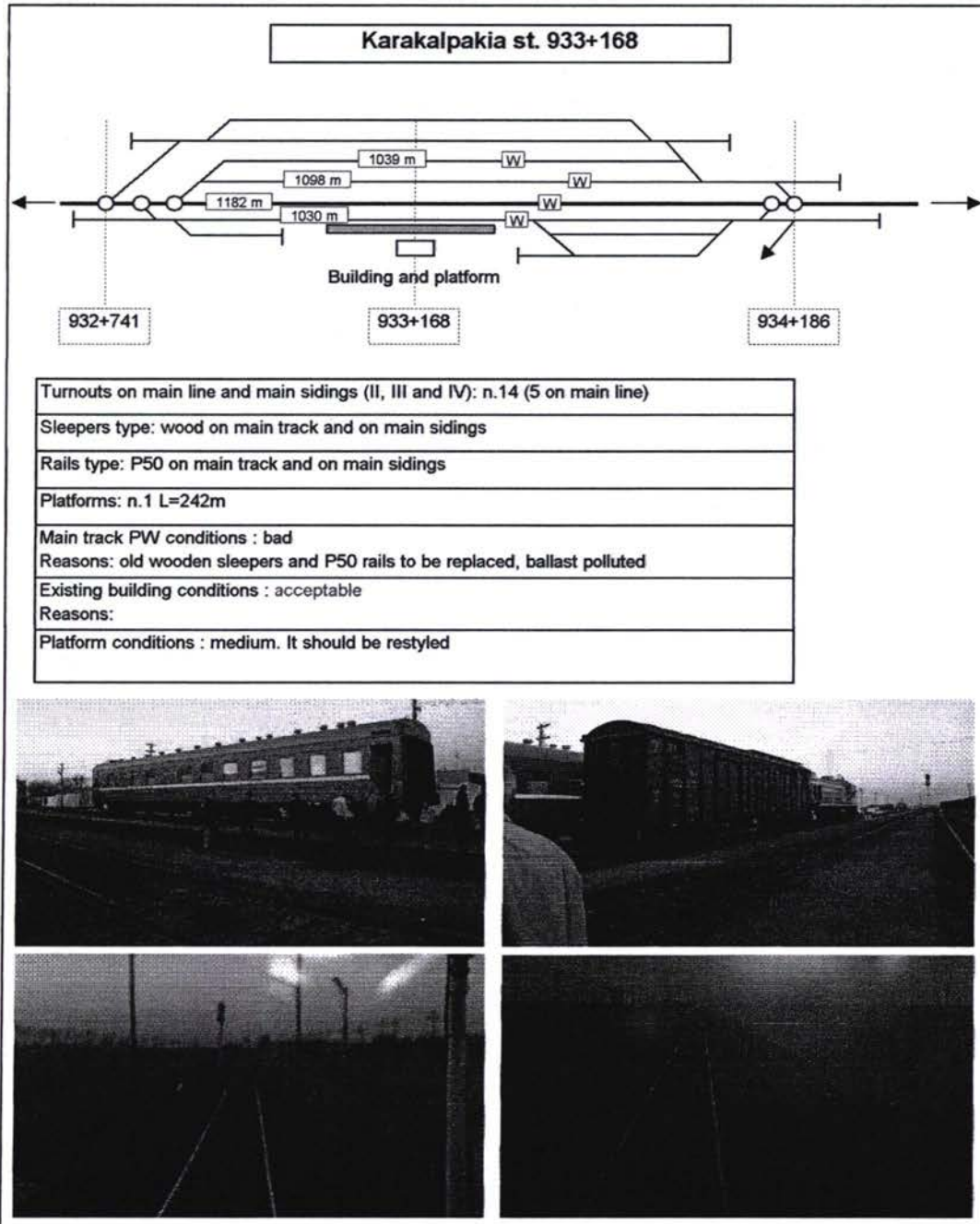












ANNEX II

LINE PHOTO COLLECTION



FIG. 1

Km 639+000 between Kungrad and Raushan station. Wooden sleepers and R50 rail type. Some broken wooden sleepers have been replaced by concrete sleepers.



FIG. 2

Km 657+000 between Raushan and Kunhodja station. Concrete sleepers and R65 rail type. Ballast is in good conditions and the cross section shape is well preserved.



FIG. 3

Km 681+000 between Kunhodja and Kirk-Kyz station. Concrete sleepers and R65 rail type. The alignment runs on a low embankment (1/2m). No geotechnic and hydraulic problems are affecting the section. Ballast is in good conditions.



FIG. 4

Km 696+000 between Kirk-Kyz and Barsa-Kelmes station. Wooden sleepers and R50 rail type. Ballast is in poor conditions and the cross section shape is well preserved.



FIG. 5

Km 706+000 between Kirk-Kyz and Barsa-Kelmes station. Wooden sleepers and R50 rail type. Ballast is in poor conditions and the cross section shape is well preserved. The embankment is very low and the line is completely flat and straight.

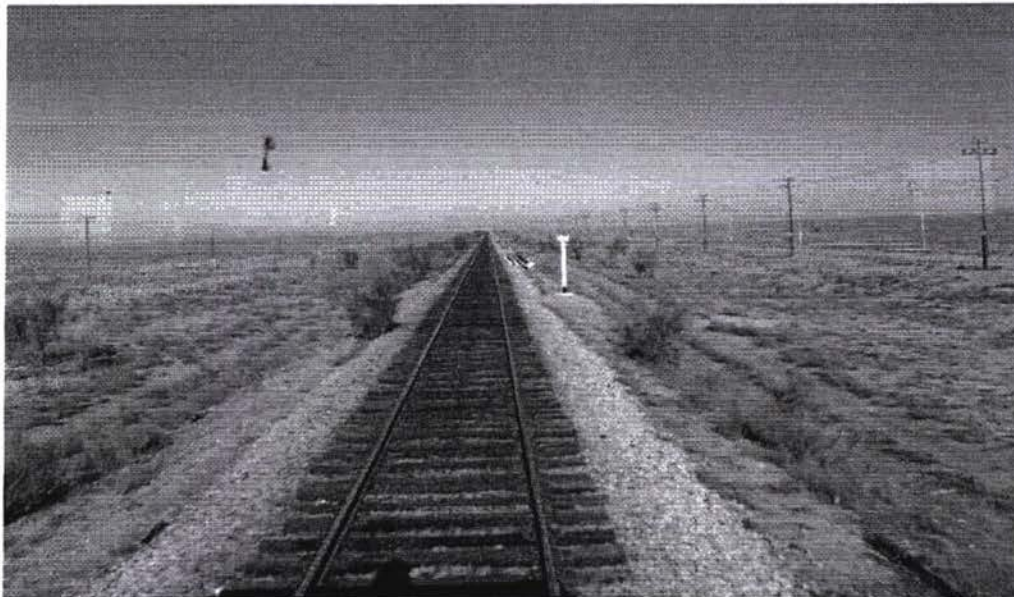


FIG. 6

Km 728+000 between Barsa-Kelmes and Ajinijaz station. Wooden sleepers and R50 rail type. Ballast is in poor conditions and the cross section shape is well preserved. The embankment is very low and the line is completely flat and straight.



FIG. 7

Km 746+000 between Ajinjaz and Abadan station. Wooden sleepers and R50 rail type. Same conditions of the previous section.



FIG. 8

Km 755+000 between Ajinjaz and Abadan station. Same conditions of the previous section. On the right side three spare rail bars for Capital Maintenance rail replacement.

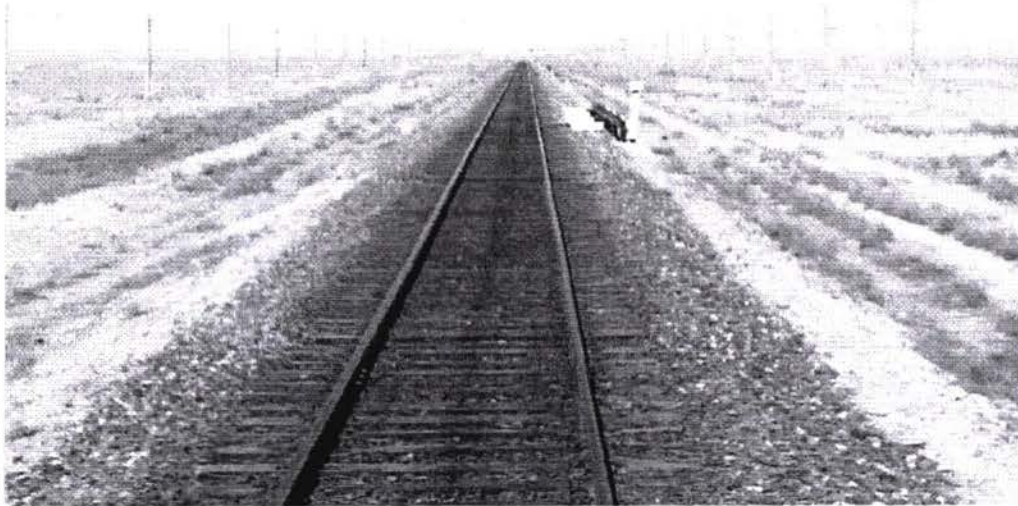


FIG. 9

Km 773+000 between Abadan and Kuanysh station. Same conditions of the previous section. On the right side three spare rail bars for Capital Maintenance rail replacement.



FIG. 10

Km 796+000 northern end of Jaslik station. Same conditions of the previous section. Level Crossing with Sant Andrews crosses at the end of the station track set. Track is out of alignment.

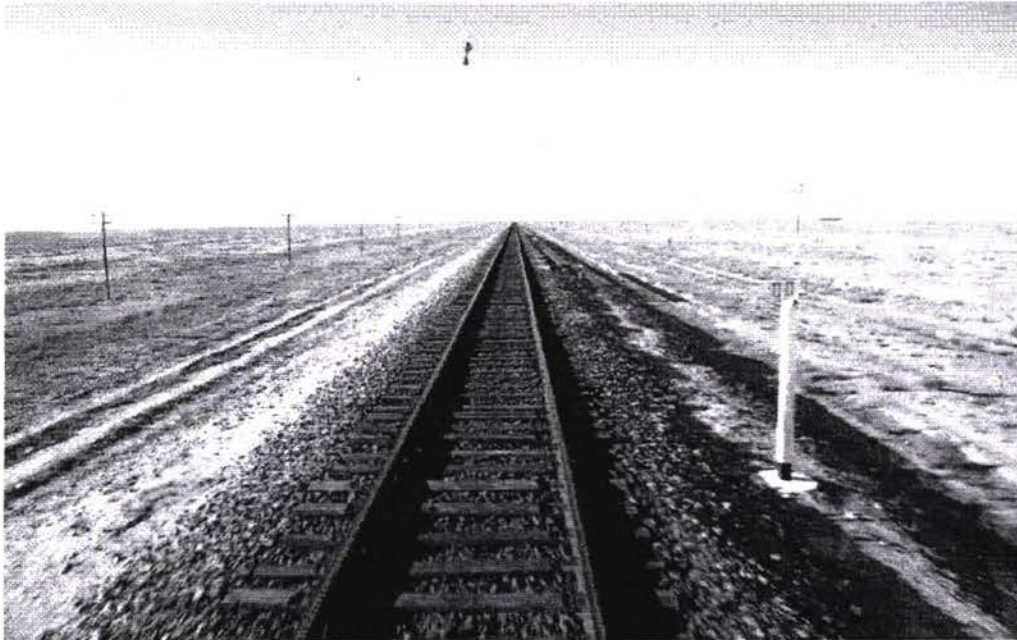


FIG. 11

Km 803+000 between Jaslik and Ayapbergen station. Same conditions of the previous section (wood and R50). Track alignment is in good conditions.



FIG. 12

Km 818+000 between Jaslik and Ayapbergen station. Same conditions of the previous section (wood and R50). Track alignment is in good conditions. Some wooden sleepers have been replaced during the Medium Maintenance with concrete ones.



FIG. 13

Km 838+000 between Ayapbergen and Berdakh station. Permanent way has been recently replaced with new R65 rails and concrete sleepers. Track alignment is in good conditions. The cross section shape is well preserved.



FIG. 14

Km 856+000 between Berdakh and Bostan station. Same conditions of the previous section. Abundance of ballast for the previous presence of an old crossing track (currently removed).



FIG. 15

Km 882+300 between Bostan and Ak-Tobe station. Permanent way continues with recently renewed elements (R65 rails and concrete sleepers). Abundance of ballast for over-dimensioned refilling and for reduction of transversal shape of the embankment.

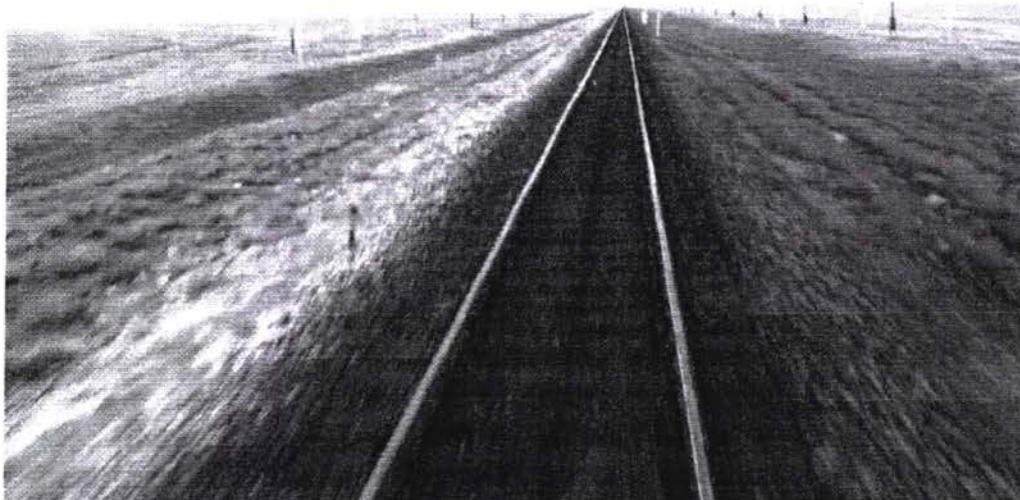


FIG. 16

Km 909+000 between Ak-Tobe and Kiyiksay station. Permanent way is old and worn out and must be replaced (currently R50 rails and wooden sleepers). Abundance of ballast for over-dimensioned refilling and for reduction of transversal shape of the embankment.



FIG. 17

Km 928+000 between Kiyiksay and Karakalpokia station. Permanent way has been recently renewed (R65 rails and concrete sleepers). The alignment is preserved in good conditions by means of a continue light maintenance.

ANNEX III

INFRASTRUCTURE PHOTO COLLECTION



FIG. 1
Permanent Way detail: indirect standard fastening device.

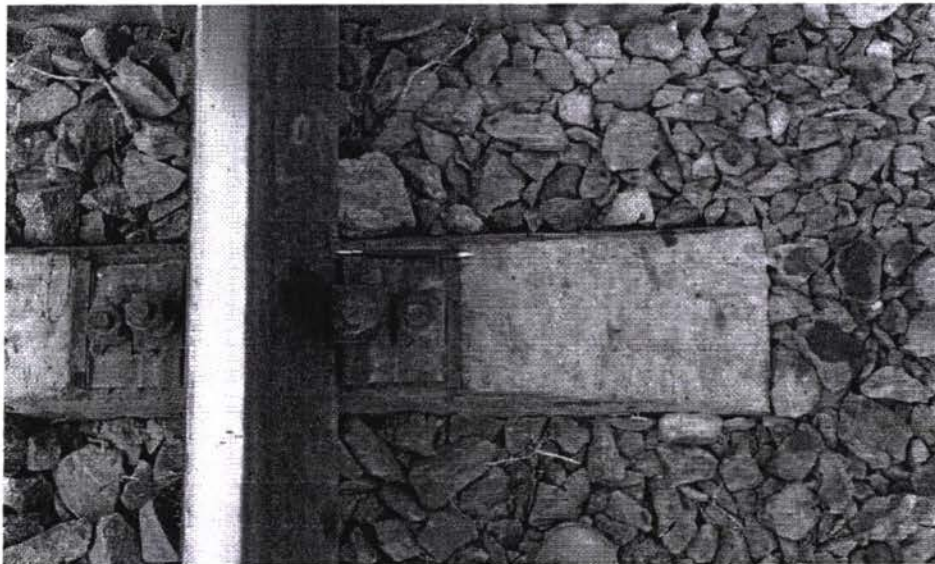


FIG. 2
Permanent Way detail: upside view of indirect standard fastening device . Each fastening counts 2 direct bolts fixed in the sleeper and 2 indirect bolts fixed in the plates.



FIG. 3
Ballast view. It is possible to see that the shoulders of ballast on the sleeper side has to be slightly corrected.



FIG. 4
Permanent Way detail in a renewed section (R65 and concrete sleeper): indirect standard fastening device and rail. As it is shown, the standard rail cross section is consumed in the inner side.

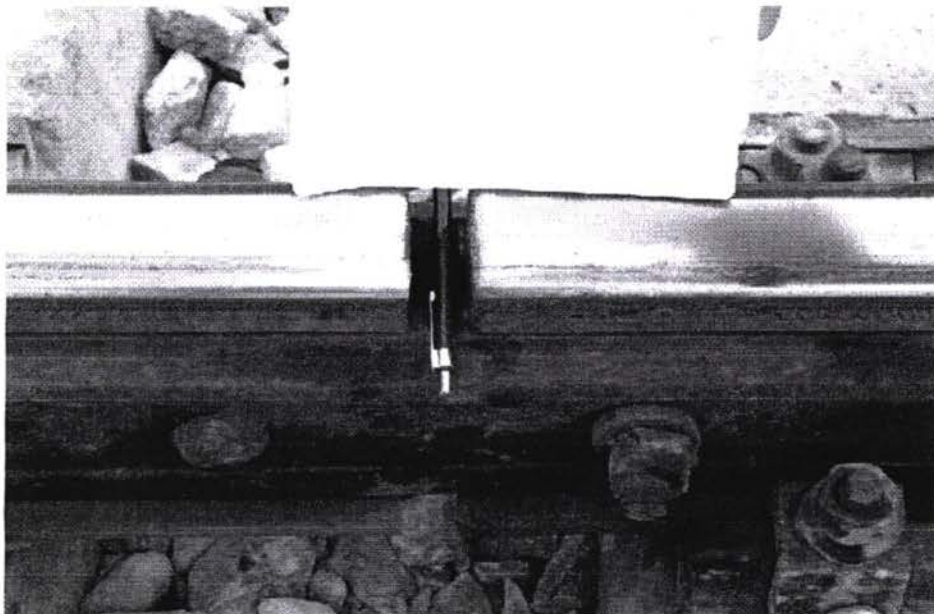


FIG. 5
Permanent Way detail in a renewed section (R65 and concrete sleeper): rail joint particular. The photo shows the excessive opening (3/4 cm). This phenomenon leads to the deformation of the rails heads for hammering effect of the train passage.

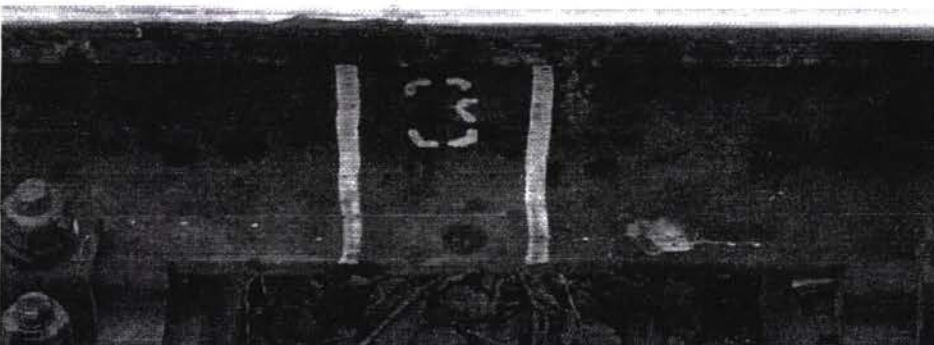


FIG. 6
Permanent Way detail in a renewed section (R65 and concrete sleeper): rail weld. The photo shows one of the few weldings.

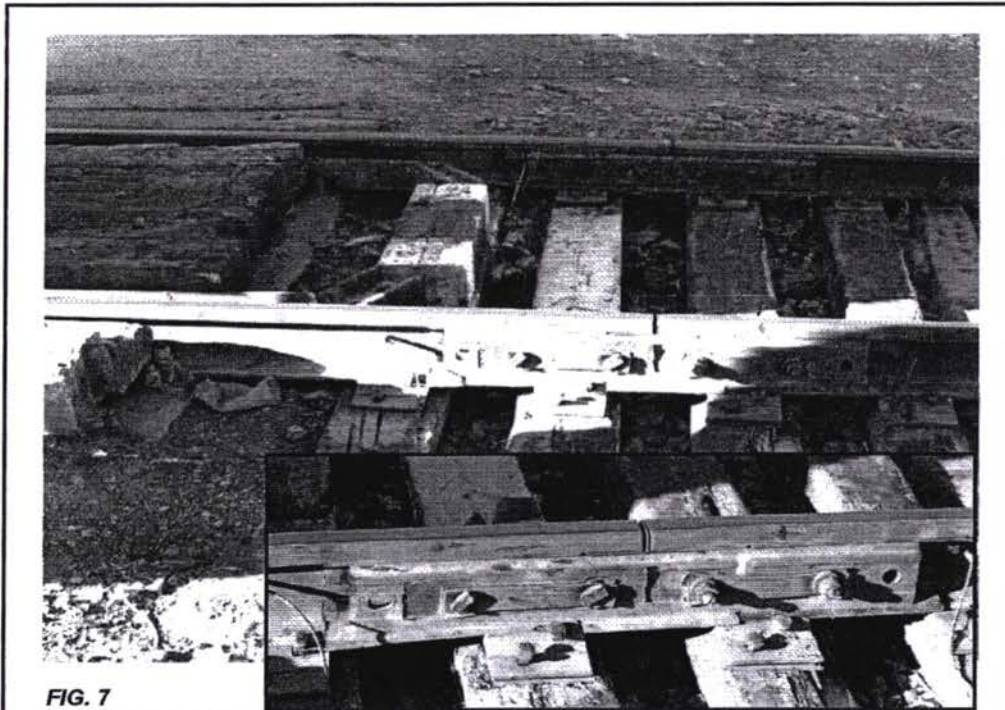


FIG. 7

Permanent Way detail in an old and worn out section (R50 and wooden sleeper): insulated rail joint particular in correspondence with a Level Crossing. The photo shows the excessively damaged status of the wooden sleepers and fastenings, two bolts missing.



FIG. 8

Permanent Way detail in an old and worn out section (R50 and wooden sleeper): rail joint particular. It is possible to point out the status and quality of the fastenings (direct ones).

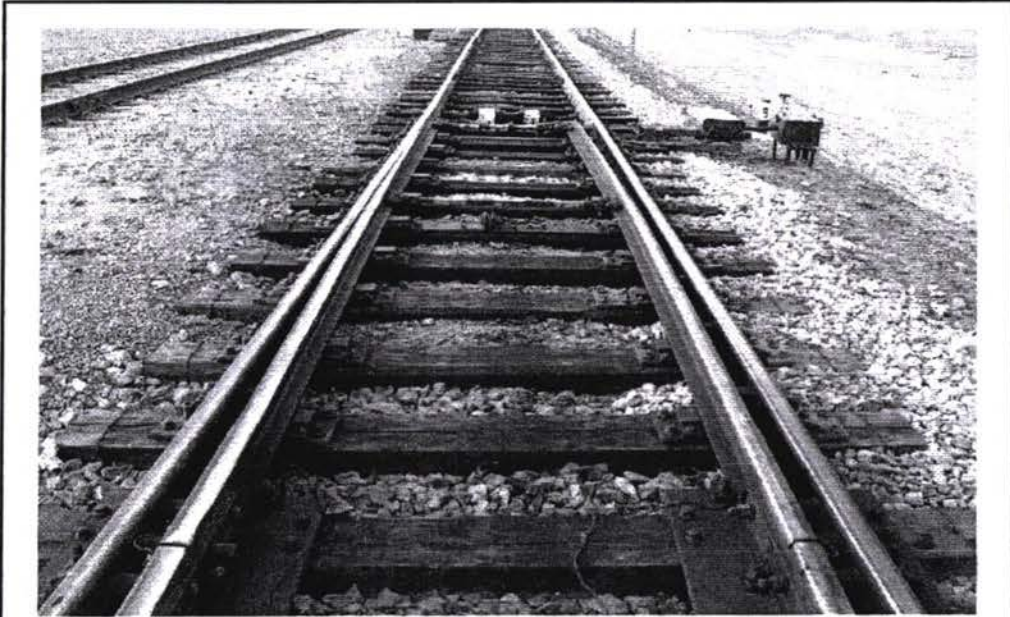


FIG. 9

Permanent Way detail: turnout. Blades and counterblades. Always turnouts are built on wooden sleepers.

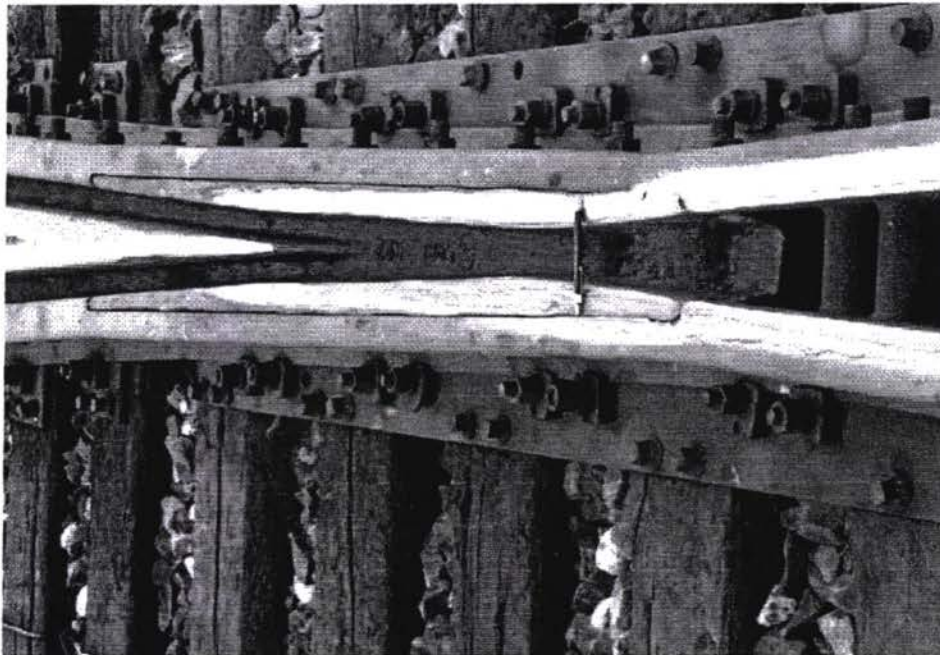


FIG. 10

Permanent Way detail: small tangent turnout. Cross. It is possible to see the cross part to be removed for replacement. This cross shows a huge consumption.

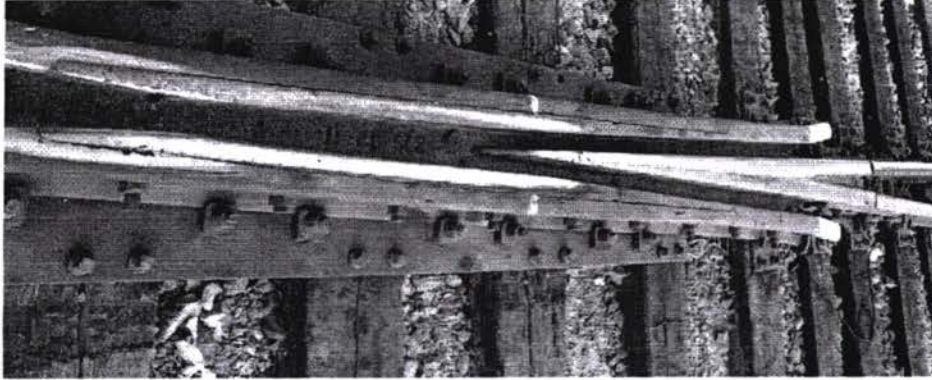


FIG. 11

Permanent Way detail: large tangent turnout. Cross. It is possible to see the cross part to be removed for replacement. This cross shows a huge consumption.

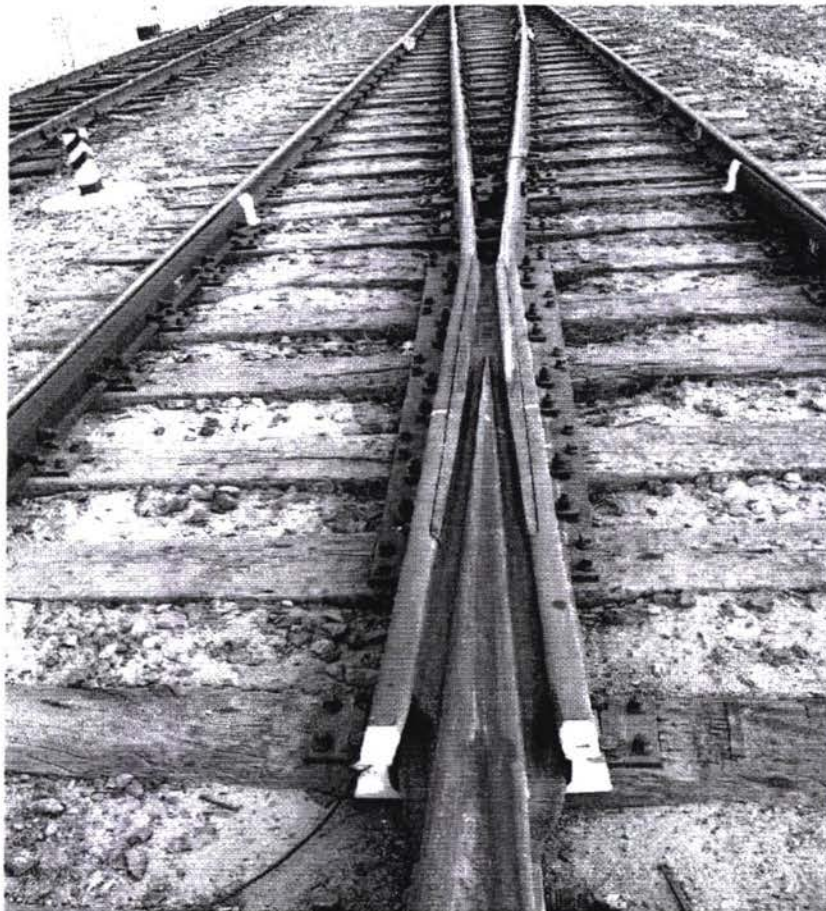


FIG. 12

Permanent Way detail: turnout. Cross general view.



FIG. 13
Permanent Way detail: turnout. Particular of the closed blade.

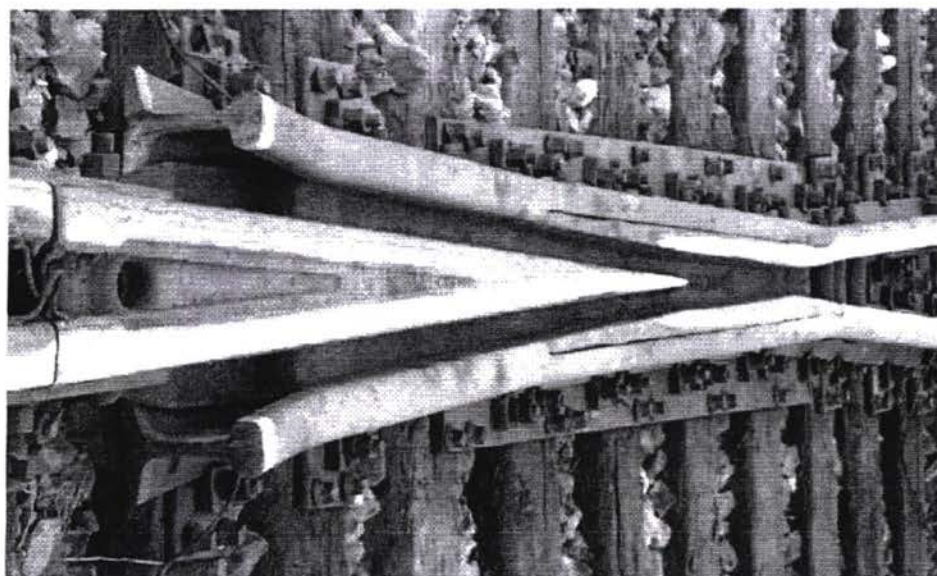


FIG. 14
Permanent Way detail: particular of the cross.

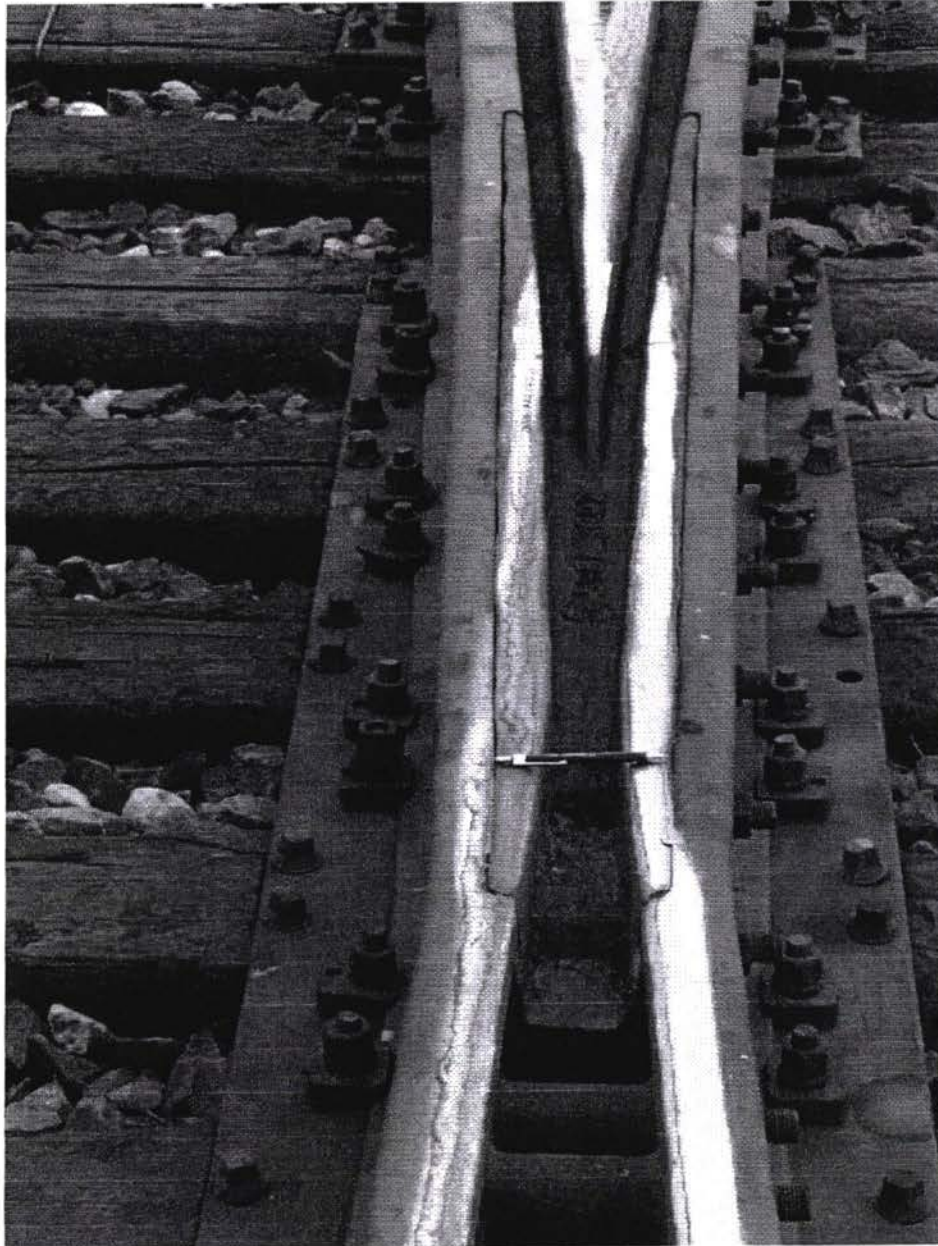


FIG. 15
Permanent Way detail: particular of the cross.

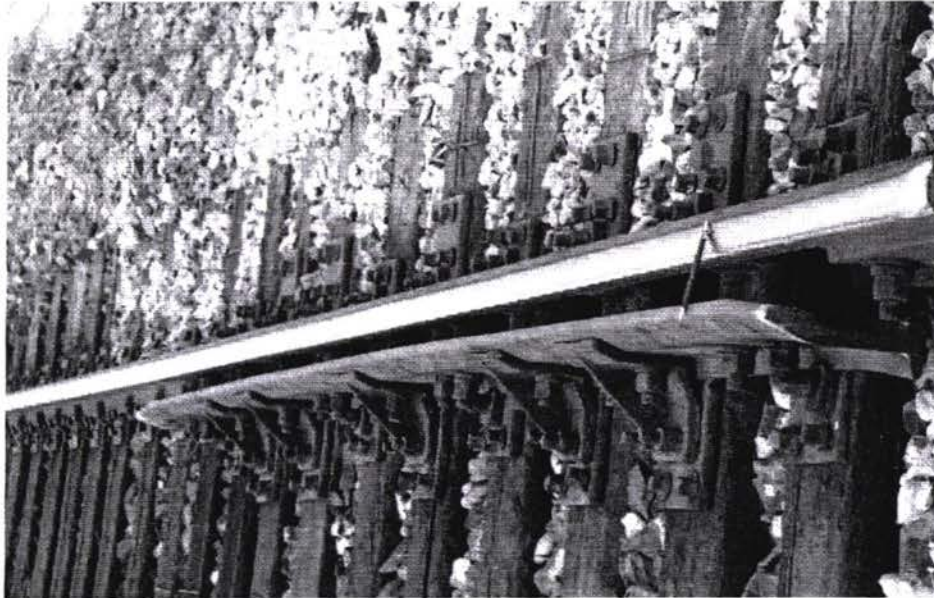


FIG. 16
Permanent Way detail: turnout. Counter-rail in correspondence of the cross.

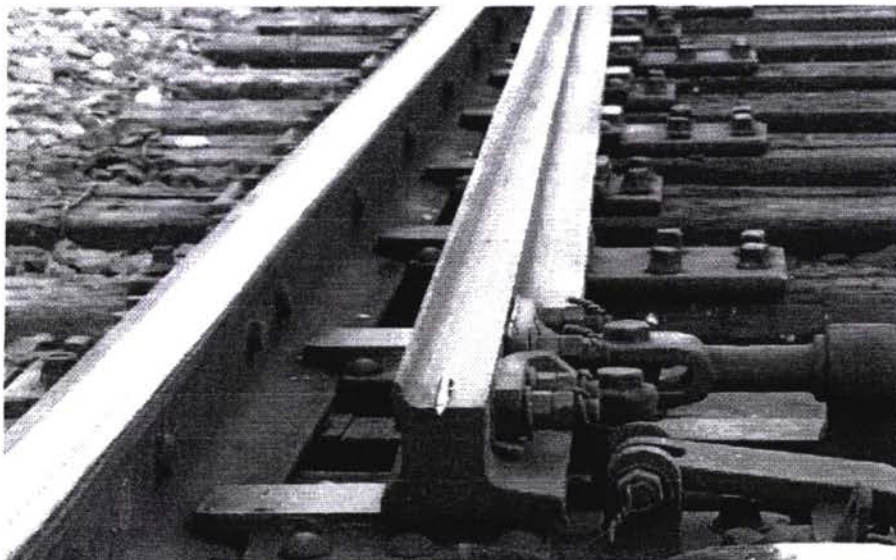


FIG. 17
Permanent Way detail: turnout. Particular of the blade.

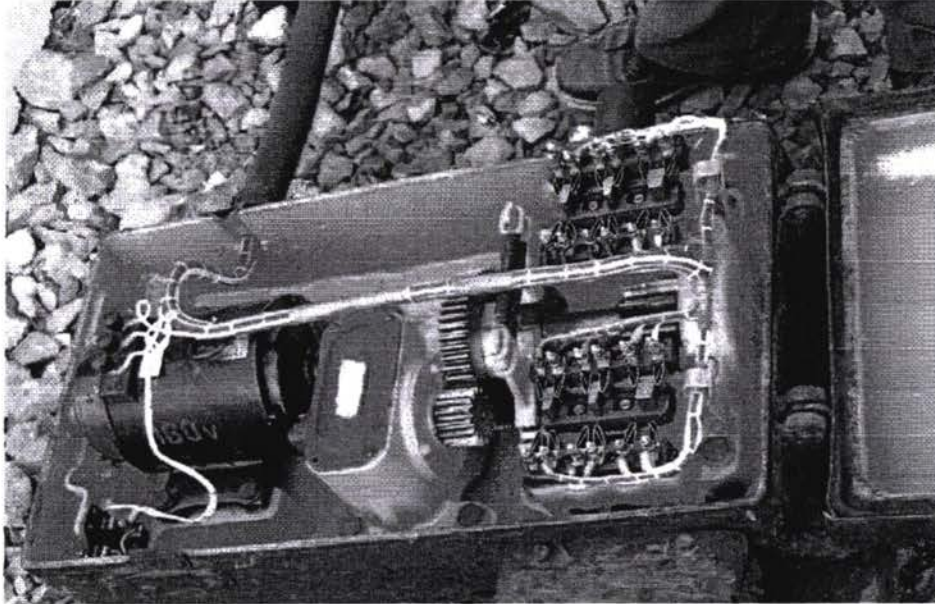


FIG. 18

Permanent Way detail: turnout. Engine. It is possible to see the electric motor, the friction group, and the electric contacts for blades position check.



FIG. 19

Level crossing without barriers, with lights, rings and Sant Andrews cross. Generally, in the area, L.C. are located at one station end, on unpaved roads.



FIG. 20

Level crossing without barriers, with lights, rings and Sant Andrews cross.

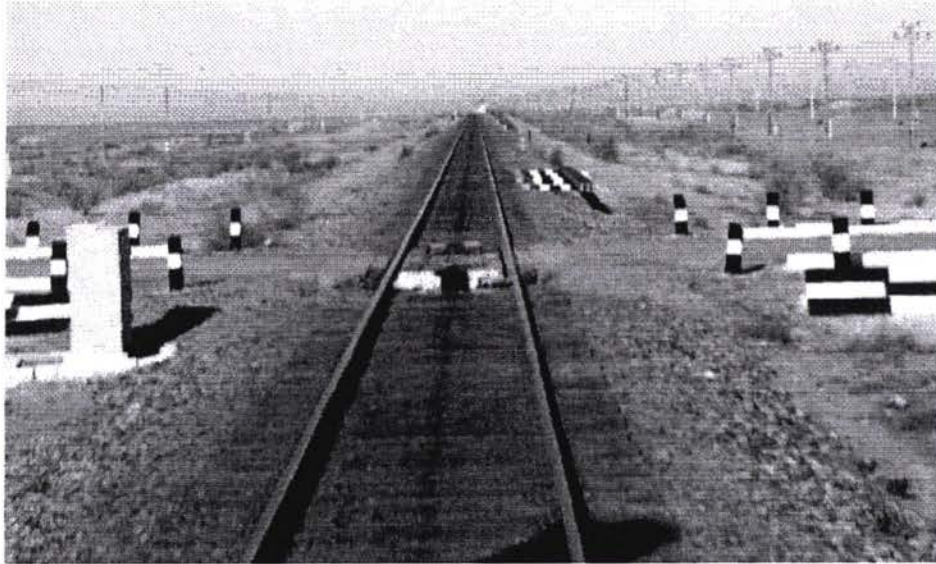


FIG. 21
Level crossing.

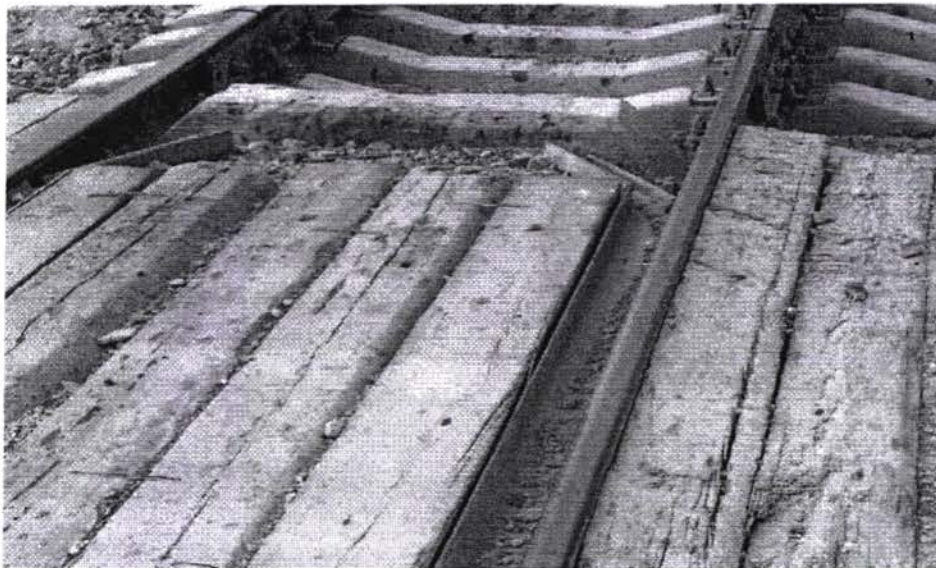


FIG. 22
Level crossing. Particulars of the pavement made by wooden sleepers.



FIG. 23
Level crossing. Particulars of the pavement protection made by old rail.

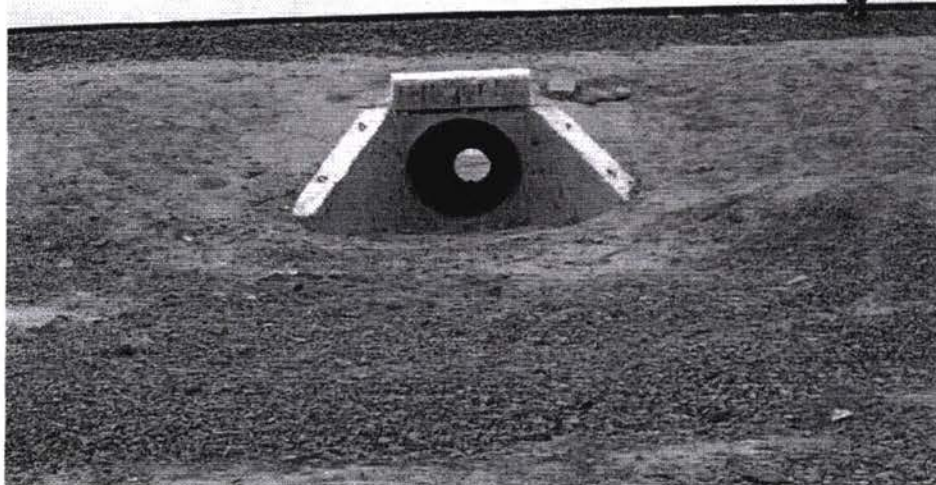


FIG. 24

Structures. Pipe culvert single pipe 1,5m. It is possible to see the pre-cast elements forming the entrance of the pipe.



FIG. 25

Structures. 2 by 6m span hydraulic bridge. Abutment and pier are built on 3 by 2 piles foundations. Abutments are protected by stone pitch against water erosion. The bridge deck is formed by two pre-cast reinforced concrete beams, simply laid on the piers



FIG. 26
Structures. 2 by 6m span hydraulic bridge.

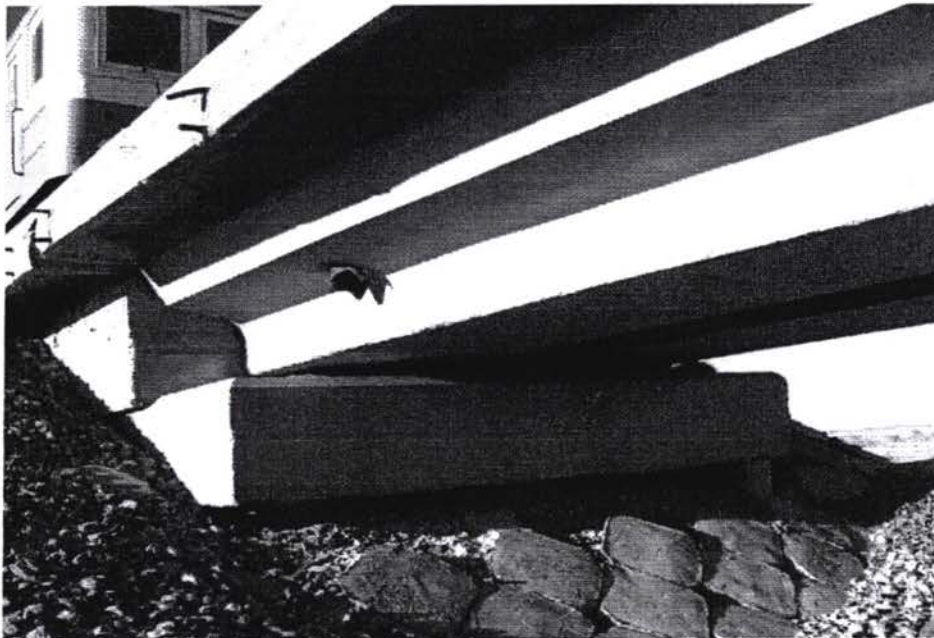


FIG. 27
Structures. 2 by 6m span hydraulic bridge. Abutment detail.



FIG. 28
Structures. 2 by 6m span hydraulic bridge. Under deck detail. The two beams are visible.



FIG. 29
Structures. 2 by 6m span hydraulic bridge.

ANNEX IV

SAFETY DEVICES PHOTO COLLECTION

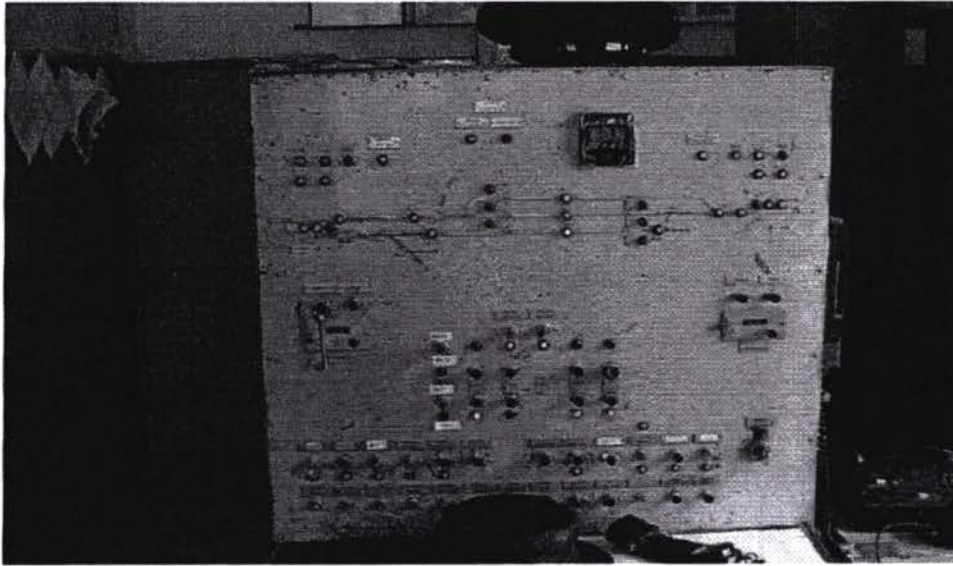


FIG. 14
Ajinyaz

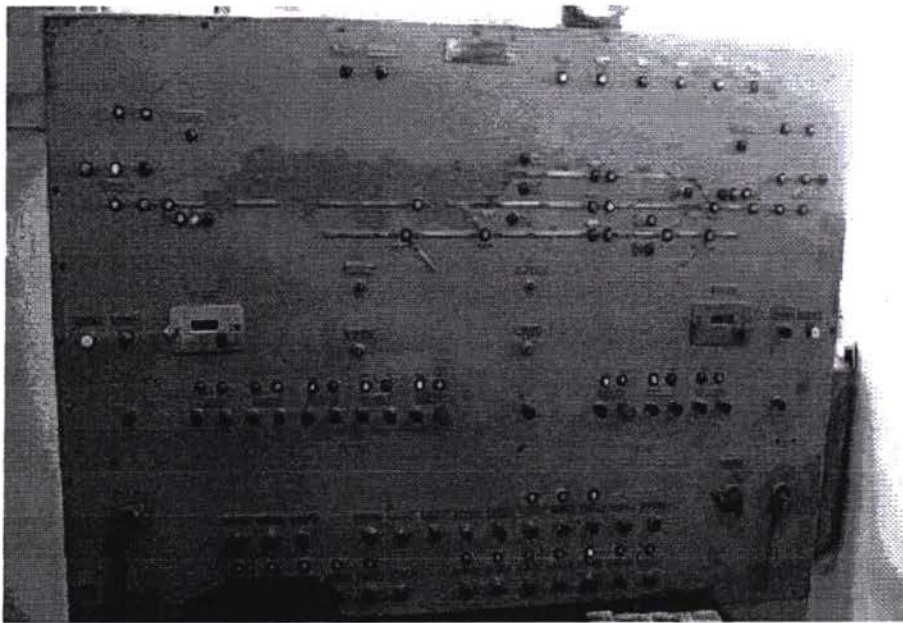


FIG. 15
Abadan

Fig. 01

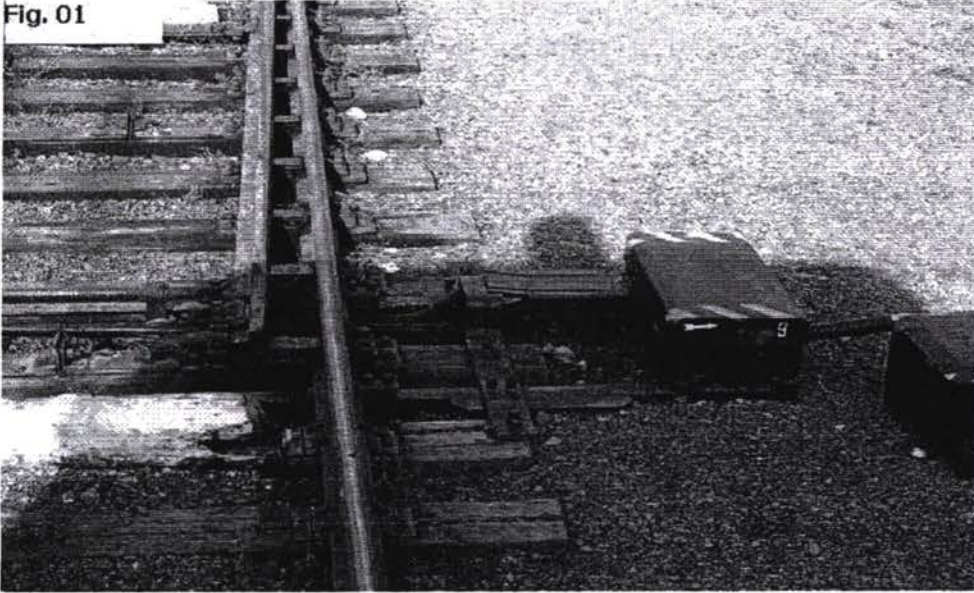


FIG. 1
Point mechanism

Fig. 02

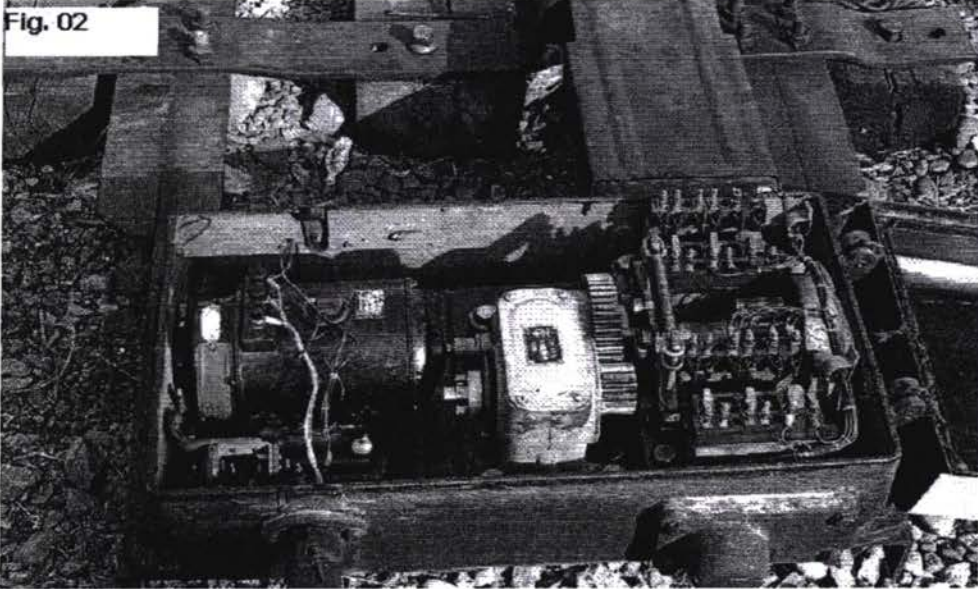


FIG. 2
Point mechanism

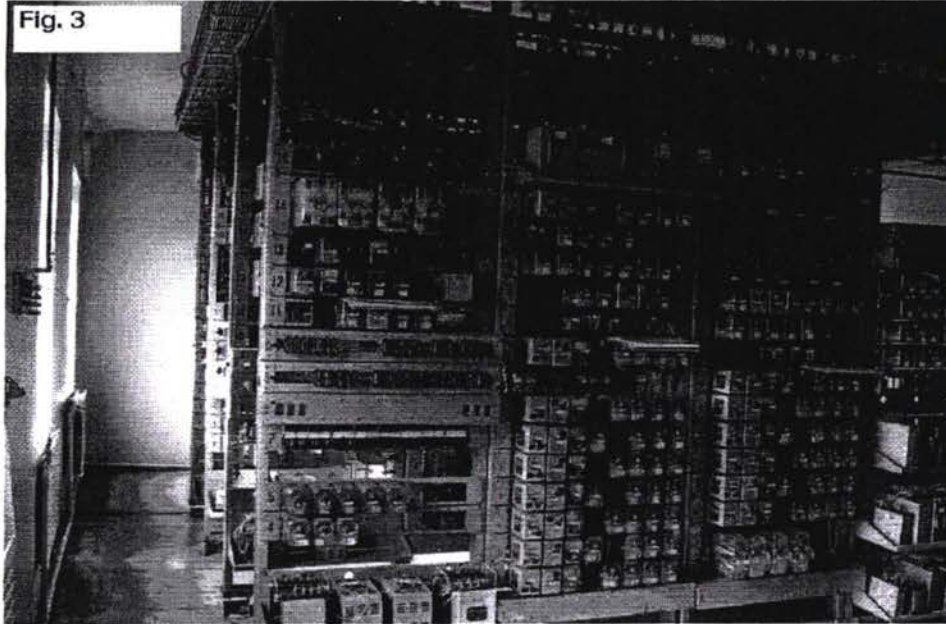


Fig. 3

FIG. 3
Re/ay standard racks

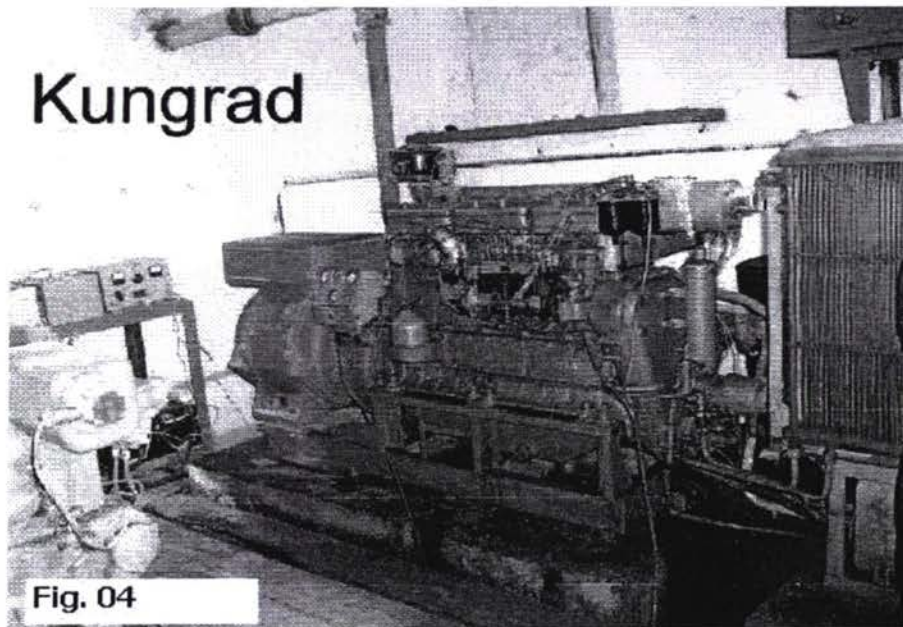


Fig. 04

FIG. 4
Diesel Generator

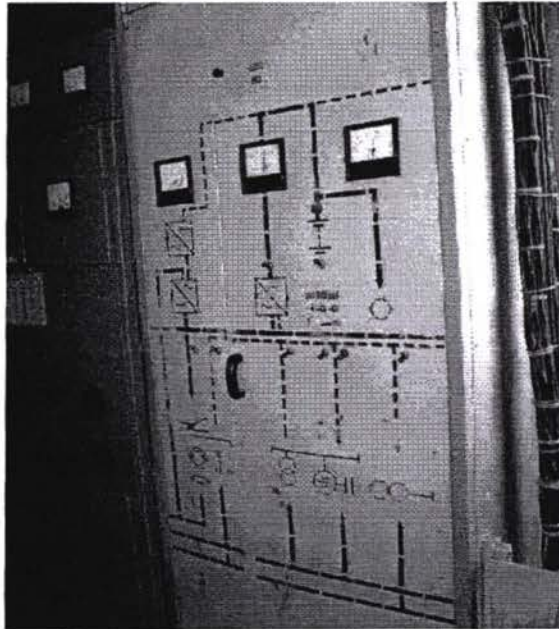


FIG. 5
UPS

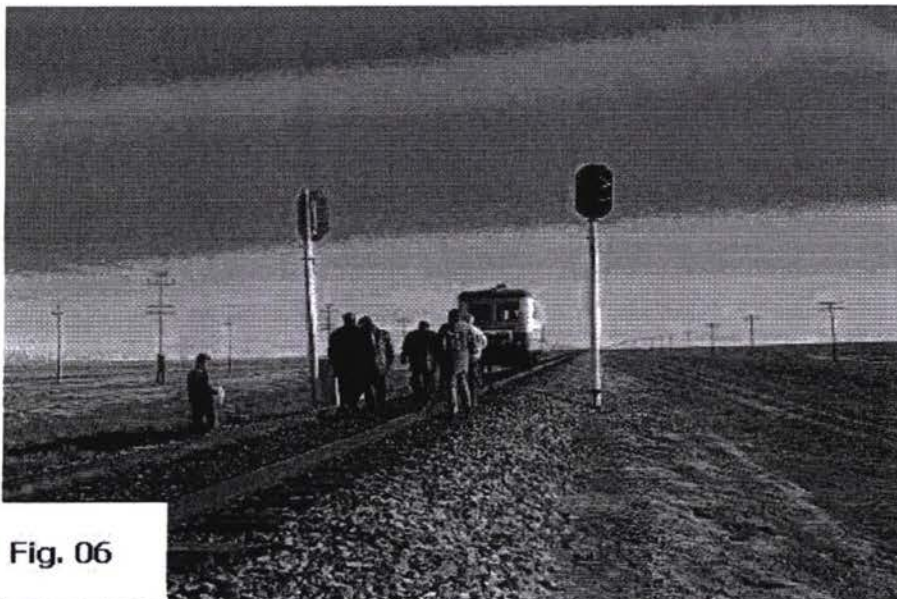


Fig. 06

FIG. 6
Block sections 2

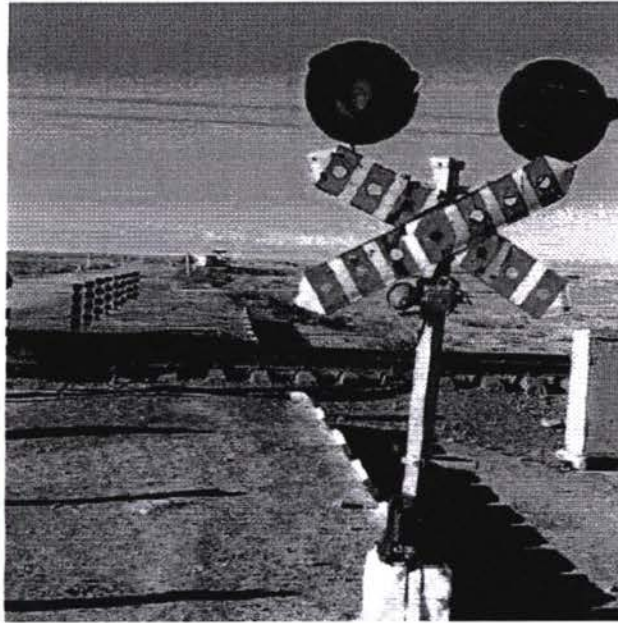


FIG. 7
Level crossing

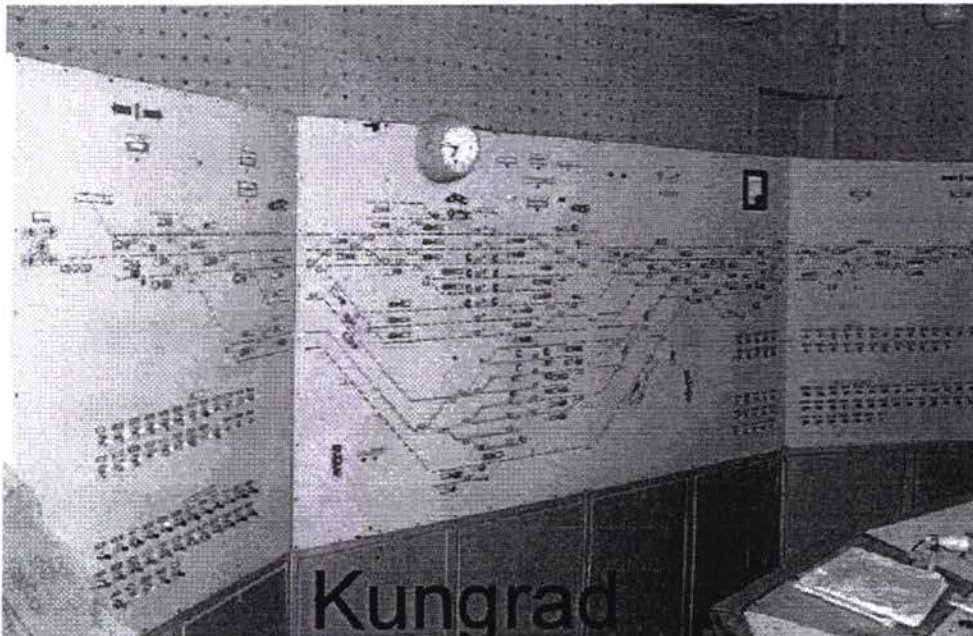


FIG. 8
Kungrad

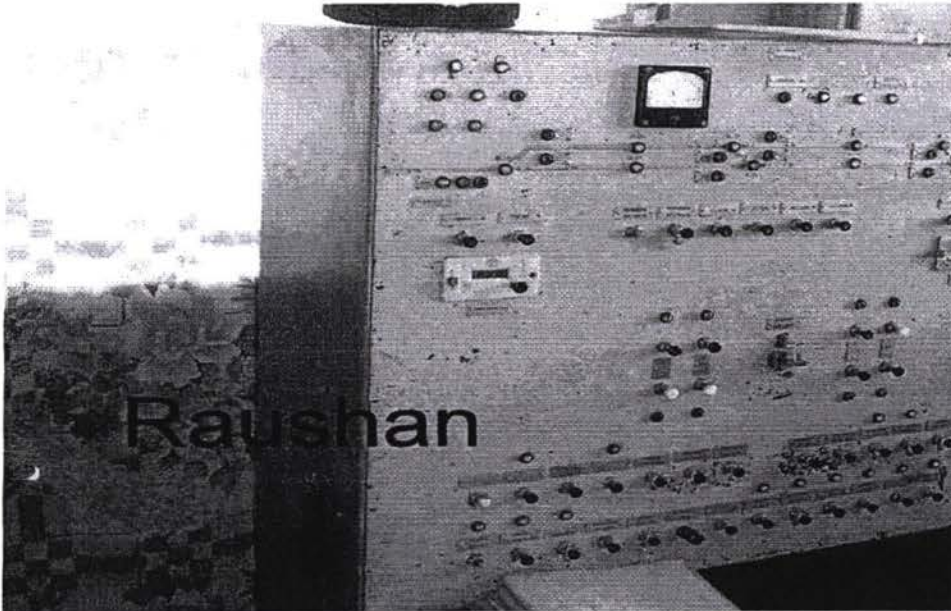


FIG. 9
Raushan

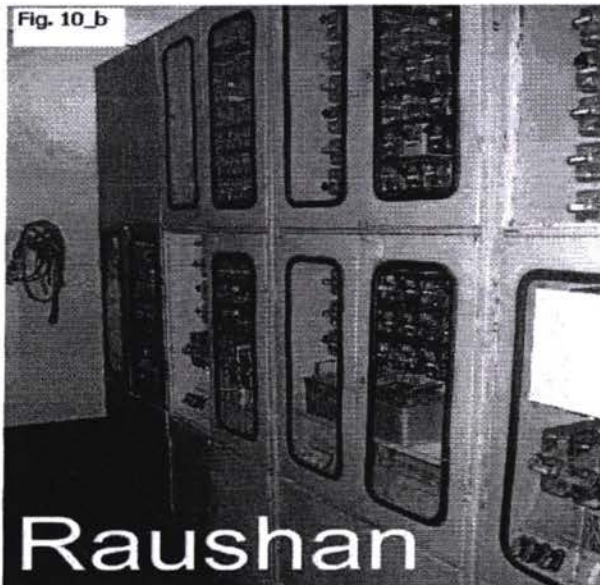


FIG. 10
Raushan relay

Fig. 11

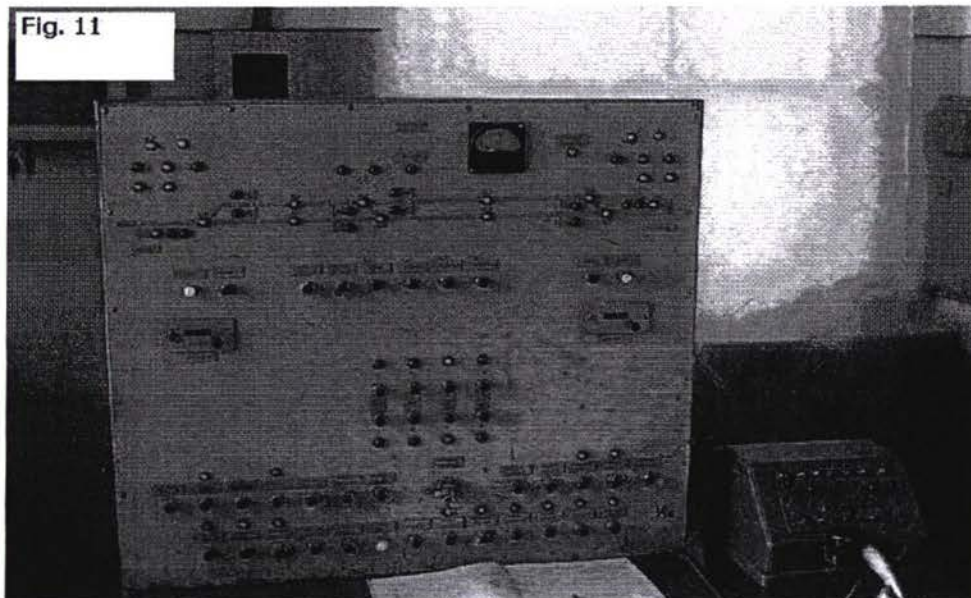


FIG. 11
Kunghodja

Fig. 12a

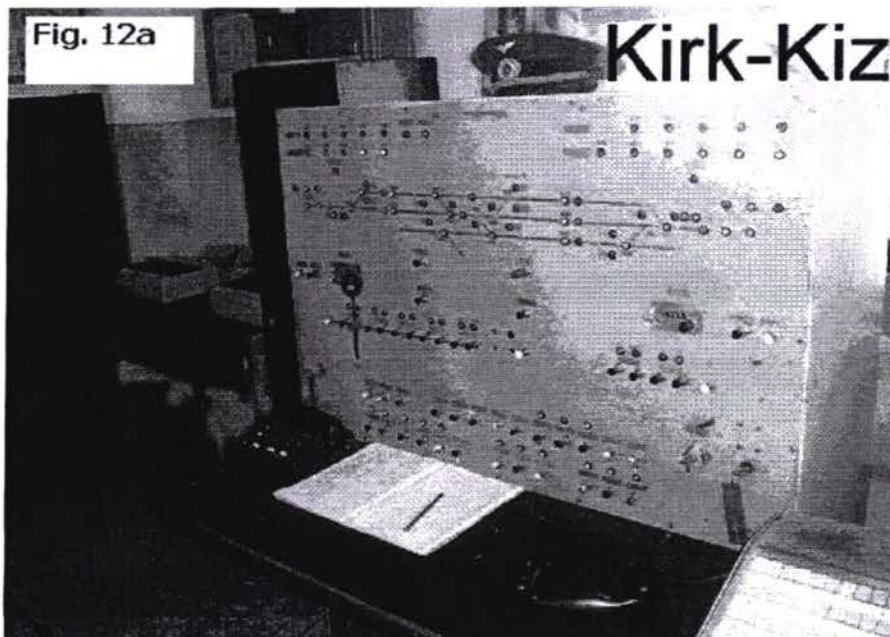


FIG. 12 a
Kyrk-Kyz

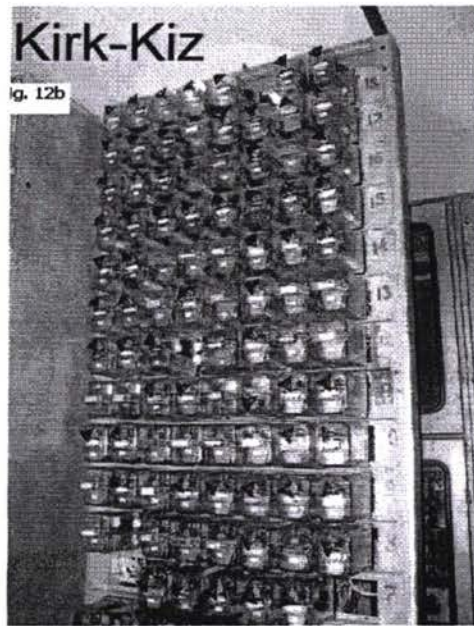


FIG. 12 b
Kyrk-Kyz

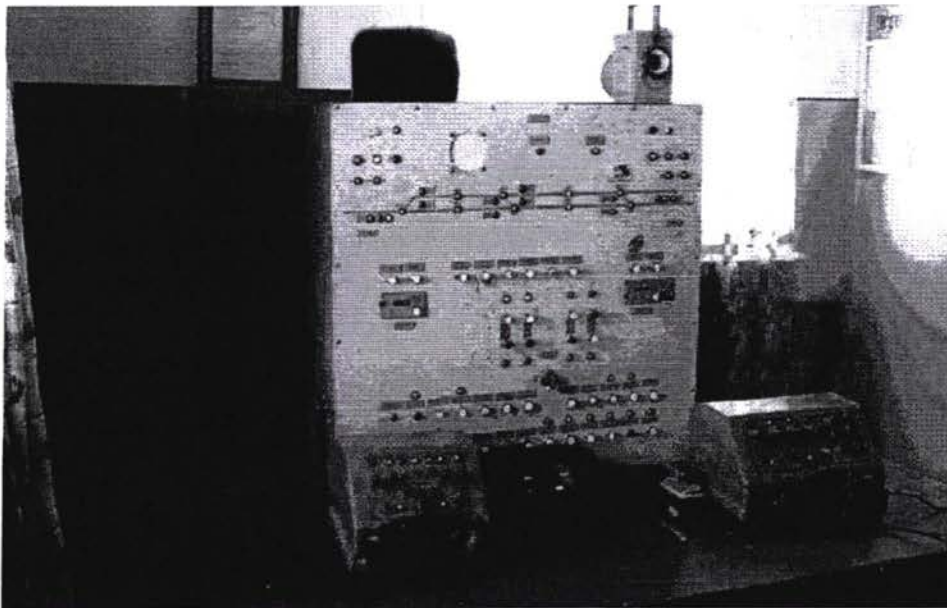


FIG. 13
Barsa-Kelmes

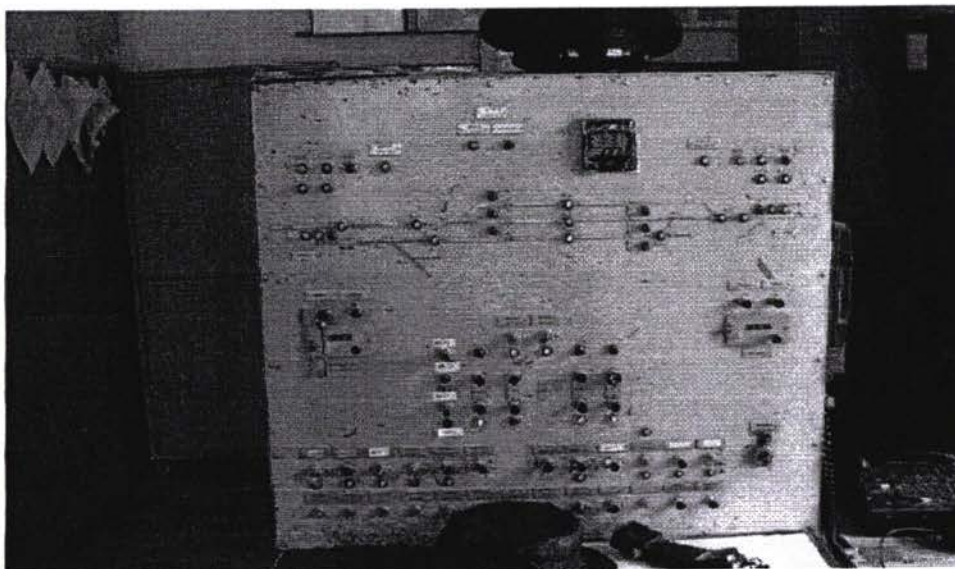


FIG. 14
Ajinyaz

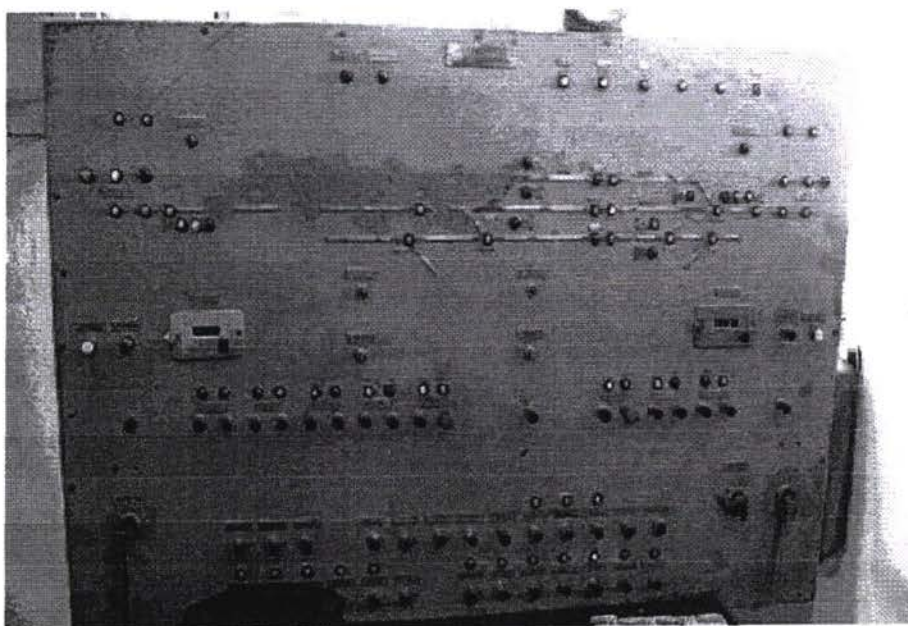


FIG. 15
Abadan

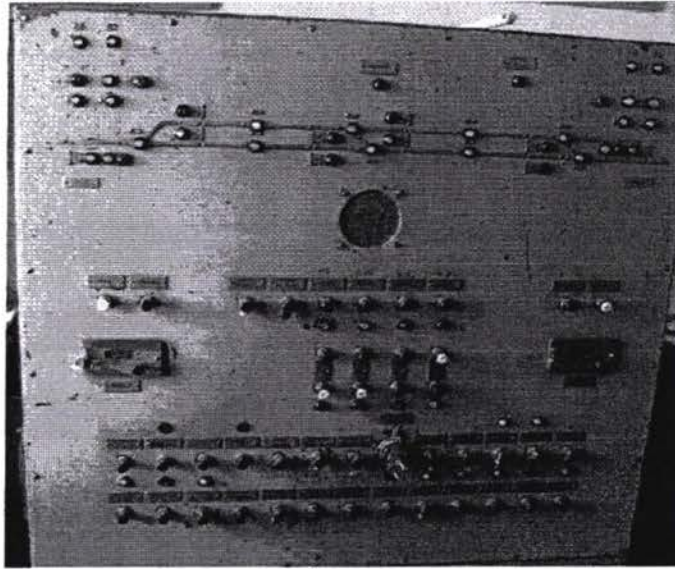


FIG. 16
Kuanysh

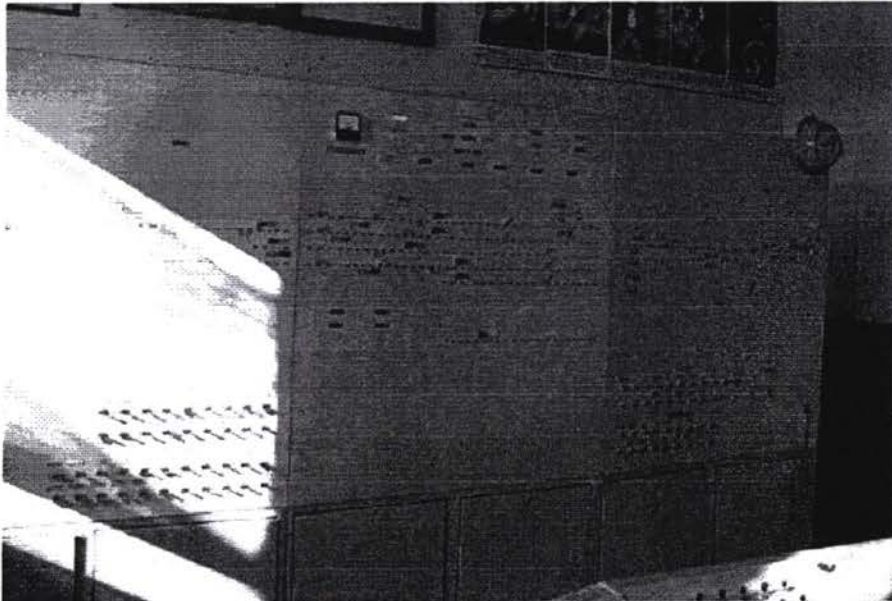


FIG. 17
Jalyk



FIG. 18
Ayapbergen

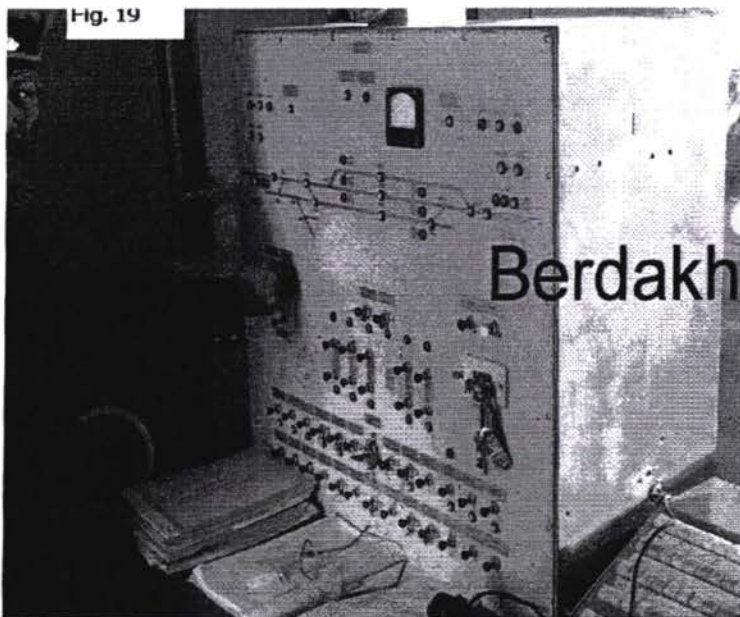


FIG. 19
Berdakh

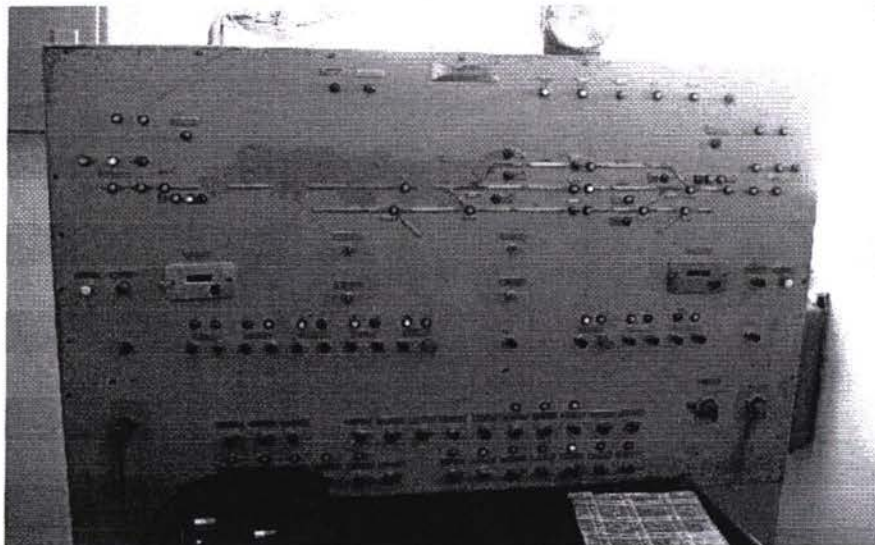


FIG. 20
Bostan

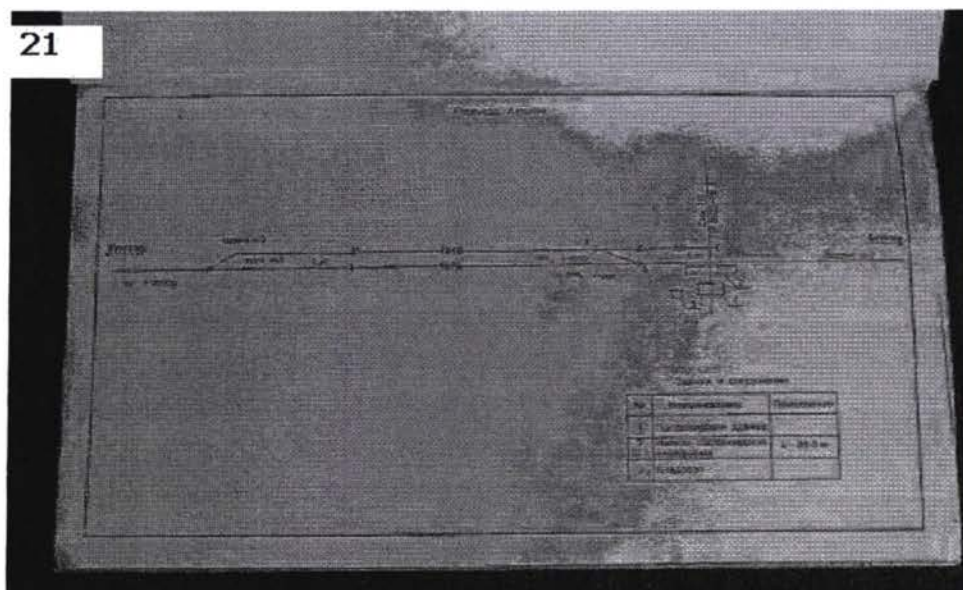


FIG. 21
Ak-Tobe

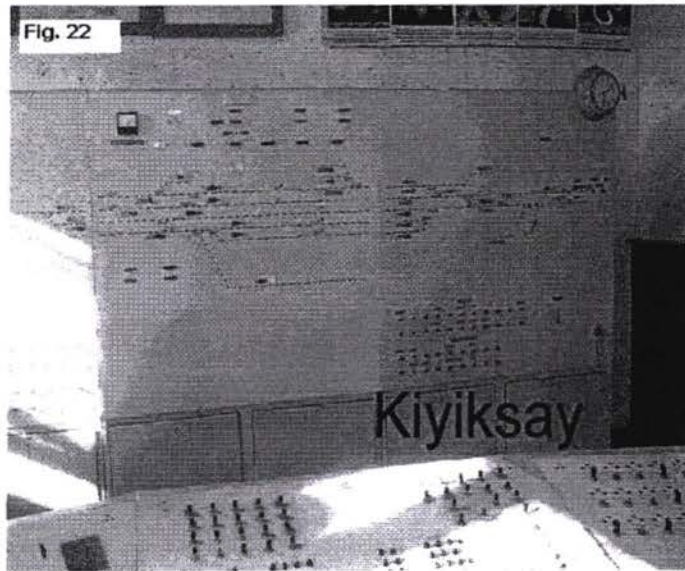


Fig. 22

FIG. 22
Kiyiksay

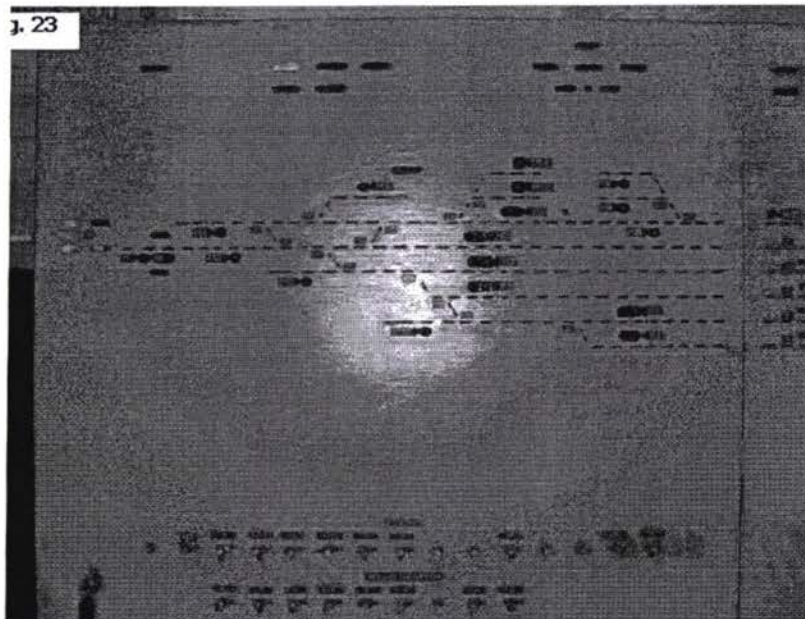


Fig. 23

FIG. 23
Karakalpakiya

ANNEX VI

COST ESTIMATES AND BILL OF QUANTITIES

Kungrad-Kazakh border section OPTION 1- INFRASTRUCURE BoQ

N	Description	Unit	Quantity	Rate	Total Local	Total Foreign	NOTES
	A. WORKS			USD	USD	USD	
1A	Topographic survey of the line and corrections of the existing alignment and profile	km	327,00	3 500,00		1 144 500,00	327km in Uzbekistan
2A	Demolition of line	km	177,07	243,90	43 187,80		All the sections with P50 and wooden sleepers, excluding main tracks into stations (177,07 km)
3A	Excavation	m ³	521 577,39	0,09	47 705,25		It includes the removal of about 0.6 m thick layer of top embankment material (ballast and sub-ballast), laying it on both sides of the embankment, profiling and compacting the top section of the embankment. (100000x2,85X80% + 100000X3,33X20%)
4A	Partial lateral rebuilding embankment section for 100 km, placing and compacting the removed top material for widening the top surface of about 1,0 m	m ³	543 000,00	0,12	66 219,51		It includes control and correction of 3.A material granulometry, if necessary, placing and compacting the removed top material for widening the top surface of about 1,0 m on both sides. In case the embankment is 1,0m high, it consists in removing 0,15m ³ /m and adding 1m ³ /m, in case the embankment is 2,0m high, it consists of removing 0,30m ³ /m and adding 2m ³ /m.
5A	Implementation of a layer of sandy gravel material, 0,2 m thick under sleepers (sub-ballast)	m ³	218 008,58	0,02	3 987,96		It includes spreading, compacting and profiling section of materials: 100000x1,08
6A	Construction of line	m	177 070,00	0,54	94 991,14		It includes installation of concrete sleepers, P65 rails, fastenings, spread of ballast, tamping and lift of rails up to 3 cm to final level
7A	Flash-butt or thermic weld of P65 rail	unit	16 524,00	1,00	16 524,00		(177000+98000-32000)x2/25 less joints (as calculated in 13B and 14B)
8A	Regulation of mechanical tension of long welded rails (l.w.r.)	km	486,00	75,00	36 450,00		177+98-32 (243km) for 2 rails
9A	Final tamping and leveling of new line	km	277,00	79,10	21 911,71		
10A	Ballast cleaning on the other existing sections	km	66,00	29,16	1 924,30		98-32 km
11A	Tamping, leveling and aligning the other existing sections with l.w.r.	km	66,00	79,10	5 220,84		
12A	Substitution of concrete pipes of culverts	n	-	200,00	0,00		
13A	Excavation of ditches	m of line	100 000,00	0,50	100 000,00		100 km of line-2 ditches. Trapezoid ditch 0.5-0.5-0.5 has a volume of 0,5m ³ /m
14A	Pavement of level crossings	unit	15,00	100,00	1 500,00		Each level crossing envisages an area of 50m by 10m
15A	Passenger stations: platforms new	m ²	-	6,00	0,00		Stations are not included in Option 1

16A	Passenger stations: platforms retying	m ²	-	4,00	0,00		Stations are not included in Option 1
17A	Passenger stations: building retying	m ²	-	30,00	0,00		Stations are not included in Option 1
18A	Replacing switch crossings	unit	-	41,72	0,00		Stations are not included in Option 1
19A	Replacing switch blades	unit	-	41,72	0,00		Stations are not included in Option 1
20A	Replacing (or installation) of switch small tg(complete)	unit	-	83,44	0,00		Stations are not included in Option 1
21A	Construction of new double threephase overhead 10kV line	km	327,00	362,00	118 374,00		
22A	Renewal of 176 bridges beams (44 bridges)	each	176,00	500,00	88 000,00		Each span bridge is composed by 2 beams.
23A	Capital rimonta of piers and abutments (110 in total)	each	110,00	100,00	11 000,00		
A				Subtot Local Works		658 996,53	
	International manpower	man-months	216,00	8 000,00		1 728 000,00	18 months duration of works per 12 experts
	Total international cost					2 872 500,00	
B. Materials							
1B	P65 rails	t	22 239,10	580,00		12 898 678,00	177km of old rails will be replaced. Out of them, 6 km are existing on the section from 688 to 711. Their residual value can be taken into consideration in the benefits
2B	Concrete sleepers	unit	325 808,80	25,00	8 145 220,00		177km of old sleepers will be replaced. Their residual value must be taken into consideration in the benefits
3B	Fastenings for concrete sleepers	pairs	325 808,80	25,00	8 145 220,00		
4B	Ballast for renovated sections	m ³	316 955,30	5,50	1 743 254,15		1,77 m ³ /m on straight; 1,9034 m ³ /m on curve (cantilever: 75 mm).
5B	Additional ballast for existing sections (99 km)	m ³	58 410,00	5,50	321 255,00		50% additional ballast on ballast cleaning operation
6B	Sandy gravel on track sections (new sub-ballast layer)	m ³	204 622,09	2,00	409 244,18		1,08 m ³ /m on straight; 1,2 m ³ /m on curve.
7B	Blocks for level crossings	unit	360,00	50,00	18 000,00		0,24 m3 each block. 24 blocks per L.C. Cement price 190,0 US\$/m3
8B	Concrete pipes φ 1,5m	n	-	6 000,00	0,00		

9B	Concrete pipes ϕ 2,0m	m		700,00			
10B	Switch crossing	unit		4 000,00		0,00	Stations are not included in Option 1
11B	Switch blades	pairs	-	15 600,00		0,00	Stations are not included in Option 1
12B	Switch complete (small lg)	unit	-	52 000,00		0,00	Stations are not included in Option 1
13B	Rail Joints	each	2 673,00	25,00		66 825,00	(243000)/2000*22 (22 joints every 2000m of rail). 243 km of line (177+98-32)
14B	Insulated rail joints	each	243,00	34,00		8 262,00	(243000)/2000*2 (2 insulated joints every 2000m of rail). 243 km of line
15B	Passenger stations: platforms new	m ²	-	54,00		0,00	Stations are not included in Option 1
16B	Passenger stations: platforms restyling	m ²	-	31,00		0,00	Stations are not included in Option 1
17B	Passenger stations: building restyling	m ²	-	400,00		0,00	Stations are not included in Option 1
18B	New double threephase overhead 10kV line	km	327,00	12 000,00		1 962 000,00	1 962 000,00
19B	Renewal of 176 bridges beams (44 bridges)	each	176,00	7 750,00		1 364 000,00	Each span bridge is composed by 2 beams. Each couple of beams, new type, costs 15,500 US\$
20A	Capital remonta of piers and abutments (110 in total)	each	110,00	1 000,00		110 000,00	
	D			TOT MATERIALS		14 072 973,33	23 080 985,00

Kungrad-Kazakh border section OPTION 2 - INFRASTRUCTURE BoQ

N	Description	Unit	Quantity	Rate	Total Local	Total International	NOTES
	A. WORKS			USD	USD	USD	
1A	Topographic survey of the line and corrections of the existing alignment and profile	km	327,00	3 500,00		1 144 500,00	327km in Uzbekistan
2A	Demolition of line	km	200,00	243,90	48 780,49		All the sections with P50 and wooden sleepers, including main tracks into stations (excluded Kungrad, Raushan, Kunhodja and Bostan) (177km on line+ 23km on station main tracks)
3A	Excavation	m ³	589 120,00	0,09	53 882,93		It includes the removal of about 0.6 m thick layer of top embankment material (ballast and sub-ballast), laying it on both sides of the embankment, profiling and compacting the top section of the embankment. (197000x2,85X80% + 197000X3,33X20%)
4A	Partial lateral rebuilding embankment section for 100 km, placing and compacting the removed top material for widening the top surface of about 1,0 m on both sides	m ³	543 000,00	0,12	66 219,51		It includes control and correction of 3.A material granulometry, if necessary, placing and compacting the removed top material for widening the top surface of about 1,0 m on both sides. In case the embankment is 1,0m high, it consists in removing 0,15m ³ /m and adding 1m ³ /m, in case the embankment is 2,0m high, it consists of removing 0,30m ³ /m and adding 2m ³ /m.
5A	Implementation of a layer of sandy gravel material, 0,2 m thick under sleepers (sub-ballast)	m ³	246 240,00	0,02	4 504,39		It includes spreading, compacting and profiling section of materials: 197000x1,08
6A	Construction of line	m	200 000,00	0,54	107 292,20		It includes installation of concrete sleepers, P65 rails, fastenings, spread of ballast, tamping and lift of rails up to 3 cm to final level
7A	Flash-butt or thermic weld of P65 rail	unit	17 356,00	1,00	17 356,00		(177000+96000-32000+27500)x2/25 less joints (as calculated in 13B and 14B). 27,5km correspond to the rehabilitated station + the stations renewed in the past but not welded.
8A	Regulation of mechanical tension of long welded rails (l.w.r.)	km	541,00	75,00	40 575,00		177+98-32+27,5 (270,5km) for 2 rails. 27,5km correspond to the rehabilitated station + the stations renewed in the past but not welded.
9A	Final tamping and leveling of new line	km	305,00	79,10	24 126,62		See the schematic of Option 2 for Kungrad-Kazakh border section.
10A	Ballast cleaning on the other existing sections	km	70,50	29,18	2 055,50		98-32+4,5 km. 4,5 km correspond to Kungrad, Raushan, Kunhodja and Bostan stations.
11A	Tamping, leveling and aligning the other existing sections with l.w.r.	km	70,50	79,10	5 576,81		
12A	Substitution of concrete pipes of culverts	n	-	200,00	0,00		
13A	Excavation of ditches	m of line	112 500,00	0,50	112 500,00		100 km of line-2 ditches. Plus 25 km of stations-1 ditch for the main track. Trapezoid ditch 0.5-0.5-0.5 has a volume of 0,5m ³ /m
14A	Pavement of level crossings	unit	15,00	100,00	1 500,00		Each level crossing envisages an area of 50m by 10m
15A	Passenger stations: platforms new	m ²	2 700,00	6,00	16 200,00		9 platforms: length 100m, width 3m
16A	Passenger stations: platforms restyling	m ²	3 000,00	4,00	12 000,00		5 platforms: length 200m, width 3m

Module B - Feasibility Study

17A	Passenger stations: building retying	m ²	600,00	30,00	18 000,00		5 stations 120m ² each
18A	Replacing switch crossings	unit	29,00	41,72	1 209,87		50% of the 58 turnouts P50 to be re-used
19A	Replacing switch blades	unit	29,00	41,72	1 209,87		50% of the 58 turnouts P50 to be re-used
20A	Replacing (or installation) of switch small tg(complete)	unit	87,00	83,44	7 259,20		Installation of 58 new P65 turnouts plus re-installation of 29 used P50 turnouts
21A	Construction of new double threephase overhead 10kV line	km	327,00	362,00	118 374,00		
22A	Renewal of 176 bridges beams (44 bridges)	each	176,00	500,00	88 000,00		Each span bridge is composed by 2 beams.
23A	Capital rimonta of 110 piers and abutments	each	110,00	100,00	11 000,00		
A					Subtot Local Works	757 622,37	
	International manpower	man-months	288,00	8 000,00		2 304 000,00	24 months duration of works per 12 experts
	Total International cost					3 448 500,00	
B. MATERIALS							
1B	P65 rails 200.000x2 m	t	26 000,00	580,00		15 080 000,00	200km of old rails will be replaced. Their residual value can be taken into consideration in the benefits
2B	Concrete sleepers 200x1840	unit	368 000,00	25,00	9 200 000,00		All the sections with P50 and wooden sleepers, including main tracks into stations (excluded Kungrad, Raushan, Kunhodja and Bostan). (177km on line+ 23km on station main tracks). It includes 1.840 sleepers per km
3B	Fastenings for concrete sleepers	pairs	368 000,00	25,00	9 200 000,00		
4B	Ballast for rehabilitated sections	m ³	358 000,00	5,50	1 969 000,00		1,77 m ³ /m on straight (80%); 1,9034 m ³ /m on curve (20%) (cantilever: 75 mm).
5B	Additional ballast for existing sections	m ³	62 392,50	5,50	343 158,75		50% additional ballast on ballast cleaning operation
6B	Sandy gravel on track sections (new sub-ballast layer)	m ³	231 120,00	2,00	462 240,00		1,08 m ³ /m on straight; 1,2 m ³ /m on curve.
7B	Blocks for level crossings	unit	360,00	50,00	18 000,00		0,24 m ³ each block. 24 blocks per L.C. Cement price 190,0 US\$/m ³
8B	Concrete pipes φ 1,5m	n	-	6 000,00	0,00		
9B	Switch crossing	unit	29,00	4 000,00		116 000,00	50% of the 58 turnouts P50 to be re-used
10B	Switch blades	pairs	29,00	15 600,00		452 400,00	50% of the 58turnouts P50 to be re-used

Module B - Feasibility Study							
11B	Switch complete (small tg)	unit	58,00	52 000,00		3 016 000,00	Existing P50 switches into stations
12B	Rail Joints for 270,5 km.	each	3 597,00	25,00		89 925,00	(177000+98000-32000+27500)/2000*22 (22 joints every 2000m of rail)
13B	Insulated rail joints for 270,5 km.	each	327,00	34,00		11 118,00	194000/2000*2 (2 insulated joints every 2000m of rail)
14B	Passenger stations: platforms new	m ²	2 700,00	54,00	145 800,00		13 platforms: length 100m, width 3m
15B	Passenger stations: platforms restyng	m ²	3 000,00	31,00	93 000,00		5 platforms: length 200m, width 3m
16B	Passenger stations: building retyng	m ²	600,00	400,00	240 000,00		6 stations 120m2 each
18B	New double threephase overhead 10kV line	km	327,00	12 000,00	1 982 000,00	1 982 000,00	
19B	Renewal of 176 bridges beams (44 bridges)	each	176,00	7 750,00	1 364 000,00		Each span bridge is composed by 2 beams. Each couple of beams, new type, costs 15,500 US\$
20A	Capital rimonta of piers and abutments (110 in total)	each	110,00	1 000,00	110 000,00		
D				TOT MATERIALS	15 907 198,75	29 927 443,00	

Kungrad-Kazakh border section OPTION 3 - INFRASTRUCTURE BoQ

N	Description	Unit	Quantity	Rate	Total Local	Total International	NOTES
	A. WORKS			USD	USD	USD	
1A	Construction design for line doubling	km	327,00	2 000,00		654 000,00	327km in Uzbekistan. Topographic works have already been computed in Option 1
2A	Demolition of line	km	27,11	243,90	6 613,17		All the stations first siding
3A	Excavation	m ³		0,09	0,00		
4A	Lateral building of second track embankment for 300 km (line, excluded stations), placing and compacting the removed top material for widening the top surface of about 4,0 m	m ³	2 400 000,00	0,12	292 682,93		Inter-axis between existing and new track 4,0m. For 2 m high embankment 8m3/m
5A	Implementation of a layer of sandy gravel material, 0,2 m thick under sleepers (sub-ballast)	m ³	444 720,00	0,02	8 135,12		It includes spreading, compacting and profiling section of materials for the second track: 327000x1,36
6A	Construction of new second line and new sidings into the 8 preserved stations	m	336 600,00	0,54	180 572,76		It includes installation of concrete sleepers, P65 rails, fastenings, spread of ballast, tamping and lift of rails up to 3 cm to final level. It includes all the line plus the second line in stations, replacing the removed siding, plus the new additional siding to be constructed into the stations left in operation (8 stations)
7A	Flash-butt or thermic weld of P65 rail	unit	22 720,50	1,00	22 720,50		(327000)x2/25 less joints (about 5 every 800m)
8A	Regulation of mechanical tension of long welded rails (l.w.r.)	km	673,20	75,00	50 490,00		(327)*2 km
9A	Final tamping and leveling of new line	km	336,60	79,10	26 626,29		
10A	Ballast cleaning on the other existing sections	km	-	29,16	0,00		
11A	Tamping, leveling and aligning the other existing sections with L.w.r.	km	-	79,10	0,00		
12A	Substitution of concrete pipes of 20 culverts	n	-	200,00	0,00		
13A	Excavation of ditches	m of line	336 600,00	0,50	168 300,00		327 km of line-1 ditch (one side only). Trapezoid ditch 0.5-0.5-0.5 has a volume of 0,5m3/m
14A	Pavement of level crossings	unit	-	100,00	0,00		
15A	Passenger stations: platforms new	m ²	8 000,00	6,00	48 000,00		Out of 15 stations, 7 stations will be closed and 8 will be left in operation and 1 new platform will be constructed for each one of them. New platforms will be 200m long and 5m large, so to be used as island platform between two tracks.

16A	Passenger stations, platforms restyling	m ²	-	4,00	0,00		
17A	Passenger stations, building retying	m ²	-	30,00	0,00		
18A	Replacing switch crossings	unit	-	41,72	0,00		
19A	Replacing switch blades	unit	-	41,72	0,00		
20A	Installation of new switches small lg(complete)	unit	10,00	83,44	834,39		Additional compared with Option1, for line doubling into left stations (8).
21A	Construction of new pipe culverts (extension of the existing)	each	82,00	130,00	10 660,00		46 single pipe and 18 double pipe (46*18*2)
22A	Construction of new bridges	each	46,00	1 500,00	69 000,00		46 double span bridges
23A	Construction of the catenary	km	674,00	6 000,00	4 044 000,00		
A				Subtot Local Works			
	International manpower (to be added to International Manpower of Option 1)	man-months	576,00	8 000,00		4 608 000,00	36 months duration of works per 16 experts (in total option 1+3 will last 36 months for 27 experts)
	Total international cost					5 262 000,00	
B. Materials							
1B	P65 rails 327,000x2 m	t	43 758,00	580,00		25 379 640,00	337 km of new single track. In the existing stations, the new track will replace the existing first siding infrastructure and a new siding is constructed.
2B	Concrete sleepers 327x1840	unit	619 344,00	25,00		15 483 600,00	It includes 1,840 sleepers per km, per 337km (new sidings are included)
3B	Fastenings for concrete sleepers	pairs	619 344,00	25,00		15 483 600,00	
4B	Insulated rail joints	unit				0,00	
5B	Ballast for renovated sections	m ³	602 514,00	5,50		3 313 827,00	1,77 m ³ /m on straight; 1,9034 m ³ /m on curve (cantilever: 75 mm).
6B	Additional ballast for existing sections	m ³		5,50		0,00	30% additional ballast on ballast cleaning operation
7B	Sandy gravel on track sections (new sub-ballast layer)	m ³	388 974,96	2,00		777 949,92	1,36 m ³ /m on average
8B	Blocks for level crossings	unit				0,00	

9B	Concrete pipes ϕ 1,5m	n	-	6 000,00	0,00		
10B	Concrete pipes ϕ 2,0m	m		700,00			
11B	Switch crossing	unit		4 000,00		0,00	
12B	Switch blades	pairs	-	15 600,00		0,00	
13B	Switch complete (small tg)	unit	10,00	52 000,00		520 000,00	New necessary switches
14B	Passenger stations: platforms new	m ²	8 000,00	54,00	432 000,00		
15B	Passenger stations: platforms restyling	m ²	-	31,00	0,00		
16B	Passenger stations: building restyling	m ²	-	400,00	0,00		
17B	Construction of new pipe culverts (extension of the existing)	each	82,00	6 000,00	492 000,00		The price is calculated for a pipe under a 3,0m high embankment for single track line
18B	Construction of new bridges	each	46,00	35 000,00	1 610 000,00		The price is calculated for a typical two spans bridge along a 3,0m high embankment for single track line, not pre-stressed structure, between 4 and 6m span, simple foundations and elevations.
19B	Electrification: catenary	km	674,00	132 000,00		88 968 000,00	including masts and wires. Including stations main tracks electrification
20B	Electrification: Electric Sub-Stations	each	5,00	2 080 000,00		10 400 000,00	Approximately one every 60 km. The cost includes the construction.
21B	Earth for new embankment on side	m ³	2 400 000,00	3,00	7 200 000,00		
D				TOT MATERIALS	29 309 376,92	140 751 240,00	

ANNEX VII

DETAILS ON MAINTENANCE COSTS

ANNEX VII Details of maintenance costs				
Description	Unit	Unit Cost (US\$)	Quantity/km	Amount (US\$/km)
Lifting Repair				
Labour	hour	0,29	2723,1	782
Light works	m of line	-	400	0
Equipment	hour	486,40	15,0	7296
Rails R-65	tonne	580,00	13,0	7540
Turnouts	each	52 000,00	0,0	0
Sleepers	each	25,00	368,0	9200
Fastenings	couple	25,00	368,0	9200
Ballast	m3	5,50	540,0	2970
Sub-Ballast	m3	2,00	0,0	0
Earthworks	m3	4,00	30,0	120
Switch crossings	each	4 000,00	0,0	0
Switch blades	pair	15 600,00	0,0	0
Joints	each	25,00	1,0	25
Insulated joints	each	34,00	1,0	34
Pipe culverts Φ 1,5m	each 12 m	6 000,00	0,0	0
Tot net constuction cost				39 203
Tot cost with client and constructor costs		29%		50 571
Tot cost with taxes		25%		63 214
Tot cost with insurance		0,40%		63 467
Tot cost with risk coefficient		15%		72 987

ANNEX VII Details of maintenance costs				
Description	Unit	Unit Cost (US\$)	Quantity/km	
			Quantity/km	Amount (US\$/km)
Medium Maintenance				
Labour	hour	0,29	4930,4	1415
Equipment	hour	486,40	40	19456
Rails R-65	tonne	580,00	39	22620
Turnouts	each	52 000,00	0	0
Sleepers	each	25,00	736	18400
Fastenings	couple	25,00	736	18400
Ballast	m3	5,50	1080	5940
Sub-Ballast	m3	2,00	33	67
Earthworks	m3	4,00	60	240
Switch crossings	each	4 000,00	0,5	2000
Switch blades	pair	15 600,00	0,5	7800
Joints	each	25,00	2	50
Insulated joints	each	34,00	1	34
Pipe culverts Φ 1,5m	each 12 m	6 000,00	0,05	300
Tot net constuction cost				101 799
Tot cost with client and constructor costs		29%		131 321
Tot cost with taxes		25%		164 151
Tot cost with insurance		0,40%		164 808
Tot cost with risk coefficient		15%		189 529

ANNEX VII Details of maintenance costs				
Description	Unit	Unit Cost (US\$)	Quantity/km	
			Quantity/km	Amount (US\$/km)
Capital Maintenance				
Labour	hour	0,29	12499,0	3587
Equipment	hour	486,40	60	29184
Rails R-65	tonne	580,00	130	75400
Turnouts	each	52 000,00	0,2	10400
Sleepers	each	25,00	1840	46000
Fastenings	couple	25,00	1840	46000
Ballast	m3	5,50	1800	9900
Sub-Ballast	m3	2,00	1080	2160
Earthworks	m3	4,00	1000	4000
Switch crossings	each	4 000,00	0,1	400
Switch blades	pair	15 600,00	0,1	1560
Joints	each	25,00	4	100
Insulated joints	each	34,00	2	68
Pipe culverts Φ 1,5m	each 12 m	6 000,00	0,1	600
Tot net constuction cost				242 489
Tot cost with client and constructor costs		29%		312 811
Tot cost with taxes		25%		391 013
<i>Tot cost with insurance</i>		0,40%		392 577
Tot cost with risk coefficient		15%		451 464

ANNEX VIII

SAFETY DEVICES TABLES

Kungrad-Beyneu line: Automated Level crossing number

Table 0

N°	Line section	Level crossings (without barriers and with light signals) number:	Level crossings with barriers switched by trains (protected by block signals) presence of operator(1) number:
1	Kungrad- Raushan	2	
2	Raushan- Kunkhodja	2	
3	Kunkhodja- Kyrk-Kyz	1	
4	Kyrk-Kyz- Barsa-Kelmes	1	
5	Barsa-Kelmes - Ajiniyaz	1	
6	Ajiniyaz- Abadan	1	
7	Abadan- Kuanysh	1	
8	Kuanysh- Jaslyk	2	
9	Jaslyk- Ayapbergen	1	
10	Ayapbergen- Berdakh	1	
11	Berdakh- Bostan	1	
12	Bostan- Ak-Tobe	1	
13	Ak-Tobe- Kiyiksay	1	
14	Kiyiksay- Karakalpakia	1	
15	Karakalpakia-Border- Oasis	1	
16	Oasis- Akjigit	1	
17	Akjigit- Kzyl-Asker	1	
18	Kzyl-Asker - Kok-Bekty	1	

TableA: Present signalling stations system

N°	Location (Km)	Station name	Interlocking technology	Train detector device	Electrical power supply	Presence of UPS with diesel generator / power	Remote control	number of point switches	present maximum allowed speed	Installation Year
1	626+917	Kungrad	relay	track circuit	380V,	yes/48kva	Only tracks+ Departure signals	75	60	1967
2	646+568	Raushan	relay	track circuit	220V		Yes-Tashkent (1972)	5	70-80	1967
3	671+602	Kunkhodja	relay	track circuit	220V		Yes-Tashkent (1972)	6	70-80	1967
4	688+184	Kyrk-Kyz	relay	track circuit	220V		Yes-Tashkent (1972)	13	50	1980
5	712+492	Barsa-Kelmes	relay	track circuit	220V		Yes-Tashkent (1972)	5	50	1967
6	734+092	Ajiniyaz	relay	track circuit	220V		Yes-Tashkent (1972)	5	50	1967
7	757+142	Abadan	relay	track circuit	220V		Yes-Tashkent (1972)	8	50	1967
8	778+682	Kuanysh	relay	track circuit	220V		Yes-Tashkent (1972)	5	50	1967
9	797+303	Jaslyk	relay	track circuit	380V	yes/16kva	Only tracks+ Departure signals	13	50	1984
10	822+113	Ayapbergen	relay	track circuit	220V		Yes-Tashkent (1972)	5	50	1968
N°	Location	Station name	Interlocking	Train	Electrical	Presence	Remote control	number	present	Installation

	(Km)		technology	detector device	power supply	of UPS with diesel generator / power		of point switches	maximum allowed speed	Year
11	846+493	Berdakh	relay	track circuit	220V		Yes-Tashkent (1972)	5	50	1968
12	870+933	Bostan	relay	track circuit	220V		Yes-Tashkent (1972)	8	70	1968
13	892+793	Ak-Tobe	relay	track circuit	220V		Yes-Tashkent (1972)	3	70	1968
14	913+544	Kiyiksay	relay	track circuit	220V		Yes-Tashkent (1972)	5	50	1968
15	933+151	Karakalpakia	relay	track circuit	380V	yes/48kva	Only tracks+ Departure signals	24	50	1983
	953+500	Border								

N°	Line Section from station X to station Y	Section length (Km) (1)	Control over the overall traffic operation of the line (Yes/not)/from	Block system technology	Block sections length	Block sections number (2)	Presence of cab signal	Present Line classification
1	Kungrad- Raushan	19,65	Yes-Tashkent	automatic	1965	10	Yes	Traceca
2	Raushan- Kunkhodja	25,03	Yes-Tashkent	"	2502	10	"	"
3	Kunkhodja- Kyrk-Kyz	16,58	Yes-Tashkent	"	1658	10	"	"
4	Kyrk-Kyz- Barsa-Kelmes	24,31	Yes-Tashkent	"	1870	13	"	"
5	Barsa-Kelmes - Ajiniyaz	21,6	Yes-Tashkent	"	1963	11	"	"
6	Ajiniyaz- Abadan	23,05	Yes-Tashkent	"	1920	12	"	"
7	Abadan- Kuanysh	21,54	Yes-Tashkent	"	1795	12	"	"
8	Kuanysh- Jaslyk	18,62	Yes-Tashkent	"	1862	10	"	"
9	Jaslyk- Ayapbergen	24,81	Yes-Tashkent	"	1908	13	"	"
10	Ayapbergen- Berdakh	24,38	Yes-Tashkent	"	2031	12	"	"
11	Berdakh- Bostan	24,44	Yes-Tashkent	"	1880	13	"	"
12	Bostan- Ak-Tobe	21,86	Yes-Tashkent	"	1987	11	"	"
13	Ak-Tobe- Kiyiksay	20,75	Yes-Tashkent	"	1825	11	"	"
14	Kiyiksay- Karakalpakia	19,61	Yes-Tashkent	"	1634	12	"	"
15	Karakalpakia- Oasis	21,82	Yes-Tashkent	"	1678	13*	"	"
	Border							

Table B: Present Line Signalling Description - Block Systems

Notes: (1)Distances from building axis; (2) direction to Kazakh Border; (3) Neva system; (*) estimated number

Table C Quantities

Quantities	Kungrad	Jaslyk	Karakalpaka(e)	Total
	Jaslyk(e)	Karakalpaka	Beyneu(e)	
Points n°	122	63	20	218
Block section n°	88	72	51	211
Length km	170+386	135+848	100+428	406+662
level cross with lights	11	6	4	21

Note: Beyneu not included

Alternative 2 Jaslyk- Karakalpakia	unities of measurement	Quantities of unities	Unities prices \$	Total \$	supply quote	works quote	national quote	foreign quote
Signal System								
Interlocking								
Jaslyk	Points n°	13	34.000	442.000	353600	88400	88400	353600
Ayapbergen	Points n°	5	73.000	365000	292000	73000	73000	292000
Berdakh	Points n°	5	73.000	365000	292000	73000	73000	292000
Bostan	Points n°	8	50.000	400000	320000	80000	80000	320000
Ak-Tobe	Whole system	3		340.000	272000	68000	68000	272000
Kiyiksay	Points n°	5	73.000	365000	292000	73000	73000	292000
Karakalpakia	Points n°	24	33.500	804.000	643.200	160800	160800	643200
Power supply								
U.P.S. with Diesel gen 16kva	n°	1	31.363	31.363	25.090	6272,6	6272,6	25090,4
U.P.S. with Diesel gen 48kva	n°	1	35.549	35.549	28439,2	7109,8	7109,8	28439,2
U.P.S. without Diesel gen	n°	5	22.010	110.050	88040	22010	22010	88040
Level crossing								
with lights	n°	6	31.000	186.000	130.200	55800	55800	130200
with lights and barriers	n°	0	0	0				
Block system								
	Block section n°	72	35.000	2.520.000	1.890.000	630000	504000	2016000
Centralised Traffic Control								
(without TLC cable)	Central Post Peripheral Places n°	7	20.000	140.000	105.000	35000	14000	126000
total				6.103.962	4.731.570	1372392	1225392	4878570

Jaslyk- Karakalpakia

Table D1- Alternative 2 Investment costs

Table D2 Alternative 3 Investments costs

Kungrad- Karakalpakia

Kungrad-Karakalpakia	measurement	unities	\$	\$	quote	quote	quote	quote
Signal System								
Interlocking								
Kungrad	Points n°	75	33.500	2.512.500	2010000	502500	502500	2010000
Raushan	Points n°	5	73.000	365000	292000	73000	73000	292000
Kunkhodja	Points n°	6	63.000	378.000	302400	75600	75600	302400
Kyrk-Kyz	Points n°	13	34.000	442.000	353600	88400	88400	353600
Barsa-Kelmes	Points n°	5	73.000	365000	292000	73000	73000	292000
Ajiniyaz	Points n°	5	73.000	365000	292000	73000	73000	292000
Abadan	Points n°	8	50.000	400000	320000	80000	80000	320000
Kuanysht	Points n°	5	73.000	365000	292000	73000	73000	292000
Jaslyk	Points n°	13	34.000	442.000	353600	88400	88400	353600
Ayapbergen	Points n°	5	73.000	365000	292000	73000	73000	292000
Berdakh	Points n°	5	73.000	365000	292000	73000	73000	292000
Bostan	Points n°	8	50.000	400000	320000	80000	80000	320000
Ak-Tobe	Whole system	3		340.000	272000	68000	68000	272000
Kiyiksay	Points n°	5	73.000	365000	292000	73000	73000	292000
Karakalpakia	Points n°	24	33.500	804.000	643.200	160800	160800	643200
Power supply								
U.P.S. with Diesel gen 16kva	n°	1	31363	31.363	25.090	6272,6	6272,6	25090,4
U.P.S. with Diesel gen 48kva	n°	2	35.549	71.098	56878,4	14219,6	14219,6	56878,4
U.P.S. without Diesel gen	n°	12	22.010	264.120	211296	52824	52824	211296

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Kungrad-Karakalpakia	measurement	unities	\$	\$	quote	quote	quote	quote
Level crossing								
with lights	n°	17	31.000	527.000	368.900	158100	158100	368900
with lights and barriers	n°	0	0	0				
Block system								
	Block section n°	160	35.000	5.600.000	4.200.000	1400000	1120000	4480000
Centralised Traffic Control	Central Post (1)		0	0				
(without TLC cable)	Periph Places n°	15	20.000	300.000	225.000	75000	30000	270000
total				15.067.081	11.705.965	3361116,2	3036116	12030964,8

(1) we assume Aktirau Central Post ready to control new peripherals places

%	100	78	22	20	80
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**Table E :Specifications of number of workers of the signaling system,
 interlocking and block signalling**

(from The appendix to the Instruction 7-U from May, 14, 1999)

By Signalling and Economical Department of the Uzbekistan Temir Yo

Divisions and served devices	Post	Measuring	Norm of service			Norm of number on a measuring
			1	2	3	
Crew on service of the station equipment:	senior electromechanic	Part Electromechanics	6	6	6	1
devices of an electric interlocking installation of large and small stations	electromechanic	switch	25	30	33	1 *
	electrical engineer	switch	36	37	38	1
control-dimensional devices, devices of the control of the derailment of the rolling stock	electromechanic	complete set	200	200	200	1
block of power station without autostart	electromechanic	block	35	35	35	1
block of power station with autostart	electromechanic	block	11	11	11	1
Diesel engine - generating set	electromechanic	set	7	7	7	1

Divisions and served devices	Post	Measuring	Norm of service			Norm of number on a measuring
			1	2	3	
Crew on service of devices of automatic block relay systems	senior electromechanic	Part Electromechanics	6	6	6	1
On a single-track site	electromechanic	km	29	32	34	1
	electrical engineer	km	58	60	62	1
On a double-track site:						
Three-value	electromechanic	km	19	20	21	1
	electrical engineer	km	38	40	42	1
Four-value	electromechanic	km	16	16	16	1
	electrical engineer	km	32	32	32	1
route - control gears	electromechanic	swith	43	45	47	1
	electrical engineer	swith	67	70	72	1
Crew for service of devices:	senior electromechanic	central post	1	1	1	1
Central control point CTC (relay system)	electromechanic	Dispatching circle	6	6	6	4
	electrical engineer	Dispatching circle	6	6	6	1
The dispatching control of relay systems	electromechanic	km	64	64	64	1

Divisions and served devices	Post	Measuring	Norm of service			Norm of number on a measuring
			1	2	3	
The crew serving crossings:	senior electromechanic	Part Electromechanics			6	1
With autobarriers	electromechanic	crossing			29	1
	electrical engineer	crossing			44	1
Without an autobarrier	electromechanic	crossing			44	1
	electrical engineer	crossing			50	1
The crew of a signal system serving wires, suspended on air and power distribution circuits	senior electromechanic	Part Electromechanics			6	1
	electromechanic	km			400	1
	electrical engineer	km			800	1
The crew of a signal system serving the devices of a controlled manual block	senior electromechanic	Part Electromechanics			6	1
	electromechanic	key dep. Switch			47	1
	electrical engineer	key dep. Switch			72	1

Divisions and served devices	Post	Measuring	Norm of service			Norm of number on a measuring
			1	2	3	
Crew of maintenance work of devices of an automatic cab signalling	senior electromechanic	Control point			3	1
	electromechanic	set			34	1
	electrical engineer	set			30	1
Staff system	electrical engineer	km			50	1

Notes:

1. The measuring on automatic block system and a centralized dispatching control (CTC) is accepted in kilometers of operational length
2. On sites with constant using double-track traffic on each track, norm of service to apply with factor 0,8
3. The norm of service at imposing on automatic block system of frequency track circuits is applied with factor 0,85
4. At service of devices which life time has expired from 1 year till 5 years, before their modernization, norm of service to apply with factor 0,95, after expiry of the term from 5 till 10 years and over 10 years factors are accordingly equal 0,9 and 0,35
5. Items 1 - 4 are applicable for calculation of specifications of number in repair - technological site of a signal system
6. In devices of an automatic block, a centralized dispatching control and the dispatching control (CTC) with microprocessors, the norm of service is applied with factor 1,2

		Number	number for each electromechanic	number for each electric engineer	electromechanic need	electric engineer need	senior need
Switiches	n °	63	33	38	1,9	1,66	
Station power blocks	n °	7	11		0,64		
Diesel elec generator	n °	2	7		0,3		
Manual block	n°of points	n.n.					
Level crossings with autobarriers	n°	n.n.					
Level crossings without autobarriers	n°	7	44	50	0,23	0,2	
Automatic block	km	135,848	32	60	4,24	2,26	
basic total equipment with life-time expired from over 10 year					7,31	4,12	2
					14		
					plus 60%		8
need							22

Kungrad-Beyneu line; Jaslyk- Karakalpakia section

Present maintenance needs :Alternative 2

Table F.1

		Number	number for each electromechanic	number for each electric engineer	electromechanic need	electric engineer need	senior need
Switiches	n °	185	33	38	5,6	4,87	
Station power blocks	n °	15	11		1,36		
Diesel elec generator	n °	4	7		0,57		
Manual block	n°of points	n.n.					
Level crossings with autobarriers	n°	n.n.					
Level crossings without autobarriers	n°	18	44	50	0,41	0,36	
Automatic block	km	306,248	32	60	9,57 18	5,1 11	5
basic total equipment with life-time expired from over 10 year						34	
			plus 60%			20	
need						54	

Kungrad-Beyneu line; **Kungrad- Jaslyk- Karakalpakia section**

Present maintenance needs :Alternative 3

Table F.2

Table G
SAFETY DEVICES

B) Estimations of expenditures of labour

B1) Estimation of expenses for a payment on existing controlled stations

Post	The cost price per unit (\$/year)	Salary (\$/year)	Quantity of monthly set / year	Quantity of working hours per day	Average quantity of the working days in one year
1	2	3	4	5	6
Switchmen I					
Switchmen II					
Traffic operator I	2970,33	1362,53	12	8	256
Traffic operator II					
Station supervisor I	2589,64	1187,91	12	8	256
Station supervisor II					
Telegraph operator					
Other					

Source: Boshtransloyiha, 2005

B2) Estimation of maintenance charges

Cost of a payment (salary and other material inputs connected to a work area)

Post	The cost price per unit (\$/year)	Salary (\$/year)	Quantity of monthly set / year	Quantity of working hours per day	Average quantity of the working days in one year
1	2	3	4	5	6
senior electromechanic	3117	1430	12	8	256
Electromechanic	2921	1340	12	8	256
senior electrical engineer	-	-	-	-	-
electrical engineer	2485	1140	12	8	256
Other					

Source: Boshtransloyiha, 2005

Existing quantity of man power on stations

Table H

№	Arrangement (km)	Name of the station	The station supervisor	The traffic operator	Switch men	senior electromechanic	electromechanic	The chief of the section	electrical engineer
1	2	3	4	5	6	7	8	9	10
1	626+917	Kungrad	5	34		1	6	}	8
2	646+568	Raushan	5				1		1
3	671+602	Kunkhodja	5	3		1	1		1
4	688+184	Kyrk-Kyz	5	3			1		2
5	712+492	Barsa-Kelmes	4				1	1	1
6	734+092	Ajinijaz	5			1	1		1
7	757+142	Abadan	5				1		1
8	778+682	Kuanysh	5				1		1
9	797+303	Jaslyk	5	7		1	1		2
10	822+113	Ajapbergen	4				1	}	1
11	846+493	Berdakh	5				1		1
12	870+933	Bostan	4			1	1		2
13	892+793	Ak-Tobe	5				1		2
17	913+544	Kiyiksay	5				1		2
18	933+151	Karakalpakija	5	24			2		3
19	953+500	Border						}	
20	954+970	Oasis	5			1	1		2
21	979+521	Akjigit	5				2		2
22	1003+638	Kzyl-Asker	5				1		1
23	1023+161	Kok-Bekty	5			1	1		2
24	1033+579	Beyneu	5	24		1	4		3
25		Total	97	95		9	30	3	39

Source: Boshtransloyiha- Tashkent 2005

Project implementation planning												
Kungrad-Karakalpokia Alternative 2		First year				Second year				Third year		
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	
1 Project Implementation												
2 Sign of implementation contract	▽											
3 Working and shop drawings and detailed specifications		▬										
4 Construction on factory and supply on site			▬									
5 Site installations					▬							
6 Subsystem tests on site out of Operation									▬			
7 Comissioning										▬		

Table J.1

Project implementation planning																
Kungrad- Karakalkapia Alternative 3		First year				Second year				Third year				Fourth year		
Activity		Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	
1	Project Implementation															
2	Sign of implementation contract															
3	Working and shop drawings and detailed specifications															
4	Construction on factory and supply on site															
5	Site installations															
6	Subsystem tests on site out of Operation															
7	Comissioning															

Table J.2



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