Tacis

Study for Rehabilitation and the Reconstruction of the Road Link
Between Baku, Tbilisi and Yerevan

Draft
Engineering Report

Construction of the Gasan Su Cay and Shemkir bridges

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CONSORTIUM composed of

KOCKS CONSULT GMBH	BCEOM	FINNROAD LTD.
Germany	France	Finland

represented by KOCKS CONSULT GMBH

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1. INTRODUCTION

1.1 Background

Since the independence of the Caucasian Republics from the former Soviet Union, their national economics have declined and their road rehabilitation and maintenance has been neglected. Therefore, extensive road rehabilitation and improvement programmes are required throughout the region. Several International Financial Institutions (IFI) and other donors are planning major investments in road works for Azerbaijan.

Tacis is prepared to finance the construction of two bridges (Gasan Su Cay and Shemkir) on the Ganja to Gazakh road in support of the rehabilitation of the whole of the remaining section.

The designs for these two bridges were prepared over ten years ago, and work on replacement bridges was started. However, activities was suspended because of budget constraints. At Gasan Su Cay foundation piles have been driven and at Shemkir the bridge piers are mostly complete. Both construction are situated alongside the existing bridges. For the Tacis financing it is necessary to prepare a separate tender package according to the Procurement Guidelines by the European Commission , recuperating the existing works which are under suspension, and completing the outstanding elements.

The engineering report in it's present form comprises the construction of the Shemkir and Gasan Su Cay bridges

1.2 Project objectives and purpose

The overall objectives of the project are to co-finance the reconstruction of the Alyat -Ganja - Georgian Border main road, and in doing so to increase the interest of other potential investors.

The specific objective is to construct two new bridges at the subject sites.

The objective of the project is to prepare detailed designs with bill of quantities and cost estimates, and preparation of tender documents for the Shemkir and Gasan Su Cay bridges.

This engineering report is prepared comprising the investigations, testing, designs, quantity and cost estimates for the project for construction of the Shemkir and Gasan Su Cay bridges. For tendering and construction, tender documents are prepared .in accordance with the Procurement Guidelines for Works by the European Commission.

2. TRAFFIC

The traffic study has been carried out as part of the present project. In accordance with the Terms of Reference, it consists of an assessment of transport demand on the following routes :

- the road between Kyurdamir and the Georgian border in Azerbaijan;
- the roads between:
  - Tbilisi and the Azerbaijan border,
  - Tbilisi by-pass,
  - Tbilisi and Marneuli, on the route to the Armenian border,
- the roads between Vanadzor and the Georgian border through :
  - Vanadzor – Tasir,
  - Vanadzor – Ayrum.

Existing traffic data was analysed to deduce additional data required for the study and to design a corresponding survey programme in order to obtain the future average daily flow, which must be accommodated in all involved sections.

Traffic counts were then executed in February and March 2001 over a short period as a basis for obtaining average daily volumes by vehicle type. As flows can have weekly variations, seven days automatic directional counts were also carried out. Furthermore, to take account of seasonal variations and obtain a reliable estimate of Annual Average Daily Traffic (AADT) for "Normal" traffic, seasonal adjustment factors were applied.

Forecast increases to this basic data were then carried out, based on projections of the economic activity and taking into account the chosen design period, as well as the effects of diverted and generated traffic from other road and routes.

Possible traffic diversion from parallel roads and modes due to rehabilitation improvement on the Baku-Tbilisi-Yerevan project required additional investigations. For this purpose, origin-destination surveys were carried out. Estimates of traffic diversion from railways were obtained from the forecasting model prepared within the "Traffic Forecasting and Feasibility Studies project".

Traffic under this chapter describes the base year traffic levels, changes in traffic, vehicle weights and axle loads, and traffic growth forecast of the Ganja to Tovuz and Tovuz to Gazakh road section. The Shemkir bridge is located on the Ganja – Tovuz road section (km 382.7), whereas the Gasan Su Cay bridge is located on the Tovuz – Gazakh section (km 447.7).

For full details refer to the Traffic Study report.

2.1 Estimated traffic patterns

Average annual daily traffic (AADT)

The average traffic volume at count stations KP 280, between Yelakh and Goran, and KP 320, between Goran and Ganja, were considered to be representative of traffic flows along the stretch Yevlakh – Ganja – Tovuz. (year 2001 AADT of about 3,800 vpd).

According to the previous study, traffic on the Ganja by-pass itself was 782 vpd (1999), and was equivalent to 30% of the traffic counted just before Ganja (between Mingachevir Junction and Ganja – by-pass east junction). Within the current study, the Origin-Destination survey carried out at the KP 320 (between Goran and Ganja) allowed to confirm that traffic on the bypass is

much lower than on the Yevlakh – Ganja section. Traffic on the by-pass is now about 1049 vpd, but still represents 30% of the traffic counted between Yevlakh and Ganja (a total of 3668 vpd were counted at the at the KP 320, between Goran and Ganja).

The average traffic at count station KP 438, between Tovuz and Gazakh was considered to represent the flows along this section (year 2001 AADT of about 2,400 vpd.

Vehicle weights and axle loads

For structural design of the study roads, traffic figures have to be expressed in terms of equivalent standard axles (all axle loads measures from surveys are converted to an equivalent number of 80kN or 8.157 tonnes axles, referred to as equivalent standard axles). Multiples axles are treated as separate axles for this purpose.

The statistical analysis of axle load survey is summarised below. The figures expressed in the table are based on statistical analysis of Equivalent Standard Axle Load (ESAL) and not in a mere conversion of mean weight per axle and per vehicle expressed in tonnes. The Consultants have compared the results with those obtained in other CIS countries with similar vehicle fleets and similar economic conditions and, in the absence of other data, are satisfied that the implied ESA values may be considered to be representative of the fleets using the main road network.

Table 2.1: Statistical analysis of axle load survey (1998 and 1999)

	Vehicle Type				
	Large Bus	**2-axle Truck**	**3-axle Truck**	**4-axle Truck**	**5-axle Truck**
Sample size	193	134	149	24	43
Weight (tonnes)					
Axle 1	4.33	2.20	3.80	4.50	4.35
Axle 2	8.09	3.60	4.90	6.04	5.36
Axle 3			4.75	4.38	4.57
Axle 4				4.63	4.59
Axle 5					4.27
Vehicle	**12.42**	**5.80**	**13.45**	**19.54**	**23.15**
Equivalent Standard Axles (ESALs)					
Axle 1	0.1113	0.0179	0.1069	0.1242	0.1214
Axle 2	1.4087	0.2769	0.6800	0.8535	0.7739
Axle 3			0.6473	0.4300	0.6634
Axle 4				0.4074	0.7575
Axle 5					0.6036
Vehicle	**1.5200**	**0.2948**	**1.4342**	**1.8152**	**2.9198**

2.2 Forecast of traffic growth on the study road

Traffic predictions have been made on the basis of available data, including :

- existing time series traffic count data
- available study reports by the Consultant for the countries involved, particularly previous report produced by Kocks for rehabilitation of roads in Azerbaijan and Georgia.
- statistical data published in the Statistical Yearbook of South Caucasus.
- past and predicted GDP (Gross Domestic Product) figures communicated by World Bank and EBRD.
- results of the « Traffic and Feasibility Studies » on-going project conducted by BCEOM.
- recent traffic counts and OD survey results carried out by the Consultant.

The predicted AADT figures were given for the period 2001 – 2030, by type of vehicle. The volumes include the "normal", "generated" and "diverted" traffic flows, where applicable, assuming that the date of opening of the rehabilitated roads to traffic is beginning of the year 2005.

Traffic forecasts rely primarily on the relationship between traffic and GDP growth, similar to the methodology applied by the consultant in the previous studies. Thus, existing traffic figures were used to derive the elasticity between traffic and GDP, where possible and the results applied on a country-by-country basis.

Predicted GDP were available from the World Bank/ IMF, however, they are basically short term, up to the year 2006. For the purpose of this study the Consultant subdivided that forecast time-span into two distinct periods : 2005 – 2010 and 2011 – 2030. In the absence of more accurate information, it has been assumed that the available short-term GDP predictions would extent to 2010, after which a reduced value was used. A distinction was made between passenger and goods vehicles.

The average annual real GDP growth rate in Azerbaijan predicted by the World Bank/ IMF is 9.8% for the period 2001 – 2006. In this study this figure was used up to the year 2010. This figure has been reduced to 6% p.a. beyond the year 2010.

Based on available traffic counts at a number of stations along the corridor for 1999 and 2001, an elasticity of 0.97 was calculated between total veh-km and GDP. Since most of the traffic includes passenger vehicles and that partial statistical figures indicate a relatively low traffic growth of goods vehicles in recent years, this figure (rounded to 1.0) was applied to passenger vehicles. Traffic flows of goods vehicles normally relate to GDP by a lower elasticity value, among others because an increase in the country's wealth creates more production centres, thus shortening the transport distance to consumers. In this case a value of 0.8 was assumed.
The relation between GDP and traffic using the above mentioned elasticity values are given in following table. The traffic growth rates represent that of the "normal" traffic flows.

Table 2.2 : Azerbaijan GDP and Traffic Growth Rates

Period	Passenger vehicle traffic			Goods vehicle traffic		
	GDP	*elasticity*	*Growth*	*GDP*	*elasticity*	*Growth*
2001 – 2010	9.8% p.a.	1.0	9.8% p.a.	9.8% p.a.	0.8	7.8% p.a.
2011 – 2030	6.0% p.a.	1.0	6.0% p.a.	6.0% p.a.	0.8	4.8% p.a.

Forecast results for 'normal' traffic (base scenario)

Yevlakh – Ganja – Tovuz: The present volume is about 3,800 vpd. By 2005, the normal traffic would have grown to about 5,400 vpd, and to 8,500 vpd and 26,500 vpd respectively in the years 2010 and 2030. Over the period 2005 – 2030 the normal traffic would have increased by an average of 6.5% per annum.

Tovuz – Gazakh : The present volume is approximately 2,400 vpd. By 2005, the normal traffic would have grown to about 3,400 vpd, and to 5,500 vpd and 17,100 vpd respectively in the years 2010 and 2030. Over the period 2005 – 2030 the normal traffic would have increased by an average of 6.6% per annum.

Forecast of 'diverted' traffic (base scenario)

Diverted traffic that was considered in the present study may have originated from two sources :

- Traffic diverted from other roads
- Traffic diverted from the rail mode

A distinction is to be made between goods (heavy) vehicles and passenger vehicles.

It has been estimated that only heavy vehicles are likely to divert to the Yevlakh - Georgian border road section. The combined volumes from other roads and from rail are estimated to range between 18 vpd in 2005 and 91 vpd in 2030.

Forecast of 'generated' traffic (base scenario)

Generated traffic is the latent demand expected to materialise after the implementation of an improvement in the transport system, in this particular case, after the rehabilitation of the project roads. It is associated with the decrease in the transport cost, reflected by the lower expected vehicle operating costs (VOC).

The estimated traffic generations in 2005 is about 350 vpd for the Ganja – Shemkir – Tovuz. For the remaining sections of the road project in Azerbaijan, no generated traffic is predicted since the road was considered to remain in good condition.

Combined traffic forecast (base scenario)

The combined estimates of forecast traffic of Yevlakh – Ganja — Tovuz – Gazakh section ("normal", "generated" and "diverted") are set out below for the years 2001, 2005, 2010 and 2030. More detailed information are given in Appendix 2.

Table 2.3 : Predicted AADT on the link Yevlakh - Ganja - Tovuz

Year	AADT	Average growth 2001- 2030	Average growth 2005- 2030
2001	3,760	7.2% p.a.	6.6% p.a.
2005	5,770		
2010	9,100		
2030	28,520		

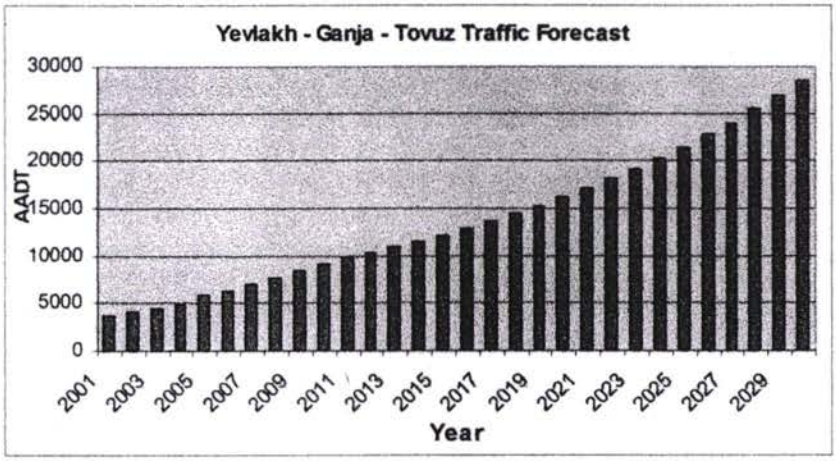
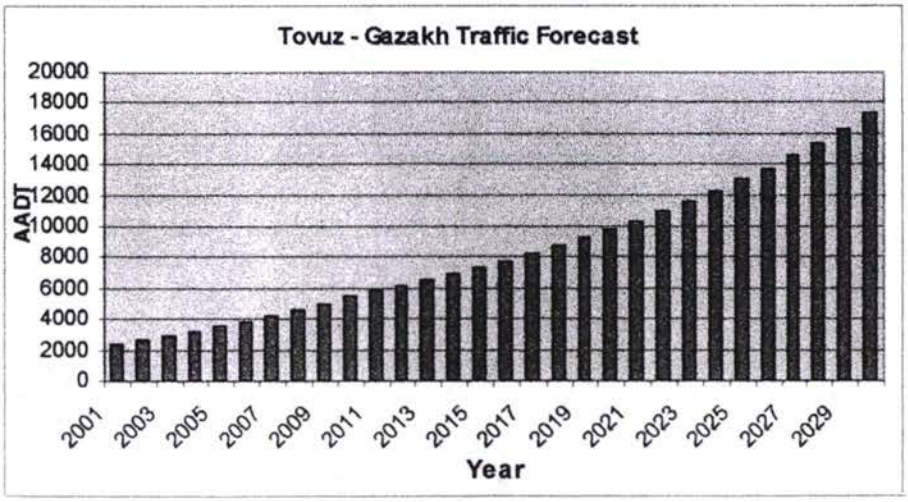


Table 2.4 : Predicted AADT on the link Tovuz - Gazakh

Year	AADT	Average growth 2001-2030	Average growth 2005-2030
2001	2,390	7.1% p.a.	6.6% p.a.
2005	3,460		
2010	5,480		
2030	17,220		



3. TOPOGRAPHICAL SURVEY, MAPPING AND DRAWINGS

The topographical survey were tied in to the Azerbaijan national grid. Prior to the survey of topographical details a polygonal traverse are established. Permanent concrete traverse points are placed, numbered and surveyed. In addition to the tachometric survey all traverse points were levelled and connected to the national elevation system. The existing road centreline, cross sections and the proposed corridor of the additional carriageway are surveyed in 50 m intervals, which were reduced to 25 m or less when required by side constrains (e.g. at junctions, build-up areas). The survey also included topographical details like existing roads, tracks, drainage structures, buildings etc.

The survey was undertaken using the following items of equipment:

- 2 total station Leica/Wild T 1000
- 2 electro-optical distance-meter Wild DI 1000
- 2 precision levelling instrument Wild NAK 2
- 2 data recording unit (digital registration) Wild REC modul GRM 10 & PC-reader GIF 10
- 2 Notebook with surveying software
- Ancillary survey equipment like tripods, reflectors, levelling staff, etc.

Survey data from the recording unit was downloaded to a notebook using CARD/1 survey software. The co-ordinates and elevations were calculated, controlled and converted to the CAD CARD/1 (Computer Aided Road Design) requirements.

Base maps were produced of the existing road showing contour details of the road corridor. Using these base maps a digital model was developed through CARD/1 and the horizontal and vertical alignments designed. Plan drawings were produced at a scale of 1:2,000. For the purposes of producing convenient sized tender documents the drawings have been prepared on A3 sheets.

4. GEOTECHNICAL INVESTIGATION AND ROAD CONSTRUCTION MATERIAL

The road from Udjar to the Georgian Border crosses the Shemkir river at km 382+690 by means of a bridge. Adjacent to the existing bridge a second structure is designed to replace the existing bridge and in order to provide in the future sufficient width for four lanes. The existing bridge, structure No. 32, with 3 spans has a total length of approximately 68 m. At the left hand side of the old existing bridge, construction works of a new bridge had already started several years ago, but the works were suspended.

The Gasan Su Cay bridge is located at km 447+650. This bridge, structure No. 44, with 1 span and cantilevers on both ends has a total length of approximately 38m. Adjacent to the existing bridge on the right hand side a second structure is designed to replace the existing bridge. Construction works of a new bridge had started, but the works were stopped and the construction site abandoned

For the review of the design of the newly constructed bridge foundations or the construction of new foundations information of the subsoil conditions were required. For an assessment of the soil conditions and bearing capacity a preliminary soil investigation was carried out. The investigation results are presented in this report.

4.1. Geological Overview

The road from Udjar to the Georgian Border crosses alluvial - proluvial foothill depressions and the Kura-Araks region. The landscape in the vicinity of the road between Udjar and Yevlakh is generally very flat. This area consists of sediments which belong to the Upper–pliocen-quaternary period and Alluvial–Proluvial deposits with various thickness. These deposits comprise generally of loam material i.e. yellow brown to grey sandy silts to sandy clays.

From Yevlakh in direction to the Georgian border the landscape becomes more hilly. This area consists of sandy-clayish deposits of the quaternary period. Lower quaternal deposits are con-

sisting of clay with changing contents of sand and silt. The upper quaternal deposits are a mixture of gravel, coarse sand and bigger stones from alluvial-proluvial periods. Riverbeds consist of coarse to fine gravel, sand and sandy silt to silty clay.

4.2 Investigation and Testing

Field Investigation and Sampling

Soil investigation has been carried out by sinking of boreholes and by execution of dynamic penetration tests.

Shemkir bridge
Two Boreholes were sunk at the proposed locations for the new abutments and one borehole in the middle of the riverbed close to the pier foundations. The boreholes reached a final depth of 12m below adjacent ground level. Penetration Tests according German Standard had to be abandoned at shallow depth (< 5,50 m) due to large stones which prevented further penetration. During the time of the field investigations in March 2001 the river bed was completely dry.

Gasan Su Cay bridge
Two Boreholes were sunk close to the proposed locations for the new abutments to a final depth of 12,0m below adjacent ground level. Penetration Tests according German Standard had to be abandoned at shallow depth (< 2,70 m) due to large stones which prevented further penetration.

The boreholes were executed by the Design Institute "Azdorprojekt" with a truck mounted drilling rig. During drilling operation soil samples were taken, sealed, marked and send to the laboratory of the Design Institute for testing. All results of the field investigations and laboratory testing have been compiled by the Design Institute in a engineering-geological investigation report. Details of the soil profiles and soil properties are presented in that report.

The dynamic penetration tests were carried out by staff of the AZYOL Laboratory with a penetrometer (as described in German Standard DIN 4095) using the light version DPL-5 (Test results see Annex1)

The field investigations, drilling and penetration tests were executed during March 2001.

Laboratory Testing

The samples taken during the field investigations were delivered to the soil laboratory of the Design Institut "Azdorprojekt", AZERAVTOYOL in Baku. Routine laboratory testing to obtain the relevant material properties for a first subsoil assessment was carried.

The laboratory testing was limited at this stage to the following classification tests of the subgrade material:

Soil / Aggregates
Grain size analysis (wet and dry sieving, Hydrometer method)
Moisture content, natural
Specific gravity

Results are presented in detail in the engineering-geological investigation report of the Design Institute "Azdorprojekt" AZERAVTOYOL

4.3 Investigation and Test Results

In the following the results of the investigations are summarised based on the information provided in the report of the Design Institute Azdorprojekt.

As shown on the presented borehole profiles and DPL-tests the subgrade situation can be described as follows:

Shemkir bridge

Layer I: Gravel, sandy, with thin layers of sandy silt (0,3m thick), the content of larger stones (blocks) was estimated to be between 3 and 15%, this layer was found up to final borehole depth of 12,0m

No water has been encountered in the borehole during drilling works up to a depth of 12,0m below ground level.

Gasan Su bridge

Layer I: Topsoil with roots and gravel, 0,20m thick

Layer II: Gravel, sandy, with thin layers of sandy silt (0,2-0,3m thick), the content of larger stones (blocks) was estimated to be between 6 and 12%, below 4,0m depth more frequent sand and clay layers up to 0,4m thick, this layer was found up to the final borehole depth of 12,0m

No water has been encountered in the boreholes during drilling works up to a depth of 12,0m below ground level.

Laboratory tests on material samples taken during field investigations were carried out to determine the main properties with the following results:

The samples of granular material taken from the boreholes and tested in the laboratory can be describe as coarse sandy gravel with a percentage of larger stones >100mm of around 10 and very little to no fines. The results of the grain size analyses are presented in detail in the geotechnical investigation report of the Design Institute Azdorprojekt.

4.4 Evaluation of investigations and assessment of subgrade condition

Soil parameter
Based on the investigation results and laboratory tests the main soil parameters are assumed to be in the following ranges:

Shemkir bridge

Layer I:

bulk weight of soil	γ = 19 to 22 kN/m^3
bulk weight of submerged soil	γ' = 9 to 12 kN/m^3
effective shear strength	φ' = 35 °, c' = 0 kN/m^2
modulus of elasticity	Es = 40 to 60 MN/m^2

Gasan Su bridge

Layer I:
Topsoil. This layer is unsuitable for foundation structures

Layer II:

bulk weight of soil	γ = 19 to 21 kN/m^3
bulk weight of submerged soil	γ' = 9 to 11 kN/m^3
effective shear strength	φ' = 32,5 °, c' = 0 kN/m^2
modulus of elasticity	Es = 35 to 55 MN/m^2

Prior to the construction works these values should be checked. Additional investigations will have to confirm the soil profile and soil condition to depths of at least 5.0 m below foundation level or pile footing.

Assessment of ground condition and permissible soil pressure
The granular material encountered in all boreholes until final depth of around 12m does in general provide a sufficient support for the bridge foundations. Actual permissible soil pressure and expected settlements will depend on the in-situ density of the coarse gravel. Until further investigation and testing will provide more and detailed data it is assumed that the in-situ condition of the granular material is loose to medium dense. Based on this assumption the following proposal for foundation level and related permissible soil pressure are made.

For slab foundations to be constructed or for re-calculations of slab foundations with a minimum depth below adjacent ground of 2,0m the permissible soil pressure can be assumed as 300kN/m^2 with assumed foundation dimensions of 5 by 15 m. Settlements will be in the range of 2 to 3 cm and will mainly occur at the time when the load is applied. However, prior to any decision if the existing foundations can be used for a new bridge, the actual foundation level and dimension shall be checked.

Measures for erosion protection for the pier foundations have also to be considered when checking the foundation level.

For all design purposes of the bridge it has to be considered that the region belongs to seismic zone 8.

Embankments and approaches to the bridge

A new bridge at the aside of the existing structure will require a realignment of the existing road and/or a widening to a 4-lane dual carriageway for a substantial length before and behind the bridge. This will require the construction of new embankments.

To asses the condition of the natural ground adjacent to the existing road the existing subgrade has been investigated by means of smaller percussion borings. The existing mainly granular material at the surface and until greater depth in the river bed is overlain by a cohesive soils outside the riverbed. The existing subgrade in the terrain for the new embankments/approaches for a new bridge is at the Shemkir bridge a clay with varying plasticity and consistency, with changing content of sand and larger stones. This material is not suitable at formation level of a road and can be categorised as Subgrade strength class S1 according TRL Road Note 31. At

the Gasan Su Cay bridge the existing subsoil is a clay with low to medium plasticity and stiff to semi firm consistency. This material is not suitable at formation level of a road and can be categorised as subgrade strength class S2 according Road Note 31.

Depending on the design of the widening to a 4-lane road, the embankment height and design traffic a layer of selected subgrade material or a capping layer has to be placed below the subbase layer. The thickness of this layer will depend on the design parameter and the new pavement structure.

For the construction of new embankments only suitable fill material should be used and placed and compacted in layers. Gravel from the riverbed could be used for this purpose if screened accordingly to fulfil requirements for common fill material. Prior to the construction of an embankment the natural ground has to be prepared by removing all soft, muddy, organic and foreign material in the area of the embankment base.

In road sections with only a low embankment it may become necessary to excavate the existing cohesive soil and replace it with selected granular subgrade material with the required thickness to provide the necessary bearing capacity. This case should be limited to the absolut necessary minimum as it may required additional measures for drainage.

4.5 Summary

Soil investigations for the proposed new bridges across the Shemkir and Gasan Su Cay have been carried out by sinking boreholes and performing dynamic penetration test. Granular material, mainly coarse gravel with larger stones has been found with the boreholes until final investigation depth. The bearing capacity of this material is generally acceptable and sufficient to support the bridge foundations. An assessment of the soil conditions with assumptions of soil parameter and permissible soil pressure has been made.

Prior to any construction works additional soil investigations and tests are required to confirm the soil profile and soil parameter to depths of at least 5,0 m below foundation level or pile footing.

The existing subgrade material at the terrain for the new embankments/approaches at the Shemkir bridge is a clay with varying plasticity and consistency, with changing content of sand and larger stones. This material can be categorised as Subgrade strength class S1 according TRL Road Note 31. At the Gasan Su Cay bridge the existing subgrade material at the terrain is a clay with low to medium plasticity and stiff to semi firm consistency. According TRL Road Note 31 this material can be categorised as subgrade strength class.

The placement of a layer of selected subgrade material or a capping layer may be necessary.

For the construction of new embankments only suitable fill material should be used and placed and compacted in layers. Prior to the construction of an embankment the natural ground has to be prepared by removing all soft, muddy, organic and foreign material in the area of the embankment base.

5. BRIDGE CONDITION AND DESIGN

5.1 Condition of the existing structures

Existing bridges

At each bridge site, there are the old existing bridges and the suspended structures. The old existing bridges were inspected and are in a poor condition, and cannot be repaired, but need replacement.

Existing Shemkir bridge (road chainage 382+690)

3 spans – bridge length 67.88 m – bridge width 8.50 m.

The existing 3 spans bridge is a simple, concrete bridge, with 7 meters carriageway width and pedestrian width equal to 0.75 meters. The bridge superstructure T diaphragm beams are 22.2 m long and made of reinforced concrete. The existing bridge is designed for N 13 and NG 60 standard loading, which do not meet the design load requirements. Bridge piers are constructed of concrete and not reinforced. The existing bridge is not designed for seismic loading.

Existing Gasan Su Cay bridge (road chainage 447+650)

Length of the old bridge 37.94 m. – width of the old bridge 8.50 m.

The existing 1 span bridge is a cantilever bridge, with 7 meters carriageway and pedestrian width equal to 0.75 meters. The existing bridge superstructure beams are made of in-situ concrete. Beam span is equal to 22.2 meters and cantilever length is 7.87 meters. The existing bridge is designed for N 13 and NG 60 standard loading, which do not meet the design load requirements. Bridge piers are made of concrete and not reinforced. The existing bridge superstructure beams are diaphragm beams. The existing bridge is not designed for seismic loading.

Suspended construction of bridges

The investigation of the condition of the existing elements of the suspended bridges construction was carried out by visual inspection and testing, using various Schmidt hammer (concrete strength testing equipment) and reinforcement steel thickness gauge. Azeravtoyol made available the existing design documents including drawings and construction details. The data were checked in course of the bridge inspection and, corrected and/or supplemented as necessary. The structure conditions are summarised as follows:

Suspended Shemkir Bridge

The suspended bridge structure is located to the north and downstream of the existing bridge. Measured concrete strength of the foundation elements (shafts below the round columns) is about 120 kp/cm² and lower, much below the required concrete strength. Reinforcement in the cross beams is not sufficient. Main reinforcement in the spans of the cross beams Φ20 / 5 cm. Stirrups Φ 4 / 25 cm. The reinforcement does not have adequate concrete cover. The suspended structure cannot be used because of the low and sub-standard quality of the structural members.

The design of the suspended bridge does not comply with the requirement of the site situation (existing bridge and hydraulic situation of the river bed). The general arrangement of a new structure should follow the general arrangement of the existing bridge, which is 3 spans: 22.22 - 22.22 - 22.22 m. Total length of bridge: ~ 67.0 m. The cross section of the new bridge superstructure should provide a total width of 14.94m, e.g. carriageway 2x3.74m, shoulders 2x2.00m, sidewalks 2x1.72 m. The suspended structure has a general arrangement with 6 spans of 18 m (total length 119.0 m). The 2 exterior spans are situated just above the embankment. The hydraulic section of the river was also maintained. Level of river bed ~ + 65.45 m; high water level given in the drawing: +69.40 m.

Suspended Gasan Su Cay Bridge

Existing at site is the pile foundation for:

2 piers = 2 x 8 pipes diameter 530 mm
2 abutments = 2 x 4 pipes diameter 530 mm

Reinforcement of the piles is: 4 Φ 20 + 4 Φ 16 stirrups Φ 10/20 cm.

The measured concrete strength at the left side cross beam was 110 kp/cm². At the right side cross beam 150 kp/cm². The cross beams on the abutment piles cannot be used for the new structure and must be demolished.

5.2 Bridge Design

For the design of repairs, extension, widening or replacement the prevailing FSU bridge standard has been applied in principle, so that one uniform standard is used on the structural components. The traffic class is A 11, and the load category is NK-80, in accordance with SNIP 2.05.03-84. The structural standards for a para-seismic should be considered.

The installations and bridge furniture such as concrete repair, sealing, surfacing, drainage, bridge bearings etc. are selected from international standards in order to improve previous and identified shortcomings.

Shemkir bridge

The new bridge over Shemkir Cay river will be located upstream on the proposed second carriageway of the road.

The design bridge is a 3 span, reinforced concrete bridge, with 11.50 m carriageway width and 1.00 m width walkways.

Span scheme of the designed bridge is 3 x 22.2 meters.

Bridge superstructure beams are precast and of the same length as the existing bridge beams, equal to 22.2 meters. In order not to break the hydraulic mode of flood water flow, the openings of the design bridge are similar to the existing ones.

Bridge superstructure beams are designed as pre-stressed concrete. Design standard loading is A-11 and NK-80. Piers are designed to be made with cast in-situ reinforced concrete. The

upper part of piers are located higher than the flood water level and are designed to be made of in-situ reinforced concrete posts.

Abutments are also designed to be made of monolithic concrete. Abutment body are made of flat walls, which are, in purpose of stability, of increasing thickness towards its foundation. Flow shaping structures are designed to be made with gabions. Bridge design seismic loading is equal to seismic zone 8 on the intensity scale.

For all visible concrete surfaces – wing walls and the cornices of the sidewalks, the concrete surfaces shall be of high grade.

The foundations consists of in-situ reinforced concrete slabs 5.0 x 14.06 x 3.80 m for the piers and 7.0 m x 15.25 x 2.50 m for the abutment column, as shown on the drawings. The dimension of the foundation consider the earthquake and breaking force and the level of local scour.

For the river bed and slopes an erosion protection of gabions will be provided.

Expansion joints type 'MAURER' are selected. Parapets, sidewalks and crush barriers are proposed to international standard.

Gasan Su Cay bridge

The designed bridge over Gasan Su Cay will be located downstream on the proposed second carriageway of the road.

The designed bridge is a 3 span, reinforced concrete bridge, with carriageway width equal to 11.5 meters and 1 meter width walkways.

Span scheme of the designed bridge is 12 + 18 + 12. Bridge superstructure beams are precast T pre-stressed concrete beams. Design standard loading is A-11, NK – 80. Piers are designed to be made as in-situ concrete walls and are resting on the existing piles foundations

Abutments are piles structure, with resting on the existing, earlier driven, piles backwalls. Flow shaping structures are designed to be made with gabions. Bridge design seismic loading is equal to seismic zone 8 on the intensity scale.

For all visible concrete surfaces – wing walls and the cornices of the sidewalks, the concrete surfaces shall be of high grade.

The existing pile foundation was constructed 1988/1989 under supervision of Azeravtoyol according the detailed design documents from Azdorprojekt. According to the design documents the piles were driven up to 12 m below ground level. The diameter of the piles are 730 mm. The concrete quality of visible parts of the piles is satisfactory and the measured concrete strength is sufficient. Before construction of the new bridge it is recommended that the bearing capacity of the existing piles should be confirmed.

For the river bed and slopes an erosion protection of gabions will be provided.

Expansion joints type 'MAURER' are selected. Parapets, sidewalks and crush barriers are proposed to international standard.

6. ENVIRONMENTAL INVESTIGATION

The corridor of the existing road for the proposed World Bank financed road section from Ganja to Gazakh was inspected as well as the proposed construction material sources in order to identify potential environmental impacts resulting from the proposed construction works for the improvement of the road.

Environmental impacts relating to the rehabilitation of the existing road will the direct physical intrusion on the land within the immediate construction corridor, to health and safety conditions within the works-related human settlements, construction camps and work sites and finally to the extraction, the handling and transport of construction materials.

The analysis of the environmental impacts will focus on the following:

- Identification of project-related key concerns with regard to
  - impacts on the natural environment
  - human health
  - human safety
- Compilation of key environmental, health and safety regulations that will be relevant to the proposed project
- Development of a concept of mandatory and additional measures for impact avoidance and impact mitigation
- Identification of additional measures for environmental enhancement

Details of the environmental investigations, findings, assessments and recommendation including the Environmental Mitigation and Monitoring Plans are attached as Appendix 8.

7. ENGINEERING ROAD DESIGN

The engineering design comprised the measures to construct the approach road in consideration of the following:

- Former Soviet Union Standard (SNIP) 2.05.02-85
- Junction standard drawings 503-0-44
- Marking standard drawings 503-0-04
- Pavement in accordance with the TRL Road Note 31
- The selection and/or adaptation of the appropriate designs standards
- Consideration of pavement strength field investigation results
- Consideration of traffic volumes
- Consideration of the equivalent standard axles

7.1 Road design standards

The geometric design will be carried out according to the Former Soviet Union Standard (SNIP) 2.05.02-85, which is in use in Azerbaijan.

Within the present project only the approach roads to the new bridges will be constructed. The approach roads to the new bridges are located on the proposed second carriageway of the road.

The design elements for the cross section are half the width of the cross section for a category I (4 lane) road.

Lane width:	3.75 m
Carriageway:	7.50 m
Width of shoulder:	3.75 m
Paved shoulder:	0.75 m on the outside, 1.00 m on side of the future median

The minimum superelevation of the carriageway is 1.5 % with a shoulder inclination of 3 %.

The horizontal and vertical alignment will generally follow the existing carriageway.

7.2 Pavement design

For the pavement design the analysis of early investigations, studies and comparisons of the Former Soviet Union (FSU) pavement standard to which the existing roads in Azerbaijan were designed with international standards has shown that due to comparatively thin asphalt layer thickness the FSU pavement designs are inadequate. Considering that mechanistic procedures are to a large degree dependent on the selection of material specification characteristics it is essential to assess the FSU pavement designs based on empirical procedures which deal with more tangible aspects of pavements.

Therefore it has been proposed by the Consultant to prepare the pavement design to international standards according to TRL Road Note 31 which expresses a relationship between the pavement thickness, subgrade CBR and the cumulative equivalent standard axle loading (ESAL) at the end of the design life period.

The design procedure is based on the analysis of all available data obtained from the existing pavement and geotechnical evaluations together with traffic data. The relevant input figures are as follows:

Approach road Shemkir bridge

Design life:	18 years
Cumulative ESAL:	14,5 millions per directions
Design CBR:	2 %

With the aforementioned ESA per lane the traffic is within the traffic class T 7 according to Road Note 31. Concerning the subgrade strength, expressed in CBR after 4 days soaking, the applicable design is assumed to be 2 %, resulting in subgrade strength class S 1 according Road Note 31.

The design subgrade strength class of S 1 together with the traffic class T 7 will be used with the catalogue of structures in Road Note 31 to determine the pavement layer thickness. According to chart 7 following pavement structure is recommended:

Flexible bituminous surface	50 mm
Bituminous road base (RB)	175 mm
Granular sub-base (GS)	225 mm
Granular capping layer (GC)	350 mm
Total thickness	800 mm

A total of 225 mm bituminous material is needed. 175 mm road base and 50 mm surface course. Tack coat shall be applied between the layers.

Approach road Gasan Su Cay bridge

Design life: 18 years
Cumulative ESAL: 6.1 millions per directions
Design CBR: 3 - 4 %

With the aforementioned ESA per lane the traffic is within the traffic class T 6 according to Road Note 31. Concerning the subgrade strength, expressed in CBR after 4 days soaking, the applicable design is assumed to be in a range of 3 to 4 %, resulting in subgrade strength class S 2 according Road Note 31.

The design subgrade strength class of S 2 together with the traffic class T 6 will be used with the catalogue of structures in Road Note 31 to determine the pavement layer thickness. According to chart 7 following pavement structure is recommended:

Flexible bituminous surface	50 mm
Bituminous road base (RB)	150 mm
Granular sub-base (GS)	225 mm
Granular capping layer (GC)	200 mm
Total thickness	625 mm

A total of 200 mm bituminous material is needed. 150 mm road base and 50 mm surface course. Tack coat shall be applied between the layers.

The TRL Road Note 31 also describes the required properties of unbound materials for use as sub-base, capping and selected subgrade layers.

Granular sub-bases (GS)
The sub-base is an important load spreading layer in the completed pavement. It enables traffic stresses to be reduced to acceptable levels in the subgrade and its acts as a working platform for the construction of the upper pavement layers. The most stringent requirements are dictated by the need to support construction traffic and paving equipment.

A minimum CBR of 30 % is required at the highest anticipated moisture content when compacted to the specified field density.

Granular capping layers (GC)
Granular capping layers are required to provide sufficient cover on weak subgrades. They are used in the lower pavement layers as a substitute for a thick sub-base to reduce costs.

The requirements are less strict than for sub-bases. A minimum CBR of 15 % is specified at the highest anticipated moisture content measured on samples compacted in the laboratory at the specified field density.

The following layers are recommended considering the technical specifications given in Road Note 31:

GS: Natural gravel for granular sub-base
GC: Gravel or gravel-soil for granular capping layer

7.3 Utility lines

Existing utility lines like water supplies, electricity and telephone services within the road reservation were surveyed. They are shown as lines or poles on the drawings.

During construction it has to be ensured that heavy construction equipment does not damage the lines and pipelines are proper protected prior to commencement of construction activities.

The tender documents draw the Tenderer's attention to the need to investigate any service diversions or alterations that may be necessary for the purpose of constructing the road.

8. COST ESTIMATES

The cost estimates are based on the prices of locally available material, on plant and equipment purchase on the international market or local market as applicable and local labour.

Cost Estimates for the works have been prepared using the Bills of Quantities in conjunction with the following:

i) The Drawings
ii) The General and Special Specifications
iii) The General and Special Conditions of Contract
iv) Addenda or clarifications issued in connection therewith or any other information contained in the bidding documents.

The Bills of Quantities comprise the following:
i) The General Items including specified Provisional Sums
ii) The Works
iii) Dayworks
iv) Contingency Provision
v) Grand Summary

General Items
This comprise of Contractual and Specified Requirements and Provisional Sums.

Contractual Requirements
Contractual requirements items are normally lump sums which were derived using as basis the financial costs of obtaining the guarantees or premiums together with any other information contained in the Bidding Documents, Conditions of Contract and Specifications.

Specified Requirements
Specified requirements items have prices were derived using current cost of inputs making up the particular item together with all other relevant information from the specification, Conditions of Contract and other sections of the Bidding Documents. After building up the cost of the item an allowance is then made to cover contractor's profit and overheads to finally arrive at the lump sum price of the item in question.
Labour, plant and material unit costs encountered in building up lump sums under General Items are treated elsewhere.

Provisional Sums
Provisional Sums have been derived using cost data from the following:
i) Similar completed projects

ii) Site Visits, Investigations and Inventory
The relevant cost data once identified and computed for an item was updated to reflect current costs. Labour, plant and material unit costs encountered in building up provisional sums are treated elsewhere.

Works Items
In deriving unit rates for work items prevailing unit costs of labour and plant were established and a market survey carried out for all relevant materials to establish their current prices and together with the relevant outputs a total unit cost for the item was obtained. An allowance was then added to cover contractor profit and overheads.

Dayworks
Dayworks are provided for valuation of works which cannot be valued by the works items in the Bills of Quantities and as such covers materials, labour and plant.

Unit prices were inserted against the nominal quantities provided in the daywork schedules. A percentage for profit and overheads was then added to the subtotals to obtain the dayworks totals.

Contingency Provision
A contingency sum computed as a percentage of the sum of the Works and General Items less all specified provisional sums and comprising of a financial and physical component was allowed to cover any variations in scope of the works as well as fluctuation in the cost of the various inputs.

Grand Summary
The Grand Summary sums up all the various sections of the Bill of Quantities to arrive at the total construction Cost.

The unit costs for equipment, material and labour are based on information and data from the international competitive tendering for the proposed Alyat – Gazi Mammed road in Azerbaijan and relate to prices from other international projects in the region (i.e. Turkmenistan, Armenia, Uzbekistan).

The costs summary is shown on the following table. The detail cost estimate has been submitted to Azeravtoyol under separate volume.

Table 8.1 Cost Estimate - Summary

Bill No.	Description	Total EURO
100	General Items (5 of %	67,174.93
200	Shemkir Bridge	773,187.25
300	Gasan Su Cay Bridge	260,482.25
400	Approach Road to Shemkir Bridge	153,268.25
500	Approach Road to Gasan Su Cay Bridge	151,560.75
600	Miscellaneous	5,000.00
700	Dayworks	12,310.00
	Sub – Total	**1,422,983.43**
	Provisional Sum / Contingencies (5 % of the above)	71,149.17
	TOTAL	**1,494,132.60**

9. IMPLEMENTATION PROPOSALS

9.1 Resources and International Open Tender Procedure

The Projects are to be tendered in line with the European Community requirements for International Open Tender Procedure. Contracts are open on equal terms to all Contractors of the Member States of the European Community and the countries governing the aid programme under which a given contract is being financed.

Under the open procedure, any natural or legal person wishing to tender receives, upon request, the tender dossier (which may have to be paid for), in accordance with the procedures laid down in the procurement notice. When the tenders received are examined, the contract is awarded by conducting the selection procedure and the award procedure.

9.2 Time Schedule

After approval of the technical specification of the Works, the procurement notice will be published in the Official Journal of the European Communities, on the Internet and in any other appropriate media.

The minimum period between the date of publication of the procurement notice and the deadline for receipt of tenders is 90 days.

Tenderes are bound by their tenders for the period specified in the tender dossier, which is normally fixed at 90 days from the deadline for the submission of tenders. This period must be sufficient to allow the contracting authority to examine the tenders, notify the successful tenderer and conclude the contract.

If the procurement notice published by the end of August 2001 it is anticipated that the successful tenderer would not start on site before the end of January 2002.

The contract period for the construction is 8 months giving a Works completion date of end of September 2002.

9.3 Procurement of works

Procurement of the Works will follow the Manual of Instructions of the European Community, SRC Common Service for External Relations (EUROAID).

The general rule for the award of works contracts is the international open tender procedure following publication of a procurement notice.

For the and tender process, the services of the consulting engineering firm experienced in preparation of the project, and experienced in the region on similar works should be retained, in particular for the tendering services such as issue of tender documents, pre-tender meeting, for the issue of clarifications or amendments, and evaluation of tenders and recommendation for award of contract.

9.4 Project management and supervision of construction

The conditions of the contract assign rights, duties and responsibilities to the contracting partners, to the Road Administration and to the Contractor. For correct administration and to assure that the works in quality and quantity are constructed as specified, and paid for as contained in the contract, the Project Manager and Supervising Engineer is appointed. Prior to commencement of the works, he checks and advises on performance bonds and advance payment guarantees, as well as insurance of works, equipment, plant etc.

The Project Manager and Supervising Engineer carries out the following duties:

1. Undertakes the day-to-day administration of the project.
2. Ensures that the right safety practices have been put in place by the Contractor.
3. Checks the setting out of the Works to ascertain that the right - alignment, levels and dimensions of the various parts of the Works have been attained.
4. Ensures that the vertical and horizontal alignments of the completed Works are within the tolerances specified in Technical Specifications.
5. Tests and examines any materials to be incorporated into the permanent works to ensure compliance with the Technical Specifications and the Design Standards.
6. Ensures that quality control measures specified in the Technical Specifications are strictly complied with by the Contractor.
7. Checks and advises on the workmanship and work methods being employed by the Contractor.
8. Checks the Contractor's Work Programme and advises on any modifications required.
9. Monitors the use by the Contractor of all categories of staff and constructional plant and equipment.
10. Conducts regular site meetings and distributors minutes of such meetings to all parties and offices.
11. Checks and advises on the authenticity of Manufacture's Test Certificates.
12. Keeps the Supervisor informed of significant occurrences and events at the site.
13. Checks and verifies the Contractor's invoices and recommends payment.
14. Prepares and certifies Interim Payment Certificates on the Project.
15. Prepare Monthly and Quarterly Progress Reports.
16. Keeps a daily diary of activities and events at the site.
17. Issues Site Instructions to the Contractor.
18. Monitors the use of resources by the Contractor for Works specified and agreed to be executed by Day Works.

19. Controls access at the works site to minimise interference with the Constructional Works.

20. Advises on claims from the Contractor.

21. Prepares the Final Account for the project.

22. Advise the Employer on the Contractor's rate proposals for work items not covered in the contract.

23. Ensures that any completed portion of the Project meets the minimum thresholds of the various properties specified in the Technical Specification and the Design Standards.

24. Ensures that the as-built-drawings are prepared.

25. Assesses requests for extension of time by the Contractor.

10. BIDDING DOCUMENTS

The Bidding Documents have been prepared on 'International Competitive Bidding' basis, using the European Community Standard Tender Dossier for Works.

The tender dossier comprises the following documents:

VOLUME 1 INSTRUCTIONS TO TENDERERS

Section 1	Instructions to Tenderers
Section 2	Form of Tender, Appendix to Tender
Section 3	Form of Tender Guarantee
Section 4	Questionnaire
	Form 4.1 General Information about the Tenderer
	Form 4.2 Organisation Chart
	Form 4.3 Power of Attorney
	Form 4.4 Financial Statement
	Form 4.5 Financial identification
	Forms 4.6.1.1 through 4.6.10 Technical Qualifications
	Cash Flow Schedules
Section 5	Glossary of Terms
Section 6	Draft template Evaluation Grid

VOLUME 2 CONTRACT

Section 1	Form of Contract
Section 2	General Conditions
Section 3	Special Conditions
Section 4	Form of Performance Guarantee
Section 5	Form of Advance Payment Guarantee (if applicable)
Section 6	Form of Retention Money Guarantee

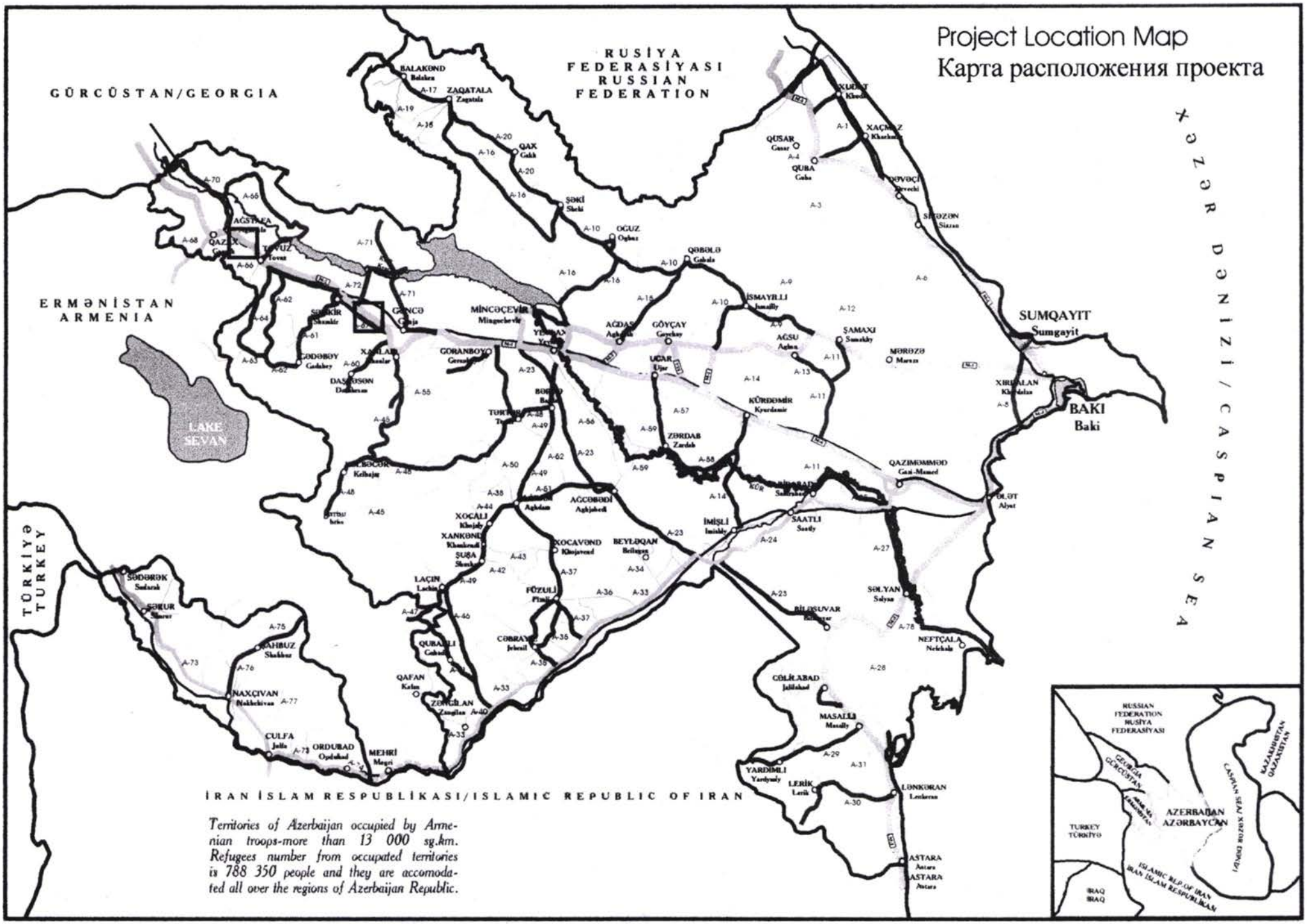
VOLUME 3 TECHNICAL SPECIFICATIONS

VOLUME 4 BILL OF QUANTITIES/PRICE SCHEDULE

VOLUME 5 DESIGN DOCUMENTS INCLUDING DRAWINGS

Information for Bidders
This volume will not become part of the contract, but is to assist contractors during bidding and in the subsequent use of materials sources during construction. It will mainly include information on soils and materials, laboratory testing results and other conditions in the project area.

Appendix A 1


Project Location Map
Карта расположения проекта
RUSİYA FEDERASİYASI
RUSSIAN FEDERATION
GÜRCÜSTAN/GEORGIA
ERMƏNİSTAN
ARMENIA
TÜRKİYƏ
TURKEY
İRAN İSLAM RESPUBLİKASI/ISLAMIC REPUBLIC OF IRAN
XƏZƏR DƏNİZİ / CASPIAN SEA
LAKE SEVAN
BAKI
Baki
SUMQAYIT
Sumgayit
GƏNCƏ
MİNGƏÇEVİR
NAXÇIVAN
Territories of Azerbaijan occupied by Armenian troops-more than 13 000 sq.km. Refugees number from occupated territories is 788 350 people and they are accomodated all over the regions of Azerbaijan Republic.
RUSSIAN FEDERATION
RUSİYA FEDERASİYASI
GEORGIA
GÜRCÜSTAN
KAZAKHSTAN
QAZAXISTAN
CASPIAN SEA
XƏZƏR DƏNİZİ
AZERBAIJAN
AZƏRBAYCAN
TURKEY
TÜRKİYƏ
ISLAMIC REP.OF IRAN
İRAN İSLAM RESPUBLİKASI
IRAQ
IRAQ

Appendix A 2

TOTAL PREDICTED TRAFFIC BY ROAD SECTION (Normal + Generated + Diverted)

1. Kyurdamir - Yevlakh

Year	Car	MB	PU	B	2T	3T	4T	5T	6+T	Total
2001	1748	139	41	344	237	77	347	150	25	3109
2002	1920	153	45	378	256	83	375	161	27	3397
2003	2108	168	49	415	276	90	404	174	29	3712
2004	2314	184	54	455	298	97	436	188	32	4057
2005	2922	232	68	523	345	112	499	215	36	4953
2006	3209	255	74	574	373	121	539	232	39	5416
2007	3523	280	82	630	402	130	582	251	42	5922
2008	3868	308	90	692	434	140	628	271	45	6476
2009	4248	338	98	760	468	151	677	292	49	7082
2010	4664	371	108	834	505	163	731	315	53	7744
2011	5007	398	116	888	532	172	769	331	56	8270
2012	5307	422	123	942	558	180	806	348	58	8745
2013	5626	448	130	998	585	189	845	364	61	9247
2014	5963	474	138	1058	613	198	886	382	64	9777
2015	6321	503	146	1121	643	208	928	400	67	10338
2016	6700	533	155	1189	674	218	973	419	71	10931
2017	7102	565	164	1260	706	228	1019	439	74	11558
2018	7528	599	174	1336	740	239	1068	460	77	12222
2019	7980	635	185	1416	775	251	1120	483	81	12925
2020	8459	673	196	1501	813	263	1173	506	85	13667
2021	8966	713	207	1591	851	275	1230	530	89	14453
2022	9504	756	220	1686	892	288	1289	555	93	15285
2023	10075	801	233	1787	935	302	1350	582	98	16164
2024	10679	850	247	1895	980	317	1415	610	103	17095
2025	11320	901	262	2008	1027	332	1483	639	107	18080
2026	11999	955	278	2129	1076	348	1554	670	113	19121
2027	12719	1012	294	2257	1128	365	1629	702	118	20223
2028	13482	1073	312	2392	1182	382	1707	736	124	21389
2029	14291	1137	331	2536	1239	400	1789	771	130	22623
2030	15149	1205	350	2688	1298	420	1875	808	136	23928

2. Yevlakh - Ganja - Tovuz

Year	Car	MB	PU	B	2T	3T	4T	5T	6+T	Total
2001	2383	209	64	480	92	311	43	153	26	3761
2002	2617	229	70	527	100	336	47	165	28	4117
2003	2873	251	77	579	108	362	50	177	30	4508
2004	3155	276	85	635	116	390	54	191	32	4935
2005	3745	328	100	714	132	441	61	216	36	5775
2006	4112	360	110	784	143	477	66	234	39	6325
2007	4515	395	121	861	154	515	71	253	42	6927
2008	4958	434	133	945	167	556	77	273	46	7587
2009	5444	476	146	1038	180	600	83	294	49	8309
2010	5977	523	160	1139	194	647	90	318	53	9101
2011	6382	559	171	1210	204	680	94	334	56	9691
2012	6765	592	181	1283	214	714	99	351	59	10258
2013	7171	628	192	1360	225	748	104	367	62	10856
2014	7601	665	203	1442	235	784	109	385	65	11489
2015	8057	705	215	1528	247	821	114	403	68	12160
2016	8541	747	228	1620	259	861	119	423	71	12869
2017	9053	792	242	1717	271	902	125	443	75	13620
2018	9596	840	257	1820	284	945	131	464	78	14416
2019	10172	890	272	1929	298	991	137	487	82	15258
2020	10783	944	288	2045	312	1038	144	510	86	16149
2021	11429	1000	306	2168	327	1088	151	534	90	17093
2022	12115	1060	324	2298	343	1140	158	560	94	18093
2023	12842	1124	343	2436	359	1195	166	587	99	19150
2024	13613	1191	364	2582	376	1252	174	615	104	20271
2025	14429	1263	386	2737	394	1312	182	645	109	21456
2026	15295	1338	409	2901	413	1375	191	675	114	22712
2027	16213	1419	434	3075	433	1441	200	708	119	24042
2028	17186	1504	460	3259	454	1511	209	742	125	25449
2029	18217	1594	487	3455	475	1583	220	777	131	26939
2030	19310	1690	516	3662	498	1659	230	815	137	28518

3. Tovuz - Gazakh

Year	Car	MB	PU	B	2T	3T	4T	5T	6+T	Total
2001	1612	244	77	193	46	107	27	70	11	2387
2002	1770	268	84	212	49	115	29	76	12	2616
2003	1943	295	93	233	53	124	31	82	13	2866
2004	2134	323	102	256	58	134	34	88	14	3141
2005	2343	355	112	281	65	152	38	100	15	3461
2006	2572	390	123	308	71	165	41	108	17	3794
2007	2825	428	135	338	76	178	44	117	18	4159
2008	3101	470	148	371	82	193	48	126	20	4560
2009	3405	516	163	408	89	208	51	137	21	4998
2010	3739	567	178	448	96	225	56	148	23	5479
2011	3963	601	189	475	101	236	58	155	24	5803
2012	4201	637	201	503	106	248	61	163	25	6146
2013	4453	675	213	533	111	260	64	171	27	6508
2014	4720	716	225	565	117	273	67	179	28	6891
2015	5004	759	239	599	122	286	71	188	29	7296
2016	5304	804	253	635	128	300	74	197	31	7725
2017	5622	852	268	673	134	314	77	206	32	8180
2018	5959	903	284	714	141	329	81	216	34	8662
2019	6317	958	302	757	148	345	85	226	35	9172
2020	6696	1015	320	802	155	361	89	237	37	9712
2021	7098	1076	339	850	162	379	93	248	39	10284
2022	7524	1141	359	901	170	397	98	260	40	10890
2023	7975	1209	381	955	178	416	103	273	42	11532
2024	8454	1281	404	1012	186	436	108	286	44	12211
2025	8961	1358	428	1073	195	457	113	300	47	12931
2026	9498	1440	453	1138	205	479	118	314	49	13694
2027	10068	1526	481	1206	215	502	124	329	51	14501
2028	10672	1618	509	1278	225	526	130	345	54	15357
2029	11313	1715	540	1355	236	551	136	361	56	16263
2030	11992	1818	572	1436	247	577	142	379	59	17222

4. Gazakh - Georgian border

Year	Car	MB	PU	B	2T	3T	4T	5T	6+T	Total
2001	1774	213	53	127	34	70	7	54	11	2342
2002	1948	234	58	139	36	76	7	58	12	2568
2003	2139	257	63	153	39	82	8	63	13	2816
2004	2348	282	70	168	42	88	8	68	14	3088
2005	2578	310	77	184	49	103	10	78	15	3405
2006	2831	340	84	203	53	111	11	84	17	3735
2007	3108	374	92	222	57	121	12	91	18	4097
2008	3413	410	101	244	62	131	13	99	20	4493
2009	3748	451	111	268	67	141	14	107	21	4928
2010	4115	495	122	294	72	153	16	116	23	5405
2011	4362	524	129	312	76	161	17	122	24	5727
2012	4623	556	137	331	80	170	17	128	25	6068
2013	4901	589	145	351	84	178	18	134	27	6427
2014	5195	625	154	372	88	186	19	140	28	6807
2015	5507	662	163	394	92	195	20	147	29	7210
2016	5837	702	173	418	96	204	21	154	31	7636
2017	6187	744	184	443	101	214	22	162	32	8088
2018	6558	789	195	469	106	224	23	169	34	8567
2019	6952	836	206	497	111	235	24	178	35	9075
2020	7369	886	219	527	116	246	25	186	37	9612
2021	7811	939	232	559	122	258	27	195	39	10181
2022	8280	996	246	592	128	271	28	204	40	10784
2023	8777	1055	260	628	134	284	29	214	42	11423
2024	9303	1119	276	666	140	297	31	224	44	12100
2025	9861	1186	293	705	147	311	32	235	47	12817
2026	10453	1257	310	748	154	326	34	246	49	13577
2027	11080	1332	329	793	161	342	35	258	51	14382
2028	11745	1412	349	840	169	358	37	271	54	15235
2029	12450	1497	370	891	177	376	39	284	56	16138
2030	13197	1587	392	944	186	394	40	297	59	17095

Origin-Destination Surveys Results

Country: Azerbaijan
Road: Yevlakh - Gazach
Station N°: 1 and 4
Location: Jevlach and Gazach
DATE 12 -13 and 21-22 Februray 2001

Code N° of Zone	Name of the Zone
1	Apsheron Baku
2	Khachmaz
3	Shirvan
4	Priarak
6	Mugan-Salyan
7	Lenkoran
8	UpperKarabagh
9	Kalbajar
10	MilKarabagh
11	Shaki
13	Nakhchivan
5	Gyanja
12	Kazak
22	Geor-Telavi
23	Georgie (Gori)
24	Georgie (Rustavi)
30	Georgie (Poti)
32	Geor-Batumi
34	Georgie (Tbilisi)
	IRAN
	TURKEY
	RUSSIA
	UKRAINE

O-D Surveys Results per vehicle type

Cars	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Georgie-Telavi	Georgie-Gori	Georgie-Rustavi	Georgie-Poti	Georgie-Batumi	Georgie-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	8	0	0	0	143	133	3	0	21	0	0	28	0	0	0	0	336
Khachmaz	0	0	0	0	0	0	0	2	0	0	0	12	14	0	0	0	0	0	4	0	0	0	0	32
Shirvan	0	0	0	0	0	0	0	2	0	0	0	41	38	0	0	0	0	0	0	0	0	0	0	81
Priarak	2	0	0	5	0	0	0	0	0	0	0	46	39	0	0	2	0	0	1	0	0	0	0	95
Mugan-Salyan	0	0	0	2	0	0	0	5	0	0	0	29	41	0	0	1	0	0	0	0	0	0	0	78
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	1	0	0	0	0	7
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7
Kalbajar	5	0	0	2	2	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	19
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	5	8	0	0	0	0	0	0	0	0	0	0	13
Shaki	5	0	2	0	0	0	0	0	0	0	0	15	17	0	0	0	0	0	0	0	0	0	0	39
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Gyanja	192	8	24	70	21	8	0	3	3	14	0	308	155	0	2	19	2	2	14	0	0	0	0	845
Kazak	149	16	22	41	26	10	5	8	4	14	0	155	312	2	0	19	0	0	9	0	0	0	0	792
Geor-Telavi	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	28	0	0	3	3	0	0	0	0	1	0	33	15	0	0	0	0	0	0	0	0	0	0	83
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Tbilisi	32	0	0	2	1	0	0	3	0	1	0	4	20	0	0	0	0	0	0	0	0	0	0	63
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	416	24	48	125	56	18	5	31	7	30	0	799	809	5	2	63	2	2	57	0	0	0	0	2.499

Minibuses	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	1	0	0	0	20	33	0	0	0	0	0	1	0	0	0	0	55
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Shirvan	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Priarak	0	0	0	2	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	6
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	3
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MilKarabagh	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Shaki	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	19	0	0	2	0	0	0	0	0	0	0	25	14	0	0	2	0	0	0	0	0	0	0	62
Kazak	40	0	1	3	3	4	0	0	0	4	0	20	33	0	0	6	0	0	0	0	0	0	0	114
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Tbilisi	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	67	0	1	7	3	4	0	1	0	4	0	70	86	0	0	8	0	0	2	0	0	0	0	253

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PU-Van	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	2	0	0	0	0	8
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shirvan	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Priarak	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shaki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	6	0	1	3	0	0	0	0	0	0	0	10	4	0	0	0	0	0	0	0	0	0	0	24
Kazak	5	0	1	1	1	0	0	0	0	0	0	3	12	0	0	0	0	0	0	0	0	0	0	23
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Tbilisi	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	14	0	2	5	1	0	0	0	0	0	0	22	19	0	0	0	0	0	2	0	0	0	0	65

Buses	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	63	25	0	0	2	0	0	1	0	0	0	0	91
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shirvan	0	0	0	0	0	0	0	0	0	0	0	19	5	0	0	1	0	0	1	0	0	0	0	26
Priarak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MilKarabagh	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Shaki	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	11
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	55	0	16	3	0	3	0	0	0	10	0	67	18	0	0	0	0	0	2	0	0	0	0	174
Kazak	42	0	0	0	0	10	0	0	0	6	0	19	16	0	0	2	0	0	0	0	0	0	0	95
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Tbilisi	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	111	0	16	3	0	13	0	3	0	16	0	179	65	0	0	5	0	0	4	0	0	0	0	415

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Truck 2 axles	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shirvan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Priarak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shaki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	4	0	4	0	4	0	0	2	0	0	0	15	5	0	0	0	0	0	0	0	0	0	0	34
Kazak	4	0	0	9	4	0	0	0	0	0	0	0	3	0	0	2	0	0	0	0	0	0	0	22
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Tbilisi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**8**	**0**	**4**	**9**	**8**	**0**	**0**	**2**	**0**	**0**	**0**	**17**	**10**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	60

Truck 3 axles	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	41	21	0	0	0	0	0	0	0	0	0	0	62
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4
Shirvan	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4
Priarak	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	5	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shaki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	28	3	0	15	3	0	0	0	3	0	0	47	8	0	0	0	0	0	0	0	0	0	0	107
Kazak	18	8	3	6	3	0	0	0	0	1	0	5	7	0	0	0	0	0	0	0	0	0	0	51
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Tbilisi	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	54	**14**	**3**	**24**	**6**	**0**	**0**	**2**	**3**	**1**	**0**	**99**	**42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	248

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Truck 4 axles	Zones																							Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	5	0	0	14
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shirvan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Priarak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shaki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Kazak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Batumi	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Geor-Tbilisi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**5**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	25

Truck 5 axles	Zones																							Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	3	24	0	0	0	9	0	0	0	0	0	0	36
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shirvan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Priarak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	6
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shaki	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gyanja	0	4	4	2	2	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	16
Kazak	12	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Rustavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geor-Poti	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Geor-Batumi	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	7
Geor-Tbilisi	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	0	0	8
TURKEY	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UKRAINE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**23**	**8**	**4**	**2**	**2**	**4**	**2**	**0**	**0**	**0**	**0**	**7**	**30**	**0**	**0**	**2**	**9**	**6**	**0**	**6**	**0**	**0**	**0**	105

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Trucks > 5 axles	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Khachmaz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Shirvan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Priarak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Mugan-Salyan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Kalbajar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
MilKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Shaki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Gyanja	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	**9**
Kazak	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	**3**
Geor-Telavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Geor-Rustavi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Geor-Poti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Geor-Batumi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Geor-Tbilisi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
TURKEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
UKRAINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12**

ADT	Zones																						Total
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE	
Apsheron Baku	0	0	0	0	0	0	0	9	0	0	0	285	239	3	0	23	9	0	33	0	5	0	0	**606**
Khachmaz	0	0	0	0	0	0	0	2	0	0	0	12	19	0	0	0	0	0	4	0	0	0	0	**37**
Shirvan	1	0	0	0	0	0	0	3	0	0	0	61	45	0	0	1	0	0	1	0	0	0	0	**112**
Priarak	2	0	0	7	0	0	0	0	0	0	0	53	41	0	0	2	0	0	1	0	0	0	0	**106**
Mugan-Salyan	0	0	0	2	0	0	0	5	0	0	0	33	50	0	0	1	0	0	0	0	0	0	0	**91**
Lenkoran	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	1	0	0	0	0	**9**
UpperKarabagh	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	**7**
Kalbajar	10	3	0	4	2	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	**29**
MilKarabagh	2	0	0	0	0	0	0	3	0	0	0	5	8	0	0	0	0	0	0	0	0	0	0	**18**
Shaki	5	0	2	0	0	2	0	0	0	0	0	28	17	0	0	0	0	0	1	0	0	0	0	**55**
Nakhchivan	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**2**
Gyanja	303	17	51	95	29	11	0	5	6	24	0	484	203	0	2	21	2	2	16	0	0	0	0	**1,271**
Kazak	270	27	26	59	36	25	5	8	4	25	0	202	385	2	0	28	0	0	9	0	0	0	0	**1,111**
Geor-Telavi	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
Geor-Gori	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Geor-Rustavi	45	0	0	3	3	0	0	0	0	1	0	35	17	0	0	0	0	0	0	0	0	0	0	**104**
Geor-Poti	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Geor-Batumi	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	**12**
Geor-Tbilisi	43	0	0	2	1	0	0	3	0	1	0	4	20	0	0	0	0	0	0	0	0	0	0	**74**
IRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	0	0	0	**8**
TURKEY	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
RUSSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
UKRAINE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Total	**697**	**47**	**79**	**172**	**74**	**38**	**7**	**38**	**10**	**51**	**0**	**1,210**	**1,063**	**5**	**2**	**79**	**11**	**8**	**66**	**6**	**5**	**0**	**0**	3,868

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ADT in %	Zones																					
	Apsheron Baku	Khachmaz	Shirvan	Priarak	Mugan-Salyan	Lenkoran	UpperKarabagh	Kalbajar	MilKarabagh	Shaki	Nakhchivan	Gyanja	Kazak	Geor-Telavi	Geor-Gori	Geor-Rustavi	Geor-Poti	Geor-Batumi	Geor-Tbilisi	IRAN	TURKEY	RUSSIA	UKRAINE
Apsheron Baku												23.1%		1.9%									
Khachmaz																							
Shirvan																							
Priarak																							
Mugan-Salyan																							
Lenkoran																							
UpperKarabagh																							
Kalbajar																							
MilKarabagh																							
Shaki																							
Nakhchivan																							
Gyanja																							
Kazak																							
Geor-Telavi																							
Geor-Gori																							
Geor-Rustavi																							
Geor-Poti																							
Geor-Batumi																							
Geor-Tbilisi																							
IRAN																							
TURKEY																							
RUSSIA																							
UKRAINE																							

Apsheron Baku																						
Khachmaz																						
Shirvan																						
Priarak																						
Mugan-Salyan																						
Lenkoran																						
UpperKarabagh																						
Kalbajar																						
MilKarabagh																						
Shaki																						
Nakhchivan																						
Gyanja	25.9%								2.1%			34.7%		2.2%								
Kazak																						
Geor-Telavi																						
Geor-Gori																						
Geor-Rustavi	2.6%						0.5%					2.1%										
Geor-Poti																						
Geor-Batumi																						
Geor-Tbilisi																						
IRAN																						
TURKEY																						
RUSSIA																						
UKRAINE																						

2. Yevlakh - Ganja - Tovuz

ANNUAL AVERAGE DAILY TRAFFIC (AADT) BY VEHICLE TYPE

Vehicle Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Car	2383	2617	2873	3155	3745	4112	4515	4958	5444	5977	6382	6765	7171	7601	8057	8541	9053	9596	10172	10783	11429	12115	12842	13613	14429	15295	16213	17186	18217	19310
Utility	273	299	329	361	428	470	516	567	622	683	729	773	819	868	921	976	1034	1096	1162	1232	1306	1384	1467	1555	1649	1748	1852	1964	2081	2206
Bus	480	527	579	635	714	784	861	945	1038	1139	1210	1283	1360	1442	1528	1620	1717	1820	1929	2045	2168	2298	2436	2582	2737	2901	3075	3259	3455	3662
Truck 2-axle	92	100	108	116	132	143	154	167	180	194	204	214	225	235	247	259	271	284	298	312	327	343	359	376	394	413	433	454	475	498
Truck 3-axle	311	336	362	390	441	477	515	556	600	647	680	714	748	784	821	861	902	945	991	1038	1088	1140	1195	1252	1312	1375	1441	1511	1583	1659
Truck 4-axle	43	47	50	54	61	66	71	77	83	90	94	99	104	109	114	119	125	131	137	144	151	158	166	174	182	191	200	209	220	230
Truck > = 5-axle	178	192	207	223	253	273	295	318	344	371	390	410	429	450	471	494	518	543	569	596	624	654	686	719	753	789	827	867	908	952
TOTAL	3761	4117	4508	4935	5775	6325	6927	7587	8309	9101	9691	10258	10856	11489	12160	12869	13620	14416	15256	16149	17093	18093	19150	20271	21456	22712	24042	25449	26939	28518

CUMULATIVE NUMBER OF STANDARD AXLES

Vehicle Category	Equival Factor	ESA 2001	ESA 2002	ESA 2003	ESA 2004	ESA 2005	ESA 2006	ESA 2007	ESA 2008	ESA 2009	ESA 2010	ESA 2011	ESA 2012	ESA 2013	ESA 2014	ESA 2015	ESA 2016	ESA 2017	ESA 2018	ESA 2019	ESA 2020	ESA 2021	ESA 2022	ESA 2023	ESA 2024	ESA 2025	ESA 2026	ESA 2027	ESA 2028	ESA 2029	ESA 2030
Car	0.0007	609	669	734	806	957	1,051	1,154	1,267	1,391	1,527	1,631	1,728	1,832	1,942	2,059	2,182	2,313	2,452	2,599	2,755	2,920	3,095	3,281	3,478	3,687	3,908	4,142	4,391	4,654	4,934
Utility	0.0011	109	120	132	145	172	189	207	227	250	274	293	310	329	349	370	392	415	440	467	495	524	556	589	624	662	702	744	788	836	886
Bus	1.5200	266,262	292,356	321,007	352,466	396,078	434,893	477,513	524,309	575,692	632,109	671,540	711,832	754,542	799,814	847,803	898,672	952,592	1,009,747	1,070,332	1,134,552	1,202,625	1,274,783	1,351,270	1,432,346	1,518,287	1,609,384	1,705,947	1,808,304	1,916,802	2,031,810
Truck 2-axle	0.2948	8,950	10,731	11,572	12,479	14,236	15,379	16,610	17,934	19,360	20,894	21,983	23,070	24,176	25,336	26,551	27,825	29,160	30,559	32,024	33,561	35,170	36,857	38,625	40,478	42,420	44,455	46,587	48,822	51,164	53,618
Truck 3-axle	1.4342	162,895	175,666	189,438	204,290	231,092	249,545	269,415	290,810	313,849	338,660	356,121	373,603	391,527	410,311	429,996	450,625	472,244	494,900	518,643	543,525	569,601	596,928	625,567	655,579	687,030	719,991	754,534	790,733	828,669	868,425
Truck 4-axle	1.8152	28,622	30,866	33,286	35,896	40,534	43,780	47,275	51,037	55,087	59,448	62,502	65,582	68,728	72,025	75,480	79,101	82,896	86,872	91,040	95,407	99,984	104,780	109,807	115,074	120,595	126,380	132,442	138,796	145,454	152,432
Truck > = 5-axle	2.9196	189,913	204,802	220,858	238,173	269,545	291,183	314,390	339,368	366,255	395,199	415,934	436,484	457,421	479,363	502,357	526,455	551,708	578,173	605,907	634,972	665,430	697,350	730,801	765,857	802,594	841,094	881,440	923,722	968,032	1,014,467
TOTAL		656,361	715,209	777,027	844,255	952,613	1,036,020	1,126,563	1,224,952	1,331,883	1,446,113	1,530,003	1,612,810	1,696,556	1,789,140	1,884,616	1,985,251	2,091,328	2,203,143	2,321,012	2,445,266	2,576,256	2,714,350	2,859,940	3,013,436	3,178,274	3,345,913	3,525,836	3,715,555	3,915,610	4,126,871
CUMULATIVE				1,492,236	2,336,491	3,289,104	4,325,124	5,451,687	6,676,639	8,008,522	9,456,635	10,986,638	12,599,248	14,297,803	16,086,944	17,971,560	19,956,811	22,048,138	24,251,281	26,572,293	29,017,559	31,593,815	34,308,165	37,168,104	40,181,541	43,356,815	46,702,727	50,228,563	53,944,118	57,859,728	61,986,300

NUMBER OF STANDARD AXLES / DAY

Vehicle Category	Equival Factor	ESA 2001	ESA 2002	ESA 2003	ESA 2004	ESA 2005	ESA 2006	ESA 2007	ESA 2008	ESA 2009	ESA 2010	ESA 2011	ESA 2012	ESA 2013	ESA 2014	ESA 2015	ESA 2016	ESA 2017	ESA 2018	ESA 2019	ESA 2020	ESA 2021	ESA 2022	ESA 2023	ESA 2024	ESA 2025	ESA 2026	ESA 2027	ESA 2028	ESA 2029	ESA 2030
Car	0.0007	2	2	2	2	3	3	3	3	4	4	4	5	5	5	6	6	6	7	7	8	8	8	9	10	10	11	11	12	13	14
Utility	0.0011	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Bus	1.5200	729	801	879	966	1,085	1,191	1,308	1,436	1,577	1,732	1,840	1,950	2,067	2,191	2,323	2,462	2,610	2,766	2,932	3,108	3,295	3,493	3,702	3,924	4,160	4,409	4,674	4,954	5,252	5,567
Truck 2-axle	0.2948	27	29	32	34	39	42	46	49	53	57	60	63	66	69	73	76	80	84	88	92	96	101	106	111	116	122	128	134	140	147
Truck 3-axle	1.4342	446	481	519	560	633	684	738	797	860	928	976	1,024	1,073	1,124	1,178	1,235	1,294	1,356	1,421	1,489	1,561	1,635	1,714	1,796	1,882	1,973	2,067	2,166	2,270	2,379
Truck 4-axle	1.8152	78	85	91	98	111	120	130	140	151	163	171	180	188	197	207	217	227	238	249	261	274	287	301	315	330	346	363	380	399	418
Truck > = 5-axle	2.9196	520	561	605	653	738	798	861	930	1,003	1,083	1,140	1,196	1,253	1,313	1,376	1,442	1,512	1,584	1,660	1,740	1,823	1,911	2,002	2,096	2,199	2,304	2,415	2,531	2,652	2,779
TOTAL		1,804	1,959	2,129	2,313	2,610	2,838	3,086	3,356	3,649	3,967	4,192	4,418	4,654	4,902	5,163	5,439	5,730	6,036	6,359	6,699	7,058	7,437	7,835	8,256	8,699	9,167	9,660	10,180	10,728	11,306

3. Tovuz - Gazakh

ANNUAL AVERAGE DAILY TRAFFIC (AADT) BY VEHICLE TYPE

Vehicle Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Car	1612	1770	1943	2134	2343	2572	2825	3101	3405	3739	3963	4201	4453	4720	5004	5304	5622	5959	6317	6696	7098	7524	7975	8454	8961	9498	10068	10672	11313	11992
Utility	321	353	387	425	467	513	563	618	679	745	790	837	888	941	997	1057	1121	1188	1259	1335	1415	1500	1590	1685	1786	1893	2007	2127	2255	2390
Bus	193	212	233	256	281	308	338	371	408	448	475	503	533	565	599	635	673	714	757	802	850	901	955	1012	1073	1138	1206	1278	1355	1436
Truck 2-axle	46	49	53	58	65	71	76	82	89	96	101	106	111	117	122	128	134	141	148	155	162	170	178	186	195	205	215	225	236	247
Truck 3-axle	107	115	124	134	152	165	178	193	208	225	236	248	260	273	286	300	314	329	345	361	379	397	416	436	457	479	502	526	551	577
Truck 4-axle	27	29	31	34	38	41	44	48	51	56	58	61	64	67	71	74	77	81	85	89	93	98	103	108	113	118	124	130	136	142
Truck > = 5-axle	81	87	94	102	115	125	135	146	158	170	179	188	197	207	217	227	238	249	261	274	287	301	315	330	346	363	380	398	417	437
TOTAL	2387	2616	2866	3141	3461	3794	4159	4560	4996	5479	5803	6146	6506	6891	7296	7725	8180	8662	9172	9712	10284	10890	11532	12211	12931	13694	14501	15357	16263	17222

CUMULATIVE NUMBER OF STANDARD AXLES

Vehicle Category	Equival Factor	ESA 2001	ESA 2002	ESA 2003	ESA 2004	ESA 2005	ESA 2006	ESA 2007	ESA 2008	ESA 2009	ESA 2010	ESA 2011	ESA 2012	ESA 2013	ESA 2014	ESA 2015	ESA 2016	ESA 2017	ESA 2018	ESA 2019	ESA 2020	ESA 2021	ESA 2022	ESA 2023	ESA 2024	ESA 2025	ESA 2026	ESA 2027	ESA 2028	ESA 2029	ESA 2030
Car	0.0007	412	452	497	545	599	657	722	792	870	955	1,013	1,073	1,138	1,206	1,278	1,355	1,436	1,523	1,614	1,711	1,813	1,922	2,038	2,160	2,289	2,427	2,572	2,727	2,890	3,064
Utility	0.0011	129	142	156	171	188	206	226	248	273	299	317	336	356	378	400	424	450	477	508	536	568	602	638	677	717	760	806	854	905	960
Bus	1.5200	107,104	117,600	129,125	141,779	155,674	170,930	187,681	206,074	226,269	248,443	263,350	279,151	295,900	313,654	332,473	352,422	373,567	395,981	419,740	444,924	471,620	499,917	529,912	561,706	595,409	631,133	669,001	709,141	751,690	796,791
Truck 2-axle	0.2948	4,939	5,326	5,744	6,194	7,011	7,568	8,206	8,874	9,589	10,357	10,887	11,441	11,990	12,564	13,167	13,798	14,459	15,152	15,879	16,640	17,437	18,273	19,149	20,067	21,029	22,037	23,093	24,200	25,360	26,576
Truck 3-axle	1.4342	55,829	60,206	64,927	70,017	79,590	86,196	93,227	100,809	108,952	117,899	123,750	130,079	136,314	142,847	149,694	156,869	164,387	172,267	180,523	189,176	198,243	207,745	217,702	228,137	239,071	250,530	262,536	275,122	288,308	302,127
Truck 4-axle	1.8152	17,889	19,291	20,804	22,435	25,029	27,060	29,244	31,592	34,118	36,835	38,685	40,621	42,569	44,611	46,750	48,992	51,341	53,803	56,383	59,087	61,921	64,890	68,002	71,263	74,680	78,261	82,014	85,947	90,069	94,388
Truck > = 5-axle	2.9196	86,324	93,092	100,390	108,261	122,866	133,028	143,915	155,606	168,188	181,662	190,985	200,737	210,359	220,442	231,008	242,080	253,684	265,843	278,586	291,939	305,932	320,596	335,963	352,066	368,941	386,625	405,157	424,577	444,928	466,255
TOTAL		272,626	296,119	321,641	349,402	390,978	425,636	483,222	503,997	548,238	596,262	628,988	663,439	698,626	736,702	774,770	816,940	859,328	906,046	953,230	1,004,012	1,057,634	1,113,946	1,173,403	1,236,078	1,302,137	1,371,774	1,446,183	1,522,649	1,604,182	1,690,162
CUMULATIVE			568,736	890,377	1,239,779	1,630,757	2,056,393	2,539,616	3,023,612	3,571,850	4,168,102	4,797,089	5,460,529	6,159,154	6,894,856	7,669,627	8,486,566	9,344,891	10,249,937	11,203,167	12,207,179	13,264,713	14,378,658	15,552,061	16,788,137	18,090,274	19,462,048	20,907,231	22,429,880	24,033,943	25,724,114

NUMBER OF STANDARD AXLES / DAY

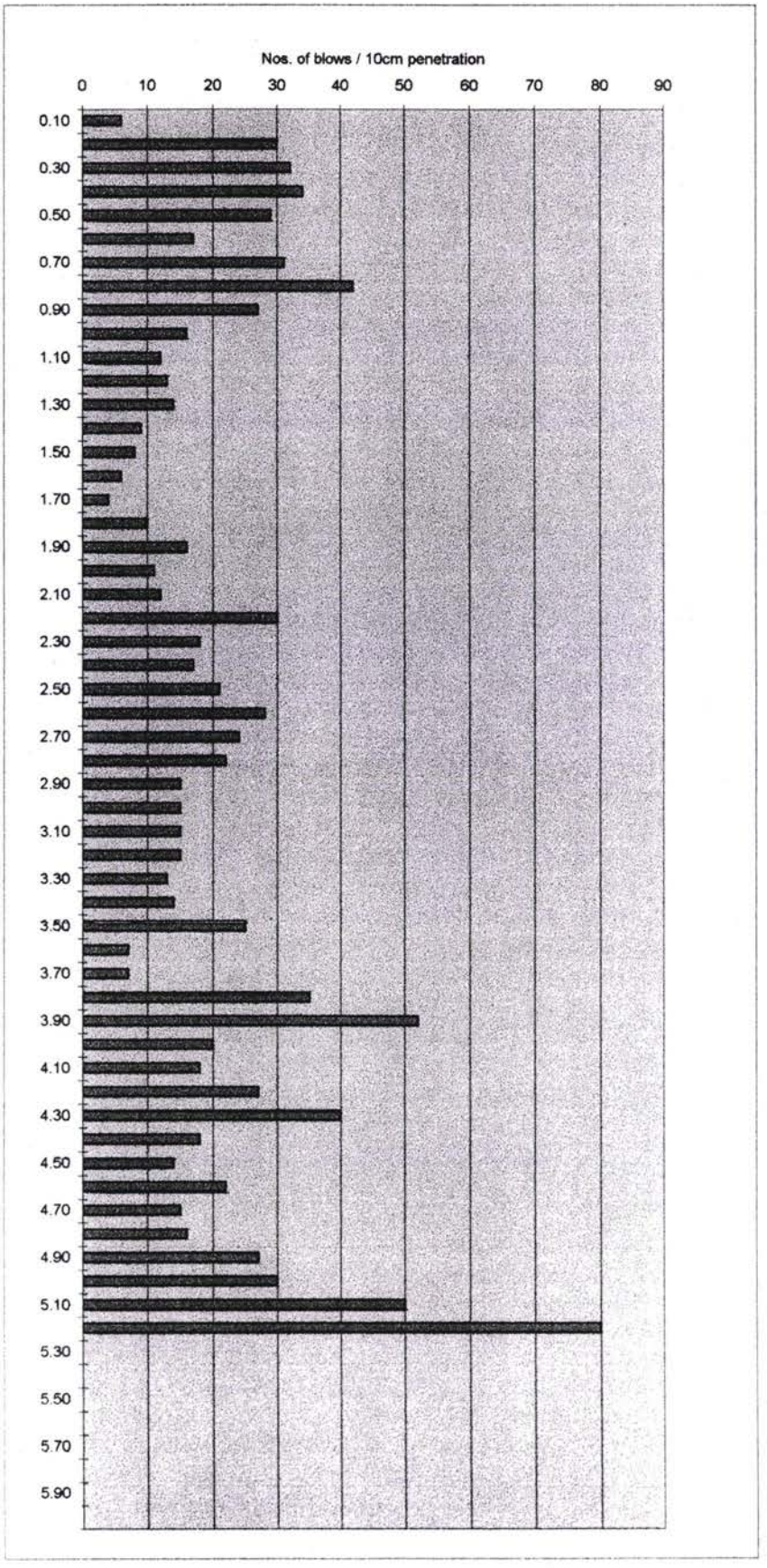
Vehicle Category	Equival Factor	ESA 2001	ESA 2002	ESA 2003	ESA 2004	ESA 2005	ESA 2006	ESA 2007	ESA 2008	ESA 2009	ESA 2010	ESA 2011	ESA 2012	ESA 2013	ESA 2014	ESA 2015	ESA 2016	ESA 2017	ESA 2018	ESA 2019	ESA 2020	ESA 2021	ESA 2022	ESA 2023	ESA 2024	ESA 2025	ESA 2026	ESA 2027	ESA 2028	ESA 2029	ESA 2030
Car	0.0007	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	6	6	6	7	7	7	8	8
Utility	0.0011	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	3
Bus	1.5200	293	322	354	388	427	468	514	565	620	681	722	785	811	859	911	966	1,023	1,085	1,150	1,219	1,292	1,370	1,452	1,539	1,631	1,729	1,833	1,943	2,059	2,183
Truck 2-axle	0.2948	14	15	16	17	19	21	22	24	26	28	30	31	33	34	36	38	40	42	44	46	48	50	52	55	58	60	63	66	69	73
Truck 3-axle	1.4342	153	165	178	192	218	236	255	276	298	322	339	356	373	391	410	430	450	472	495	518	543	569	596	625	655	686	719	754	790	828
Truck 4-axle	1.8152	49	53	57	61	69	74	80	87	93	101	106	111	117	122	128	134	141	147	154	162	170	178	186	195	205	214	225	235	247	259
Truck > = 5-axle	2.9196	237	255	275	297	337	364	394	426	461	498	523	550	576	604	633	663	695	728	763	800	838	878	920	965	1,011	1,059	1,110	1,163	1,219	1,277
TOTAL		747	811	881	957	1,071	1,166	1,269	1,381	1,502	1,634	1,723	1,818	1,914	2,016	2,123	2,235	2,354	2,480	2,612	2,751	2,897	3,052	3,215	3,387	3,567	3,756	3,959	4,171	4,396	4,631

Appendix A 4

Dynamic Penetration Test (light version DPL-5 according German Standard DIN 4094)

Location : km 382+690 Baku Side Abutment Bridge No. 32
Date : 08.03.01
Level approximately 6,0m below road level

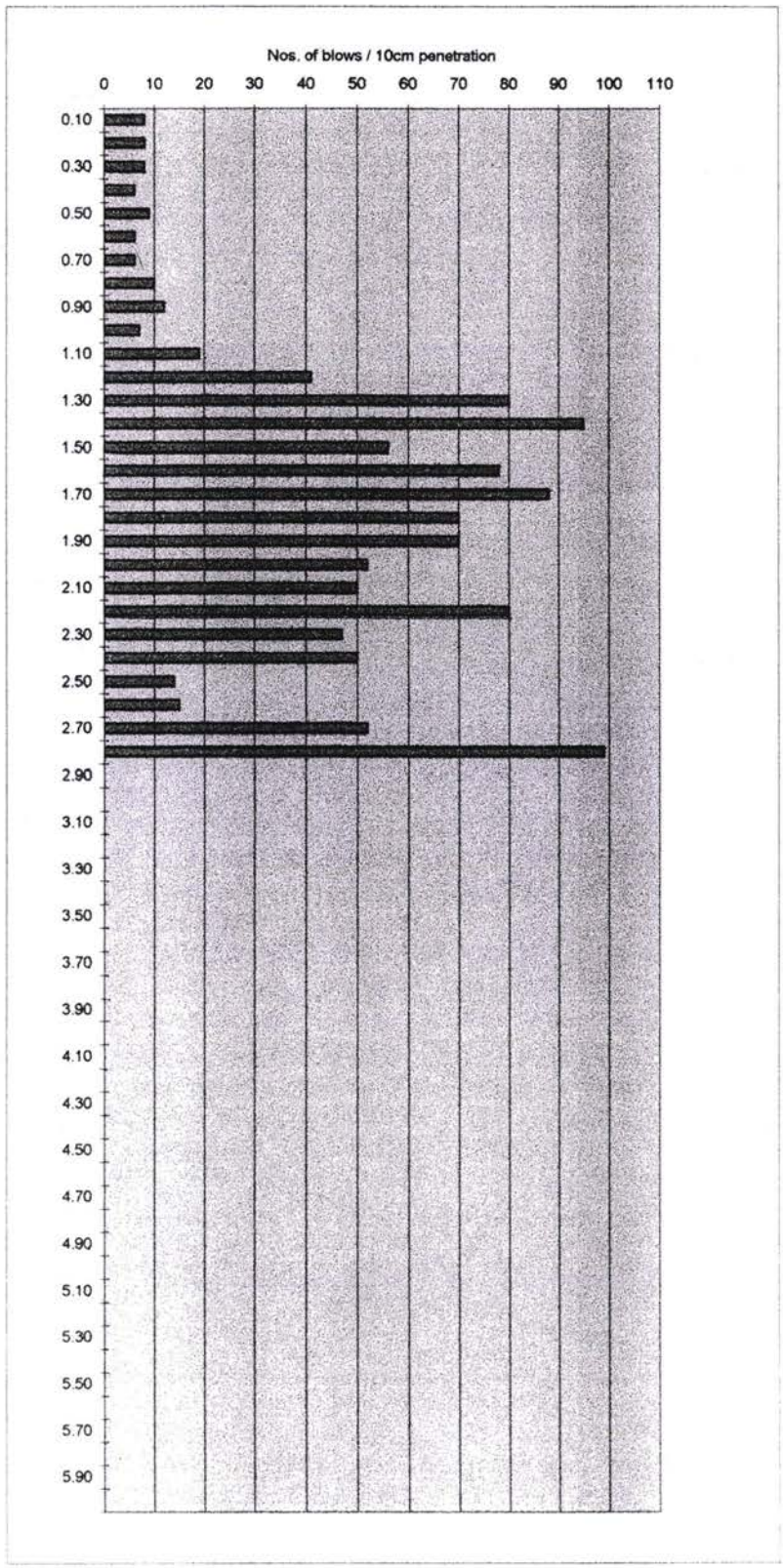
Depth (m)	No. of blows N_{10}
0.10	6
0.20	30
0.30	32
0.40	34
0.50	29
0.60	17
0.70	31
0.80	42
0.90	27
1.00	16
1.10	12
1.20	13
1.30	14
1.40	9
1.50	8
1.60	6
1.70	4
1.80	10
1.90	16
2.00	11
2.10	12
2.20	30
2.30	18
2.40	17
2.50	21
2.60	28
2.70	24
2.80	22
2.90	15
3.00	15
3.10	15
3.20	15
3.30	13
3.40	14
3.50	25
3.60	7
3.70	7
3.80	35
3.90	52
4.00	20
4.10	18
4.20	27
4.30	40
4.40	18
4.50	14
4.60	22
4.70	15
4.80	16
4.90	27
5.00	30
5.10	50
5.20	80
5.30	
5.40	
5.50	
5.60	
5.70	
5.80	
5.90	
6.00	



Dynamic Penetration Test (light version DPL-5 according German Standard DIN 4094)

Location : km 447+650 right Baku Side Abutment Bridge No. 44
Date : 09.03.01

Depth (m)	No. of blows N_{10}
0.10	8
0.20	8
0.30	8
0.40	6
0.50	9
0.60	6
0.70	6
0.80	10
0.90	12
1.00	7
1.10	19
1.20	41
1.30	80
1.40	95
1.50	56
1.60	78
1.70	88
1.80	70
1.90	70
2.00	52
2.10	50
2.20	80
2.30	47
2.40	50
2.50	14
2.60	15
2.70	52
2.80	99
2.90	
3.00	
3.10	
3.20	
3.30	
3.40	
3.50	
3.60	
3.70	
3.80	
3.90	
4.00	
4.10	
4.20	
4.30	
4.40	
4.50	
4.60	
4.70	
4.80	
4.90	
5.00	
5.10	
5.20	
5.30	
5.40	
5.50	
5.60	
5.70	
5.80	
5.90	
6.00	



АЗЕРБАЙДЖАНСКАЯ РЕСПУБЛИКА
ГОСКОНЦЕРН «АЗЕРАВТОДОР»

ПРОЕКТНЫЙ ИНСТИТУТ «АЗДОРПРОЕКТ»

ИССЛЕДОВАНИЯ ГРУНТОВ (ТОЛЬКО СКВАЖИНЫ) НА РАСПОЛОЖЕНИЯХ НОВЫХ МОСТОВ

ИНЖЕНЕРНО-ГЕОЛОГИЧЕСКИЙ ОТЧЕТ

БАКУ - 2001

ОГЛАВЛЕНИЕ

Мост № 15 (190+168 км). Мост через реку Турьян-чай.

Инженерно-геологические условия.

Согласно задания на месте проектируемого моста через реку Турьян-чай были проведены инженерно- геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено: Правее существующего моста через реку Турьян-чай на расстоянии 6,5 м от существующих опор пробурены 2 скважины глубиной по 15,0 м.

Литологический разрез:

I. 0,0-0,3 м. Растительный слой с включениями гравия.

II. 0,3-8,0-8,4 м. Суглинок до глубины 1,0-1,3 м плотный, ниже пластичный и текучепластичный с многочисленными линзами ила, супеси реже песка прослойками глина, весьма плотный. Мощность прослоек глина до 0,3 м.

III. 8,0-8,4 м до 15,0 м. Глина плотная с прослойками супеси мощностью до 0,3 м.

Грунтовые воды выявлены на глубине 5,2-5,0 м, а установились на глубине 4,7-4,5 м.

Река Турьян-чай не пересыхает, после дождей уровень воды в реке резко поднимается, иногда достигает уровня моста.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через реку Турьян-чай приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.
2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84
3. Грунтовые воды выявлены на глубине 5,2-5,0 м, а установились на глубине 4,7-4,5 м /на уровне воды в реке/
4. Район строительства по сейсмичности относится к 8 бальной зоне /на основании письма №25-9/575 от 01.02.92 г. института Геологии им. И.М. Губкина/.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 15

(190+168 км) Мост через реку Турьян-чай

№	№ скваж.	Глубина отбора, м	Естеств. влаж. % W	Объемный вес, γ т/см³	Объемный вес скелета, γ_d	Удельный вес, γ_s	Пористость, % n	Коэффициент пористости, e	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	7,2-7,4	0,38	2,23	1,61	2,71	40,2	0,673	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,42	0,25	0,17	0,77	1,53	0,28	Суглинок тяж. пылев. текучепласт.
2	2	8,5-8,8	0,26	2	1,59	2,74	42,1	0,726	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,40	0,21	0,19	0,26	0,98	0,21	Глина пылеватая, пластичная

Мост №15 (190 + 168 км) Мост через реку Турьян-чай. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. Слой с вкл. гравия	5,2	4,7	—	—	—		§9в
2		0,3	8,0	7,7		Суглинок пластичный с 1,5 м текучепластичный с линзами ила и супеси с прослойками глины мощностью до 0,3 м			1,0	—	1,70	7,2-7,4	§33а
3		8,0	15,0	7,0		Глина плотная с прослойками супеси до 0,3 м			2,3	17	1,80		§8а

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. Слой с вкл. гравия	5,0	4,5	—	—	—		§9в
2		0,3	8,4	8,1		Суглинок пластичный с 1,5 м текучепластичный с линзами ила и песка с прослойками глины мощностью до 0,3 м			1,0	—	1,70		§33а
3		8,4	15,0	6,6		Глина плотная с прослойками супеси до 0,3 м			2,0	17	1,80	8,5-8,8	§8а

Мост № 16 (205+309 км). Мост через Нематабадский канал

Инженерно-геологические условия.

Согласно задания были проведены инженерно- геологические изыскания на месте проектируемого мостового перехода через Нематабадский канал

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

На месте проектируемого моста через Нематабадский канал пробурены 2 скважины правее существующего моста глубиной по 15,0 м.

Литологический разрез:

I. 0,0-0,3 м. Растительный слой с включениями гравия.

II. 0,3-8,4-8,6 м. Суглинок серый до глубины 1,5 м плотный, ниже влажный и водонасыщенный, мягко и текучепластичный. С прослойками плотной глины и реже песка. Мощность прослоек 0,2-0,3 м.

III. 8,4-8,6 м до 15,0 м. Глина пластичная с многочисленными линзами супеси.

Грунтовые воды выявлены на глубине 2,0-2,1 м, а установились на глубине 1,3 м. /уровень воды в канале/.

Выводы:

На основе вышеизложенного можно придти к следующим выводам об инженерно-геологических условиях мостового перехода через Нематабадский канал:

1. Грунты устойчивы под основание искусственных сооружений.
2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84
3. Грунтовые воды выявлены на глубине 2,1-2,0 м, а установились на глубине 1,3 м.
4. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 16

(205+309 км) Мост через Нематабадский канал

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета г/см³	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	2	2,0-2,2	0,26	1,94	1,54	2,71	43,2	0,760	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,31	0,17	0,14	0,64	0,93	0,04	Суглинок тяж. пылев. мягкопласт.
2	1	6,3-6,5	0,28	1,90	1,48	2,71	45,2	0,826	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,29	0,19	0,10	0,9	0,91	-0,02	- " - тяж. пласт.
3	2	11,5-11,7	0,23	1,97	1,60	2,74	41,5	0,711	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,35	0,17	0,18	0,33	0,89	0,14	Глина пылеватая, пластичная

Мост №16 (205 + 309 км) Мост через Нематабадский канал. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см^2	φ^0	ρ г/см^3		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. Слой с вкл. гравия	2,0	1,3	—	—	—		§9в
2		0,3	8,4	8,1		Суглинок плотный с 1,5 м мягко и текучепластичный с линзами ила и песка. Прослойки глины до 0,3 м			1,0	—	1,70	6,3-6,5	§33а
3		8,4	15,0	6,6		Глина пластичная с линзами супеси			1,9	17	1,70		§33б

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. Слой с вкл. гравия	2,1	1,3	—	—	—		§9в
2		0,3	8,6	8,3		Суглинок плотный с 1,5 м мягко и текучепластичный с линзами супеси и ила. Прослойки глины до 0,3 м			1,0	—	1,70	2,0-2,2	§33а
3		8,6	15,0	6,4		Глина пластичная с многочисленными линзами супеси			1,9	17	1,70	11,5-11,7	§33б

Мост № 18 (219+46 км). Мост ж/д Евлах-Агдам

Инженерно-геологические условия.

Согласно задания на месте проектируемого мостового перехода через ж/д Евлах-Агдам были проведены инженерно- геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

На месте проектируемого моста через ж/д Евлах-Агдам правее на 6,5 м от крайней опоры существующего моста пробурены 2 скважины глубиной по 15,0 м.

Литологический разрез:

I. 0,0-0,3 м. Растительный слой с включениями гравия.

II. 0,3 до 9,8-12,9 м. Суглинок серый с поверхности плотный, с глубины 2,0 м мягкий и текучепластичный с многочисленными линзами супеси и песка. /В 1-ой скважине количество линз намного больше чем во второй скважине/.

III. 9,8-12,9 до 15,0 м. Суглинок плотный.

Грунтовые воды выявлены на глубине 3,4-2,4 м, а установились на глубине 2,9 м и 1,8 м соответственно в скв. 1 и 2.

Выводы:

На основе приведенных данных об инженерно-геологических условиях мостового перехода через ж/д Евлах-Агдам приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.
2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84
3. Грунтовые воды выявлены на глубине 3,4-2,4 м, а установились на глубине 2,9-1,8 м.
4. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 18

(219+461 км) Мост через ж/д Евлах-Агдам

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	7,0-7,2	0,3	1,87	1,44	2,71	46,9	0,884	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,32	0,18	0,14	0,85	0,92	-0,009	Суглинок тяж. пылев. текучепласт.
2	2	13,0-13,2	0,20	1,98	1,65	2,71	39,1	0,642	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,32	0,18	0,14	0,14	0,84	0,14	Суглинок тяж. пылев. полутвердый

Мост №18 (219 + 461 км) Мост через ж/д Евлах-Агдам. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. Слой с вкл. гравия			—	—	—		§9в
2		0,3	12,9	12,6		Суглинок серый, плотный с 2,2 м мягко и текучепластичный с многочисленными линзами супеси и песка.	3,7	2,9	1,0	—	1,70	7,0-7,2	§33а
3		12,9	15,0	2,2		Суглинок плотный			2,9	24	1,95		§33г

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. Слой с вкл. гравия			—	—	—		§9в
2		0,3	9,8	9,5		Суглинок серый, плотный с 2,0 м текучепластичный с редкими линзами песка и супеси	2,4	1,8	1,0	—	1,70		§33а
3		9,8	15,0	5,2		Суглинок плотный			2,9	24	1,95	13,0-13,2	§33г

Мост № 19[б] (291+033 км). Мост через Верхнекарабахский канал (новый мост, справа)

Инженерно-геологические условия.

Согласно задания на трассе Баку-Казах 291+033 км мостовой переход через Верхнекарабахский канал были проведены инженерно-геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

1. На месте проектируемого моста через Верхнекарабахский канал правее на расстоянии 6,5 м от края опор были пробурены 2 скважины глубиной по 15,0 м.

Литологический разрез:

I. 0,0-2,4-2,5 м. Суглинок с включениями гравия. /насыпной слой/.

II. 2,4-2,5 м до 7,0 м. Глина текучепластичная с линзами супеси.

III. 7,0-15,0 м. Глина плотная.

2. Грунтовые воды выявлены на глубине 5,6 и 4,9 м. Выяснить на какой глубине установились нет возможности из-за быстрого смыкания стенок скважины /грунты текучепластичные/.

Выводы:

На основе приведенных данных об инженерно-геологических условиях мостового перехода через Верхнекарабахский канал приходим к следующим выводам:

1. Грунты устойчивы под основание искусственных сооружений. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

2. Грунтовые воды выявлены на глубине 5,6-4,9 м.

3. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 19б

(291+033 км) Мост через Верхнекарабахский канал

№	скваж. №	Глубина отбора, м	Естеств. влаж. %	Объемный вес т/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	6,5-6,7	0,31	1,81	1,38	2,74	49,6	0,986	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,36	0,14	0,22	0,77	0,86	0,049	Глина пылеватая текучепласт.
2	2	14,0-14,2	0,25	1,98	1,58	2,74	42,3	0,734	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,38	0,20	0,18	0,28	0,93	0,18	Глина пылеватая тугопласт.

Мост №19⁶ (291 + 033 км) Мост через Верхнекарабахский канал. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см²	φ^0	ρ г/см³		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	2,5	2,5		Суглинок с вкл. гравия (насыпной слой)			—	—	1,70		§33б
2		2,5	7,0	4,5		Глина мягкая с прослойками супеси	5,6	—	1,0	—	1,80	6,5-6,7	§8а
3		7,0	15,0	8,0		Глина плотная			2,2	17	1,80		§8а

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	3,5	3,5		Суглинок с вкл. гравия (насыпанный слой)			—	—	1,70		§33б
2		3,5	7,0	3,5		Глина мягкая с прослойками супеси	4,9	—	1,0	—	1,80		§8а
3		7,0	15,0	8,0		Глина плотная			2,2	17	1,80	14,0-14,2	§8а

Мост № 20[6] (303+402 км). Мост через реку Герань-чай

Инженерно-геологические условия.

Согласно задания на месте проектируемого мостового перехода через реку Герань-чай были проведены инженерно-геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

На месте проектируемого моста через реку Герань-чай правее на расстоянии 6,5 м от края опор были пробурены 2 скважины глубиной по 15,0 м.

Литологический разрез:

I. 0,0-0,3 м. Растительный слой

II. 0,3-5,5 м. Суглинок сухой, плотный с 3,8 м. мягко и текучепластичный.

III. 5,5-8,5 м. Песок водонасыщенный, глинистый.

IV. 8,5-15,0 м. Глина плотная, тугопластичная.

Выводы:

На основе приведенных данных об инженерно-геологических условиях мостового перехода через реку Герань-чай приходим к следующим выводам:

1. Грунты устойчивы под основание искусственных сооружений. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

2. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 20б

(303+402 км) Мост через реку Герань-чай

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %														Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	4,5-4,7	0,29	1,9	1,47	2,71	45,7	0,843	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,37	0,22	0,15	0,47	0,93	0,090	Суглинок тяж. пылеватый пластич.
2	1	8,0-8,2	-	1,38	-	2,66	-	-	-	-	-	-	-	-	-	-	-	37,9	1,2	25,0	27,1	8,8	-	-	-	-	-	-	-	Песок средней крупности
3	2	14,0-14,2	0,33	1,85	1,39	2,74	49,2	0,971	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,46	0,24	0,22	0,41	0,93	0,14	Глина пылеватая, тугопластич.

Мост №20⁶ (303 + 402 км) Мост через реку Геран-чай. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см²	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см³	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Растительный слой	—	—	—	—	—	—	§9а
2		0,3	5,5	5,2		Суглинок сухой, плотный с 3,8 м пластичный			1,0	19	1,70	4,0-4,2	§33б
3		5,5	8,5	3,0		Песок водонасыщенный среднезернистый, глинистый			2,5	36	1,60	7,0-7,3	§27а
4		8,5	15,0	6,5		Глина плотная, тугопластичная			1,3	14	1,80		§8а

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Растительный слой	—	—	—	—	—	—	§9а
2		0,3	5,5	5,2		Суглинок сухой, плотный с 3,8 м пластичный			1,0	19	1,70		§33б
3		5,5	8,5	3,0		Песок водонасыщенный среднезернистый, глинистый			2,5	36	1,60		§27а
4		8,5	15,0	6,5		Глина плотная, тугопластичная			1,3	14	1,80	12,0-12,2	§8а

Мост № 23 (331+293 км). Мост через канал.

Инженерно-геологические условия.

Согласно задания были проведены инженерно-геологические исследования на месте проектируемого моста через канал.

В результате проведенных инженерно-геологических работ и лабораторных испытаний установлено:

1. Мост через канал (331+293км); пробурена 1 скважина правее на расстоянии 6,5 м от существующей опоры глубиной по 12,0 м.

Литологический разрез:

I. 0,0-12,0 м. Гравийно-галечник заполнитель супесчанистый. Включения валунов 2-8%. В разрезе небольшие линзы супеси, реже песка. Мощность линз до 0,2-0,3 м.

2. Грунтовые воды до глубины 12,0 не выявлены.

3. Канал используется только для орошения.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через канал приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.

2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

3. Район строительства по сейсмичности относится к 8 бальной зоне /на основании письма №25-9/575 от 01.02.92 г. института Геологии имени академика И.М. Губкина/.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 23

(331+293 км) Мост через канал

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	4,5-5,0	-	1,89	-	2,70	-	-	3	2	6	7,5	33,4	20,5	10,3	6,6	4,4	1,7	2,0	1,7	0,9	-	-	0,19	0,15	0,04	-	-	-	Гравийно-галечник зап. супесчанист.

Мост №23 (331 + 293 км) Мост через канал. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см^2	φ^0	ρ г/см^3		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. Вкл. валунов 2 – 8 %	—	—	5,0	45	1,95	4,5-5,0	§6в

Мост № 26 (356 км). Мост через реку Гуру-дере

Инженерно-геологические условия.

Согласно задания были проведены инженерно- геологические изыскания на месте проектируемого моста через реку Гуру-дере.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

1. На месте проектируемого моста через реку Гуру-дере левее на расстоянии 6,5 м от края существующих опор были пробурены 2 скважины глубиной по 12,0 м.

Литологический разрез:

I. 0,0-0,2 м. Растительный слой с включениями гравия.

II. 0,2-12,0 м. Гравийно-галечник заполнитель супесчанистый и суглинок имеются линзы супеси и суглинка. Мощность линз до 0,2-0,3 м. Количество валунов от 5 до 15%.

2. Грунтовые воды до глубины 12,0 м не выявлены.
3. Балка сухая. Вода появляется после дождей. Максимальный уровень воды повышается на 1,2-1,5 м.

Выводы:

На основе приведенных данных об инженерно-геологических условиях мостового перехода через реку Гуру-дере приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.

2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

3. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 26

(356 км) Мост через реку Гуру-дере

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %														Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	1,0-1,2	-	1,85	-	2,40	-	-	5	4	4	3	7,0	12	10,4	10,3	10,4	12,5	12,4	4,9	2,3	1,6	-	0,26	0,18	0,08	-	-	-	Гравийно-галечник зап. суглинок
2	2	5,0-5,2	-	1,89	-	2,40	-	-	5	3	4	5	6	10,3	12,5	11,4	12,8	13,2	6,9	4,3	3,1	2,5	-	0,26	0,18	0,08	-	-	-	Гравийно-галечник зап. суглинок

Мост №26 (356 км) Мост через реку Гуру-дере. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см^2	φ^0	ρ г/см^3		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,2	0,2		Раст. Слой вкл. гравия			—	—	—	—	§9в
2		0,2	12,0	11,8		Гравийно – галечник заполнитель супечанистый к-во волунов 5 – 15 %	—	—	4,5	45	1,95	1,0-1,3	§6в

Скв. 2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,2	0,2		Раст. Слой вкл. гравия			—	—	—	—	§9в
2		0,2	12,0	11,8		Гравийно – галечник заполнитель супечанистый к-во волунов 5 – 12 %	—	—	4,5	45	1,95	5,0-5,2	§6в

Мост № 32 (382+690 км). Мост через реку Шамхор-чай.

Инженерно-геологические условия.

Согласно задания были проведены инженерно-геологические изыскания на месте нового строящегося моста через реку Шамхор-чай. Было пробурено по одной скважине глубиной по 12,0-15,0 м около оснований.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

1. На месте строящегося моста через реку Шамхор-чай пробурены 3 скважины глубиной по 12,0 м.

Литологический разрез:

I. 0,0-12,0 м. Гравийно-галечник с включениями валунов. Количество валунов от 3,0 до 15%. Заполнитель песок и супесь. С линзами песка и супеси. Мощность линз до 0,3 м. Количество валунов от 5 до 15%.

II. Грунтовые воды до глубины 12,0 м не выявлены.

Выводы:

На основе приведенных данных об инженерно-геологических условиях мостового перехода через реку Шамхор-чай приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.

2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

3. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 32

(382+690 км) Мост через реку Шамхор-чай

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	3,0-3,3	-	2,0	-	2,40	-	-	4	6	-	-	18,2	19,5	14,0	7,3	12,0	5,6	3,5	4,8	2,5	2,6	-	-	-	-	-	-	-	Гравийно-галечник песчан. заполнит.
2	1	7,5-7,8	-	1,9	-	2,40	-	-	4	6	-	22,5	15,4	12,4	9,9	6,0	5,3	4,3	4,0	4,7	2,9	2,6	-	-	-	-	-	-	-	Гравийно-галечник песчан. заполнит.
3	2	6,2-6,5	-	2,0	-	2,40	-	-	4	6	-	-	13,3	23,7	13,6	7,4	7,7	5,5	5,1	7,4	3,6	2,7	-	-	-	-	-	-	-	Гравийно-галечник песчан. заполнит.
4	2	10,0-10,3	-	1,9	-	2,40	-	-	4	6	-	-	11,9	22,1	12,8	7,7	7,3	8,4	5,2	7,5	4,1	3,0	-	-	-	-	-	-	-	Гравийно-галечник песчан. заполнит.
5	3	7,4-7,9	-	1,9	-	2,40	-	-	4	6	-	22,5	15,4	12,4	9,9	5,0	6,3	4,3	3,0	4,7	3,9	2,6	-	-	-	-	-	-	-	Гравийно-галечник песчан. заполнит.

Мост №32 (382 + 690 км) Мост через реку Шамхор-чай. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель с вкл. валунов от 3 до 15 %. Супесчанистый заполнитель пылеватый, с линзами песка и супеси.	—	—	5,0	42	1,95	3,0-3,3 7,5-7,8	§6в

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник с вкл. валунов 3 – 12 % с супесчанистым заполнителем, с линзами песка и супеси.	—	—	5,0	42	1,95	6,2-6,5 10,0-10,3	§6в

Скв.3.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник с вкл. валунов 3 - 15 %. Супесчанистый заполнитель, с линзами песка и супеси.	—	—	5,0	42	1,95	7,4-7,9	§6в

Мост № 44 (447+650 км). Мост через реку Гасан-су.

Инженерно-геологические условия.

Согласно задания были проведены инженерно- геологические изыскания на месте нового строящегося моста через реку Гасан-су.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

1. Мост через реку Гасан-су - пробурено 2 скважины глубиной по 12,0 м.

Литологический разрез:

I. 0,0-0,2 м. Растительный слой с корнями растений и включениями гравия.

II. 0,2-12,0 м. Гравийно-галечник с включениями валунов. Количество валунов от 6 до 12% На глубине ниже 4,0 м встречаются многочисленные линзы песка и реже глины. Мощность линз до 0,4 м. Заполнитель супесь и песок.

2. Грунтовые воды до глубины 12,0 м не выявлены.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через реку Гасан-су приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.

2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

3. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 44

(447+650 км) Мост через реку Гасан-су

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	5,0-5,3	-	1,90	-	2,70	-	-	3	10	20	-	17,2	19,1	11,5	8,8	4,4	3,0	1,1	0,9	0,5	0,5	-	0,2	0,14	0,06	-	-	-	Гравийно-галечник супесчан. заполнит.
2	1	10,0-10,3	-	1,80	-	2,70	-	-	3	10	20	-	10,4	19,3	20,7	7,9	4,5	2,0	0,7	0,6	0,4	0,3	-	0,18	0,13	0,05	-	-	-	- "-
3	2	3,0-3,5	-	1,62	-	2,70	-	-	3	10	20	-	7,5	13,9	18,5	15,3	5,8	3,5	0,9	0,8	0,5	0,3	-	0,20	0,13	0,07	-	-	-	Гравийно-галечник супесчан. заполнит.
4	2	8,0-8,3	-	1,57	-	2,70	-	-	3	10	20	-	-	10,3	21,4	17,4	8,2	4,8	1,9	1,9	0,5	0,6	-	0,22	0,15	0,07	-	-	-	- "-

Мост №44 (447 + 650 км) Мост через реку Гасан-су. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,2	0,2		Растительный слой			—	—	—		§9а
2		0,2	12,0	11,8		Гравийно – галечник с вкл. валунов 8 – 12 % с супесчанистым заполнителем на глубине 4,0 – 11,0 м встречаются линзы песка и глины мощностью до 0,4 м	—	—	6,0	42	1,95	5,0-5,3 10,0-10,3	§6в

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,2	0,2		Растительный слой			—	—	—		§9а
2		0,2	12,0	11,8		Гравийно – галечник с вкл. валунов 6 – 12 % с супесчанистым заполнителем на глубине 4,0 – 11,0 м встречаются линзы песка и глины мощностью до 0,4 м	—	—	6,0	42	1,95	3,0-3,5 8,0-8,3	§6в

Мост № 45 (451+.681км). Мост через ж/д Баку-Тбилиси.

Инженерно-геологические условия.

Согласно задания на трассе Баку- Казах 451+681 км мост через железную дорогу Баку-Тбилиси были проведены инженерно-геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

1. На месте проектируемого моста через железную дорогу Баку-Тбилиси с левого края существующего моста на расстоянии 6,5 м пробурены 2 скважины глубиной по 12,0 м.

Литологический разрез:

I. 0,0-0,3 м. Растительный слой с включениями гравия.

II. 0,3-4,8-5,0 м. Супесь серая, мягкопластичная.

III. 4,8-5,0 м до 10,8-11,0 м. Суглинок мягкий, текучепластичный.

IV. 10,8-11,0 до 12,0 м. Гравийно-галечник, заполнитель супесчанистый.

Грунтовые воды до глубины 12,0 не выявлены.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через железную дорогу Баку -Тбилиси приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

2. Грунтовые воды до глубины 12,0 не выявлены.

3. Район строительства по сейсмичности относится к 8 бальной зоне /на основании письма №25-9/575 от 01.02.92 г. института Геологии им. И.М. Губкина/.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 45

(451+681 км) Мост через ж/д Баку-Тбилиси

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	2	2,4-2,6	0,22	1,94	1,59	2,70	41,1	0,698	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,26	0,19	0,07	0,42	0,85	0,002	Супесь пылеват. тяж. пластичная
2	1	8,6-8,8	0,29	1,82	1,41	2,71	47,9	0,921	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,34	0,21	0,13	0,61	0,85	0	Суглинок тяж. пылев. мягкопластич.
3	1	11,0-11,3	-	1,91	-	2,40	-	-	-	8	3	-	24,2	5,6	22,3	12,2	10,3	2,3	3,4	3,2	3,4	2,1	-	-	-	-	-	-	-	Гравийно-галечник заполнит. супесчан.

Мост №45 (451 + 681 км) Мост через ж/д Баку - Тбилиси. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см^2	φ^0	ρ г/см^3		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. слой с вкл. гравия			—	—	—		§9а
2		0.3	5.2	4.9		Супесь серая	—	—	1,1	22	1,65		§34а
3		5,2	11,0	5,8		Суглинок пластичный, мягкий, влажный			1,0	—	1,70	8,6-8,8	§33а
4		10,8	12,0	1,2		Гравийно-галечник запол. Супесчанистый			5,0	42	1,95	11,0-11,3	§6б

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. слой с вкл. гравия			—	—	—	—	§9а
2		0,3	5,0	4,7		Супесь серая	—	—	1,1	22	1,65	2,4-2,6	§34а
3		5,0	10,8	5,8		Суглинок пластичный, мягкий, влажный			2,5	36	1,60		§27а
4		10,8	12,0	1,2		Гравийно-галечник запол. супесчанистый			5,0	42	1,95		§6б

Мост № 46 (457+839 км). Мост через долину (овраг)

Инженерно-геологические условия.

Согласно задания на трассе Баку- Казах 457+839 км мост через долину (овраг) былипроведены инженерно- геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

На месте проектируемого мостового перехода с правой стороны дороги на расстоянии 6,5 м пробурены 2 скважины глубиной по 12,0 м.

Литологический разрез:

I. 0,0-0,3 м. Растительный слой с включениями гравия.

II. 0,3-4,0-4,1 м. Суглинок с включениями гравия.

III. 4,0-4,1 до 12,0 м. Гравийно-галечник, заполнитель супесчанистый с влючениями валунов до 2%.

Грунтовые воды до глубины 12,0 не выявлены.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через долину (овраг) приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

2. Грунтовые воды до глубины 12,0 не выявлены.

3. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 46

(457+839 км) Мост через долину (овраг)

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	3,0-3,3	-	1,84	-	2,71	-	-	-	-	-	-	-	-	6,7	1,3	1,3	1,3	0,5	0,3	0,3	0,3	88	0,24	0,14	0,10	-	-	-	Суглинок пылев.с включ. гравий.
2	2	6,5-6,8	-	1,91	-	2,40	-	-	2	5	5	-	23,6	5,3	22,8	11,6	8,8	3,1	3,8	3,3	3,3	2,4	-	-	-	-	-	-	-	Гравийно-галечник заполнит. супесчан.

Мост №46 (457 + 839 км) Мост через долину (овраг). Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см^2	φ^0	ρ г/см^3		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. слой с вкл. гравия			—	—	—		§9а
2		0,3	4,0	3,7		Суглинок с вкл. гравия			2,0	20	1,70	3,0-3,3	§33б
3		4,0	12,0	8,0		Гравийно-галечник с вкл. валунов	—	—	5,0	42	1,95		§6в

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	0,3	0,3		Раст. слой с вкл. гравия			—	—	—		§9а
2		0,3	4,1	3,8		Суглинок с вкл. гравия			2,0	20	1,70		§33б
4		4,1	12,0	7,9		Гравийно-галечник с вкл. валунов	—	—	5,0	42	1,95	6,5-6,8	§6в

Мост № 47 (462+610 км). Мост через реку Акстафа-чай.

Инженерно-геологические условия.

Согласно задания были проведены инженерно- геологические изыскания на месте проектируемого моста через реку Акстафа-чай.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено: На месте существующего моста на правой стороне дороги на расстоянии 6,5 от края существующего моста пробурены 4 скважины глубиной по 12,0 м.

Литологический разрез:

Гравийно-галечник с редкими включениями валунов меньше 1%. Заполнитель супесчанистый. В разрезе встречаются линзы песка и супеси, реже - глины. Мощность линз 0,2 м, реже - 0,3 м. С глубиной количество линз возрастает.

Грунтовые воды появились на разных глубинах:

Скв. 1. (левый берег реки) на глубине 6,0 м; установились на глубине 3,6 м

Скв. 2; 3 появились на глубине 1,5-2,0 м; установились на глубине 0,0 м

Скв. 4 (правый берег) появились на глубине 4,5 м; установились на глубине 3,2 м

Вышеизложенное дает возможность предположить, что вода в скважинах появилась в результате просачивания воды из реки Акстафа-чай.

Вода в реке Акстафа-чай постоянна, после дождей уровень воды поднимается до 0,5 м, выше - редко.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через реку Акстафа-чай приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.
2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84
3. Наличие и уровень грунтовых вод связано в наличием и уровнем воды в Акстафа-чай.
4. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 47

(462+610 км) Мост через реку Акстафа-чай

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	2,0-2,4	-	1,81	-	2,40	-	-	-	10	15	-	16,7	8,8	11,1	6,0	11,1	9,1	3,7	5,6	1,9	1,0	-	-	-	-	-	-	-	галечник, гравий. заполнит. песчан.
2	1	5,0-5,3	-	1,90	-	2,40	-	-	-	10	15	-	21,4	9,5	11,5	5,2	9,4	4,7	6,6	4,4	1,6	0,7	-	-	-	-	-	-	-	- " -
3	2	4,5-4,7	-	1,83	-	2,40	-	-	-	10	15	-	19,6	8,5	10,9	6,4	9,4	8,3	5,0	4,9	1,3	0,7	-	-	-	-	-	-	-	галечник, гравий. заполнит. песчан.
4	3	2,0-2,4	-	1,81	-	2,40	-	-	-	10	15	-	17,9	9,5	11,3	5,3	10,4	9,9	3,9	5,0	0,9	0,9	-	-	-	-	-	-	-	- " -
5	4	5,5-5,8	-	1,90	-	2,40	-	-	-	10	15	-	14,1	10,5	12,6	4,5	9,8	10,0	4,5	6,4	1,5	1,1	-	-	-	-	-	-	-	- " -

Мост №47 (462 + 610 км) Мост через реку Акстафа-чай. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. Вкл. валунов меньше 1 %. Небольшие линзы песка и супеси.	6,0	3,6	4,0	42	1,95	2,0-2,4 5,0-5,3	§6б

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. Вкл. валунов меньше 1 %. Небольшие линзы песка и супеси	1,5	0,0	4,0	42	1,95	4,5-4,7	§6б

Мост №47 (462 + 610 км) Мост через реку Акстафа-чай. Скв.3.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. Вкл. валунов меньше 1 %. Линзы песка и супеси до 0,2 м	0,2	0,0	4,0	42	1,95	2,0-2,4	§6б

Скв.4.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. Вкл. валунов меньше 1 %. Линзы песка и супеси реже суглинка до 0,3 м	4,5	3,2	4,0	42	1,95	5,0-5,8	§9а

Мост № 49 (481+354 км). Мост через долину (овраг)

Инженерно-геологические условия.

Согласно задания на трассе Баку- Казах 481+354 км мостовой переход через долину (овраг) былипроведены инженерно- геологические изыскания.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

На месте проектируемого мостового перехода с левой стороны дороги на расстоянии 6,5 м пробурены 2 скважины глубиной по 15,0 м.

Литологический разрез:

I. 0,0-1,9-1,5 м. Суглинок с включениями гравия /насыпной слой/.

II. 1,9-1,5-15,0 м. Суглинок светло серый и серый до бурого. Плотный глубиной 4,0-4,5 м мягкопластичный.

Грунтовые воды до глубины 15,0 не выявлены.

После дождей уровень воды в канале (овраге) сильно повышается. Иногда пропускная способность моста бывает недостаточна и вода течет над мостом. За последние 11 лет - трижды. Максимально вода поднималась выше уровня дороги на 1,0 м.

Выводы:

На основе приведенных данных об инженерно-геологических условиях мостового перехода через овраг приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

2. Грунтовые воды до глубины 15,0 не выявлены.

3. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 49

(481+354 км) Мост через долину (овраг)

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	14,0-14,2	0,28	1,87	1,46	2,71	46,1	0,855	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,36	0,21	0,15	0,47	0,88	0,06	Суглинок тяжел. пылев. тугопластич.
2	2	3,8-4,0	0,21	2,03	1,68	2,71	38,1	0,615	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,31	0,18	0,13	0,23	0,92	0,14	Суглинок тяжел. пылев. полутверд-дый

Мост №49 (481 + 354 км) Мост через долину (овраг). Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Установ.	Геолого-литологические показатели: R_0 кгс/см^2	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см^3	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	1,5	1,5		Суглинок с вкл. гравия (насыпной слой)	—	—	—	—	1,70		§33б
2		1,5	4,5	3,0		Суглинок светло-серый плотный			2,5	24	1,75		§33в
3		4,5	15,0	10,5		Суглинок светло-серый с глубины 4,5 м пластичный			1,0	19	1,70	14,0-14,2	§33б

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	1,5	1,5		Суглинок с вкл. гравия (насыпной слой)	—	—	—	—	1,70		§33б
2		1,5	4,0	2,5		Суглинок светло-серый плотный			2,5	24	1,75	3,8-4,0	§33в
3		4,0	15,0	11,0		Суглинок светло-серый плотный с глубины 4,0 – 4,3 м пластичный			1,0	19	1,70		§33б

Мост № 50 (485+557 км). Мост через реку Инджа-чай.

Инженерно-геологические условия.

Согласно задания были проведены инженерно- геологические изыскания. на месте проектируемого моста через реку Инджа-чай.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

1. Мост через реку Инджа-чай - пробурены 2 скважины левее существующих опор на расстоянии 6,5 м от глубиной по 12,0 м.

Литологический разрез:

I. 0,0-12,0 м. Гравийно-галечник с включениями валунов 2-5%. Заполнитель спесчанистый.

2 .Грунтовые воды на глубине 12,0 не выявлены.

3. Во время ливневых дождей уровень воды в реке поднимается на 1,0-1,4 м.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода через реку Инджа-чай приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.

2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84

3. Район строительства по сейсмичности относится к 8 бальной зоне /на основании письма №25-9/575 от 01.02.92 г. института Геологии им. И.М. Губкина/.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 50

(485+557 км) Мост через реку Инджа-чай

№	№ скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	4,2-4,5	-	1,96	-	2,70	-	-	2	3	6	20,6	18,7	17,4	5,6	4,3	2,3	1,9	1,6	0,4	0,3	15,9	-	0,18	0,12	0,06	-	-	-	Гравийно-галечник заполнит. супесчан.
2	2	6,5-6,8	-	1,94	-	2,70	-	-	2	3	6	22,2	18,8	18,8	6,5	5,1	3,0	1,3	0,9	0,2	0,2	12,0	-	0,18	0,11	0,07	-	-	-	- " -

Мост №50 (485 + 557 км) Мост через реку Инджа-чай. Скв.1.

№ № слоев	Отметка	Глубина залегания слоев		Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия		Геолого-литологические показатели			Интервал отбора проб	Группа грунта по труд. разработки
		Кровля	Подошва				Уров. Появ.	Уров. Устан.	R_0 кгс/см^2	φ^0	ρ г/см^3		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. К-во валунов до 5 %	—	—	5,0	42	1,95	4,2-4,5	§6в

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	12,0	12,0		Гравийно-галечник заполнитель супесчанистый. К-во валунов до 5 %	—	—	5,0	42	1,95	6,5-6,8	§6в

Мост № 51 (491+643 км). Мост через долину (овраг)

Инженерно-геологические условия.

Согласно задания были проведены инженерно- геологические изыскания на месте проектируемого мостового перехода через долину.

В результате проведенных инженерно-геологических работ и лабораторных испытаний образцов установлено:

На месте проектируемого моста с правой стороны дороги на расстоянии 6,5 м пробурены 2 скважины глубиной по 15,0 м.

Литологический разрез:

I. 0,0-1,6-2,9 м. Суглинок серый с включениями гравия (насыпной слой).

II. 1,6-2,9-15,0 м. Суглинок серый, плотный с глубины 3,2-4,0 м мягкопластичный, с редкими линзами супеси.

Грунтовые воды до глубины 15,0 не выявлены.

Выводы:

На основе вышеприведенных данных об инженерно-геологических условиях мостового перехода приходим к следующим выводам:

1. Грунты вполне устойчивы под основание искусственных сооружений.
2. На основании оптимальных значений физико-механических параметров грунтов условные сопротивления установлены согласно СНиП 2.05.03.-84
3. Грунтовые воды до глубины 15,0 не выявлены.
4. Район строительства по сейсмичности относится к 8 бальной зоне.

ВЕДОМОСТЬ

испытаний физико-механических свойств грунтов

Мость № 51

(491+643 км) Мост через долину (овраг)

№	скваж.	Глубина отбора, м	Естеств. влаж. %	Объемный вес г/см³	Объемный вес скелета	Удельный вес	Пористость %	Коэффициент пористости	Гранулометрический состав Остатки на ситах в %													Пыль, ил, глина	Пластичность			Коэффициент консистенции	Относительная влажность	Величины пористости	Вид грунта
									>200	100-200	70-100	70	40	20	10	5,0	2,0	1,0	0,5	0,25	0,1	<0,1		Верхний предел	Нижний предел	Число пластичности				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1	1	3,0-3,2	0,25	1,86	1,49	2,71	45,0	0,821	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,34	0,19	0,15	0,4	0,82	0,05	Суглинок тяж. пылев. тугопласт.
2	1	14,0-14,2	0,28	1,91	1,49	2,71	44,9	0,816	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,32	0,21	0,11	0,64	0,93	0,03	Суглинок легкий. пылев. мягкопласт.
3	2	8,5-8,7	0,25	1,97	1,58	2,71	41,8	0,719	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	0,29	0,19	0,10	0,6	0,94	0,04	Суглинок легкий. пылев. мягкопласт.

Мост №51 (491 + 643 км) Мост через долину (овраг). Скв.1.

№ № слоев	Отметка	Глубина залегания слоев: Кровля	Глубина залегания слоев: Подошва	Мощность слоя, м.	Литологический разрез	Подробное описание пород	Гидрогеологические условия: Уров. Появ.	Гидрогеологические условия: Уров. Устан.	Геолого-литологические показатели: R_0 кгс/см²	Геолого-литологические показатели: φ^0	Геолого-литологические показатели: ρ г/см³	Интервал отбора проб	Группа грунта по труд. разработки
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	2,9	2,9		Суглинок с вкл. гравия (насыпной слой)			—	—	1,7		§33б
2		2,9	4,0	1,1		Суглинок тугопластичный			1,3	19	1,7	3,0-3,2	§33б
3		4,0	15,0	11,0		Суглинок серый до 4,0м тугопластичный, ниже мягкопластичный.	—	—	1,0	16	1,7	14,0-14,2	§33а

Скв.2.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1		0,0	1,6	1,6		Суглинок с вкл. гравия (насыпной слой)			—	—	1,7		§33б
2		1,6	3,2	1,6		Суглинок тугопластичный			1,3	19	1,7		§33б
3		3,2	15,0	11,8		Суглинок плотный с глубины 3,2 м мягкопластичный	—	—	1,0	18	1,7		§33а

Appendix A 6

Azerbaijan Highway Project, Ganja to Georgian Border Road Section

Environmental Assessment Report

1 Project description

The road sector under study forms an integral part of the TRACECA-corridor linking Europe to Asia. Within this broader geographical context the M 4-M 1 provides the main transit route between Central Asia and the Black Sea ports of *Poti* and *Batumi.* In the easternmost section of the M4 between *Alyat* and *Gazi Mammed* rehabilitation, reconstruction and upgrading are presently at the state of implementation, for the following *Gazi Mammed* to *Kyurdamir* section technical planning has been completed recently.

This present environmental assessment considers the planned rehabilitation of the 250 km of the existing M 1 between *Ganja bypass* in the east and the Georgian border in the west.

Actually, characteristic physical features of the road section under study are the varying width of the carriageway (presently ranging between 7.14 and 10.94 m), poor drainage provisions as well as severe defects in the existing pavement and bridges. Moreover, the horizontal alignment is characterised by long straights which causes visibility problems from headlights at night and encourages dangerous high speeds. Finally, road markings do not exist.

The planning aims at the alleviation of physical deficiencies and the improvement of road safety. It will entail the following:

- overlay / partial reconstruction of the existing two lanes
- creation of a uniform 9m carriageway (i.e. 7.5m plus 2x 0.75m of paved shoulders) throughout the whole road section between *Ganja* bypass and the Georgian border
- improvement of the horizontal alignment in selected locations
- replacement of bridges which are heavily damaged or have proved insufficient bearing capacity

Environmental impacts relating to the rehabilitation of the existing road will the direct physical intrusion on the land within the immediate construction corridor, to health and safety conditions within the works-related human settlements, construction camps and work sites and finally to the extraction, the handling and transport of construction materials.

The analysis of the environmental impacts will focus on the following:

- Identification of project-related key concerns with regard to
  - impacts on the natural environment
  - human health
  - human safety
- Compilation of key environmental, health and safety regulations that will be relevant to the proposed project
- Development of a concept of mandatory and additional measures for impact avoidance and impact mitigation
- Identification of additional measures for environmental enhancement

Starting Point and Approach

The major part of the contents were elaborated during previous feasibility study from 2000 concerning the road corridor between *Kyurdamir* and the Georgian border, which included two site visits focused on the inspection of the 320 km corridor between *Kyurdamir* and the Georgian border and the examination of the proposed borrow sites for construction material, both earthworks and sub-base.

The third visit was performed in March 2001 for the section between *Ganja* bypass and Georgian border to amend and update the information for this report and to elaborate the Environmental Mitigation and Monitoring Plans.

A stakeholder meeting was arranged 15 of March, 2001 in Ganja. The Minutes of the meeting are provided in the Appendix 4.

For both the inspection of the Project area and the description and evaluation of the ecological characteristics of the planning area and the proposed borrow sites the consultant has been accompanied and assisted by a local expert, Dr. *Elchin Sultanov. Dr. Sultanov* is the head of the Ornithological Laboratory of the Azerbaijan Academy of Sciences (institute of Zoology), the head of the Azerbaijan Centre for the Protection of Birds and also actively supporting *'ECORES'*, a local NGO for the collection and provision of environmental information.

All the references utilised for the work are fully indicated in the report text.

The report has been written by environmental specialist of the Consultant, Ms. Erja Vallila.

2 Policy, Legal and administrative framework

2. 1 Legal and Procedural Aspects

According to the provisions of Article 31 of *the 'Law of the Republic of Azerbaijan on the Protection of the Environment and the Utilisation of Nature'* the proposed rehabilitation of the existing two lanes of the M 1 would not fall under the type of projects requiring a formal full EIA.

2.2 Compilation of Key Environmental, Health and Safety Regulations

The compilation of the existing legal and regulatory framework aims at:

- the identification of the general national requirements for impact mitigation or other environmental protection measures regarding the natural environment, human health and safety in road construction, pavement repair / rehabilitation and borrow pit operations
- the identification of further measures required for the Project to meet WB-standards.

Laws and Regulations

The Consultant has examined the laws of the Republic of Azerbaijan as well as Regulations on worker's health and safety related to road construction operations. At the occasion of previous studies conducted in 1997 and 1998 on the rehabilitation of other sections of the M4 the 'Azerbaijan State Committee on Ecology and Control of

Natural Resources Utilisation (ASCE) had been consulted for any further provisions that would be relevant to the present type of project.

Thus, the following laws and regulations would have to be considered:

A) National Regulations
The **'Law of the Republic of Azerbaijan on the Protection of the Environment and the Utilisation of Nature'** represents the general framework for all national objectives in the area of environmental protection. With regard to the present Project two articles of the Law are relevant:

Article 31 – 'Objects of the State Ecological Expertise'
Article 31 defines (among other things) the types of project, that would require compulsory 'State Ecological Expertise' i.e. to undergo the systematically EIA process. Among *construction projects* 'reconstruction, extension and technical re-equipment projects' would automatically fall under the requirements for 'State Ecological Expertise', while pavement repair / rehabilitation of existing roads would not have to be considered[1].

Article 49 of the same law deals with **'General Ecological Demands during Siting, Designing, Commissioning of Enterprises, Installations and Other Facilities'**: 'During ... feasibility study of the project,... construction, reconstruction,... of units in ... transport... which have direct or indirect influence on the state of the natural environment, the standards and requirements for ecological safety and protection of health of humans should be complied with, and measures for nature protection, rational utilization, restoration and reproduction of natural resources, saving of resources, regeneration of natural environment should be envisaged

The system of ecological standards includes:

- maximum permitted concentrations of pollutants in the environment
- maximum permitted discharges and emissions of pollutants into the natural environment
- maximum permitted levels of noise,... and other harmful physical influences as well as ... health norms and standards of hygiene...'

Specifications hereupon can be obtained from ***SNIP-Regulations*** (= Construction Norms and Rules), ***GOST-Standards*** (= state standards) and a number of further regulations. All of these provisions date back to the Soviet Era and were established in time period between 1980 and 1989. However, according to a decision of the Cabinet of Ministers of the Republic of Azerbaijan (no. 217 of 15 April 1992) these provisions will all remain officially binding until national regulations or standards may be adopted.

The Azerbaijan Draft **'Law on Automobile Roads'** has recently been submitted to the Cabinet of Ministers for approval. Under Section 71 reference is made to the provisions of the 'Law of the Republic of Azerbaijan on the Protection of the Environment and the Utilisation of Nature'. The law also clearly spells out that any construction or reconstruction of roads would require the official approval of the ASCE (i.e. a 'positive decision of State Ecological Expertise').

The national **'Draft Guidelines for Road Construction, Management and Design'** also address environmental issues in various sections (e.g. Part I: 'Planning of Automobile Roads', where it is required to minimise 'impacts on the ecological, geological, hydrogeological and other natural conditions' by the implementation of adequate pro-

[1] see also section 1.3 of this report

tection measures; the 'General Principles' that are laid down under Part II ('Construction of Automobile Roads') also provide for the consideration of appropriate protection measures which shall contribute to the maintenance of stable ecological and geological conditions as well as a stable natural balance). Section II.3 directly deals with the 'Protection of the Environment'. The provisions of this section are, however, rather general again and do largely correspond to those of the former Russian regulations that were mentioned before.

The following is a short summary of these regulatory instruments as they relate to environmental protection, health and safety issues that may be relevant to the Project.

SNIP 2.05.02-85: Regulation on Road Construction
This regulation deals with environmental issues under section 3. Most of the statements under this section are very general and do mainly apply to impact avoidance and mitigation of new road projects. However, some of the provisions (like those on the treatment of top soil during construction works) would also apply to the rehabilitation of an existing road.

BCH 8-89: Regulation on Environmental Protection in Construction, Rehabilitation and Maintenance of Roads
This document contains rather comprehensive provisions on environmental protection measures in road construction, as well as in rehabilitation and maintenance activities (among others: use of soils, protection of water resources, protection of forests, flora and fauna, use, preparation and storage of road construction machinery and materials, provisional structures, provisional roads, fire protection, borrow pits and material transport, avoidance of dust, protection of soils from pollution, prevention of soil erosion etc.)

The appendices to this document also state standards for:

- maximum permitted concentrations of toxic substances
- noise control measures
- soil pollution through losses of oil and fuel from construction equipment
- quality of surface water

Regulation of Azerbaijan Republic on Industrial and Municipal Waste (No. 514-1Q, 30 July 1998)

The law includes requirements for industry and enterprises for implementation of identified standards, norms of environmental protection when designing, constructing or reconstructing for waste. Articles 10, 11 and 12 includes requirements for the municipalities for collection and processing of waste.

SNIP III 4-80 Norms for Construction Safety
These provisions deal with construction activities in general and comprise, among others, detailed regulations on worker's health and safety. With regard to the present Project the chapters 2 and 5 may be relevant (organisation of the construction site, the work sites and transport works). In annex 9, maximum permissible concentrations of toxic substances in the air have been determined (could be relevant for road marking operations).

Safety Regulations for Construction, Rehabilitation and Maintenance of Roads 1978 (corresponds to SNIP III A-11-70)
Comprehensive compilation of safety rules for almost all aspects and stages of road construction, e.g. technical safety requirements for work with road construction equipment, the construction of dams, the rehabilitation and maintenance of bridges and

culverts, loading and unloading operations, operation and maintenance of asphalt plants, work with toxic substances, work in borrow pits and borrow pits, work with compressors, mobile power plants, operation and maintenance of road construction machines etc.

GOST 13508-74
This document deals with road marking and describes the requirements and standards of white lining for the various road categories, which is an important aspect of road safety.

B) International Conventions
Convention on the Conservation of Migratory Species of Wild Animals (CMS)
The Migratory Species Convention (Bonn 1979) is a skeleton agreement on the conservation of migratory species of wild animals and prepares the ground for the establishment of further regional agreements. According to information obtained from the Ornithological Society of Azerbaijan this convention will soon be signed by Azerbaijan.

African-Eurasian Waterbird Agreement (AEWA)
This regional agreement results from the above 'Bonn-Convention' 'CMS'. According to article ii (1.) parties to the agreement 'shall take co-ordinated measures to maintain migratory waterbird species in a favorable conservation status or to restore them to such a status'. With regard to human activities parties to the Agreement shall 'assess the impact of proposed projects... and human interests.... In cases where human disturbance threatens the conservation status ... parties should endeavor to take measures to limit the level of threat'.

Azerbaijan is not yet a party to this agreement, but the Convention is considered to be relevant to the EBRD as a European donor organisation.

Conclusions

The existing national laws, draft laws and regulations as well as the former Soviet norms and rules on (road) planning, construction and rehabilitation do in fact include the general concept of avoiding or minimising impacts on the natural environment and also health and safety regulations cover a broad range of issues generally required to support environmentally sound planning and construction practices. From this point of view and also taking into account the actual environmental conditions in the Project area it could be assumed, that there is a fairly appropriate regulatory framework to support results according to WB or EBRD standards.

In practice, however, no bodies / institutions have yet been established at the appropriate levels, that would automatically and effectively pursue the early consideration and consistent implementation of the existing regulations at the planning stage nor to supervise the implementation of the various requirements for environmental protection, impact mitigation and the protection of health and safety during construction.

As regards the present Project it will therefore have to be assured, that appropriate measures be identified, translated into detailed technical specifications and eventually incorporated into the tender and contract documents.

3 Baseline data

3.1 Brief Characterisation of the Project Area

The Project area is located within the valley of the river *Kura* in the central western part of the country (see following page). The section *Ganja* bypass - Georgian border is characterised by slowly increasing altitude from 200 m west of Ganja to maximum elevations of around 500 m in the westernmost section near to the Georgian border. Annual precipitation is low throughout this region ranging between 200 mm in the eastern and 300 mm in the western part of the Project area.

Within the area under study the natural landscape can be classified as typical semi-desert and sections with agricultural landscape, which in most part of the section represents a very monotonous type of landscape. Last section from Gasakh to Georgian border represents more green section with rich tugay forest in opposite side of Kura river.

Salsola spec., Holocneum strobilaceum, Salicornia europaea and various species of *Artemisia* would be typical and common elements of the natural flora. Higher shares of *Tamarix ramosissima* or *Poa bulbosa* indicate areas with increasingly dry conditions. Animal-wildlife is also composed of typical and mostly common semi-desert species. Characteristic mammals of this region are *Lepus europaeus, Meriones blackeri, Alactago elacter, Vulpes vulpes* and *Canis aureus*, typical reptiles are *Vipera lebetina* and *Testudo graeca*, the latter being listed in the Red Data Book of Azerbaijan. Common birds of the area are various species of larks and *Oenanthe, Merops apiaster*, *Coracius garrulus* and *Falco naumannii* which is a globally threatened species.

Today most of the natural landscape and vegetation have disappeared in favour of agriculture. For this purpose a widely branched network of irrigation channels was created which presently criss-cross the land in the environs of the road. Abundant growths of reed *(Phragmites communis, Typha sp., Scirpus acutus)* demarcate the courses of these channels, the natural rivers and also the shorelines of some shallow artificial ponds which are occasionally found along the M1 near to settlements. Typical fauna associated to these structures are *Rana ridibunda, Bufo viridis and Mauremis caspica, moreover a few waterbirds like Egretta garzett, Ardea alba, Ardea cinerea, Phalacrocorax carbo* and *Ixobrichus minutus*. The White Stork Ciconia alba may also, but only locally be encountered: this species could expand its habitat into the semi-desert when the electricity lines were put in place. Today, nesting sites can be observed in a few locations on the electricity poles along the road, while artificial watercourses and ponds are being used as feeding habitats.

Within this broader context the road corridor under study may be divided into the following sub-sections (from east to west):

<u>*Section Ganja – Tovuz*</u>

The eastern part of this section is predominantly semi-desert where vegetation is extremely scarce. Further to the west agricultural use increases (maize, pasture). Wine-fields may also be encountered, most of them were, however, abandoned. Two or three stripes of trees are along the roadside. Ring type connection to Shamkir is reached at about km 20 which provides local merchandises (see typical merchandises at ring type crosssings picture 2 in Appendix 2).

West of *Shamkir* , between km 24 and 34, the landscape within the wider road corridor changes, becomes increasingly green and is fully under agricultural use. Along

the road long stripes of trees exist. Tree plantations (2 – 3 rows) are common alongside the road, main species are *Populus alba, Pinus eldarica, Acacia sp., Ulmus* sp., *Morus sp.* and *Cypressus* .

A mosque situates at km 41 and at km 43 up to seven kilometres later the community dump their municipal waste in the road embankments and waste may still be observed up to seven km later. The settlements become less dense at about 58 km. At km 58 there is a direct connection of a house entrance road to the M1, which may need special arrangements for new connection.

The road passes through the river Tovuz valley at about km 58.The road passes through dense settlement of Tovuz between km 62 and 66. Herein the road is quite narrow. Pedestrians are provided with sidewalks (see picture in Appendix 2). For more 3 km the road passes through less dense settlement.

Most part of the road section is characterised with straight vertical and high horizontal lining. Close to settlements the horizontal lining is low.

In this road section the communities typically dump their municipal waste in the road embankments.

Tovuz – Georgian border

According to increasing precipitation volumes and also due to the vicinity of the River *Kura* all the land along the last section of the M 1 is being cultivated and roadside trees and shrubs are most common throughout this section (see typical rows of poplars picture 9 in Annex 5.4). Some of these rows are couple of hundred meters long and some about two kilometres.

Worth mentioning are 3 artificial strips of forest in the section between *Tovuz* and *Gazakh* which are all composed of the previously mentioned species. These situate in the fertile zone before Agstafa community. A stripe of planted but quite rare forest is cut by the road at about km 64.

After Qasakh there the road passes through several villages, at about 90 km, 102 km, 110 km, 122 km. On the last 20 km before the Georgian border the M 1 runs in a distance of only some 50 m to the south of a side arm of the river *Kura*. In this area all land in the environs of the road is again being used for agricultural purposes and vine yards.

Interesting rows of trees typical for this section are reached at about km 115 (Black currant bushes and Black Poplars) and at about 121 km (at present condition these trees may endanger the road safety). At about km 125 km a row of trees is reached which is followed by steep curve and another row of trees on both sides of the road. This section of the road is about two kilometres long. The road alignment may have to be changed because of the steep curve and special attention in the detailed design have to be put for to save these characteristic rows of trees.

The River *Inja Tschai*, which the road passes over at about 127 km, shows some exceptionally high and steep embankments which have significant numbers of nesting sites of bee-eaters and rollers, the latter having European conservation status[2] (see picture 10 in Appendix II).

[2] Source: Birds in Europe: Their Conservation Staus. Conservartion Series no. 3. Graham Parker, Melanie Heath. 1994

The road passes through most of the settlements in quite wide corridor. The sidewalks provided for pedestrians are in need for reconstruction.

The most important artificial green areas with rows of trees and the important nesting sites of the bee-eater and rollers are indicated also in map in Appendix 2.

Rivers along the road corridor

The road passes over several rivers: Rivers Turjan Tshaj, Kura, Geran Tshaj, Kjurek Tshaj, Ganja, Guru dere, Koshkar Tshaj, Shamkor Tshaj, Dshagri Tsaj, Dsegam Tshaj, Ashrik Tshaj, Tovuz Tshaj, Gasan-Su, Agstafa Tshaj, Inja Tshaj and Chram- Tshaj. The water flows from the mountains towards the River Kura situating on the right side of the road corridor. For part of the year some of the rivers are dry.

Of these rivers side arm of river Kura and river Inja Tschaj indicated earlier in the text provide important bird life habitats and habitats for bee-eaters and rollers. The industrial areas situate most of the time to the downstream of these rivers, except for River Kura, thus the riverbeds and sediments are not suspected to be contaminated. The species met in these rivers are *Caspiomyzon wagneri, Salmo (fario morpha) caspius, Chondrostoma cyri, Gobi Persia, Varicorhinus capoeta capoeta, Barbus lacerta, Barbus mursa, Chalcalburmus chalcoides, Cyprinus carpio, Nemachilus brandti, Lucioperca lucioperca, Abramis brama, Aspius aspius* and *Silurus glanis.*

Out of these the *Caspiomyzon wagneri* is included in the Red Book of Azerbaijan. Its spawning time ranges between March and May. *Salmo (fario morpha) caspius* is very valuable but becoming rare and spawns from the end of October to the end of January. Most of the other fish mentioned above are valuable for food and their spawning time is between March and May.

3. 2 Borrow sites

The consultant has visited a total of 11 borrow pits which *Azeravtoyol* considers appropriate for material extraction. All of these sites are located within the floodplains of natural rivers, which, according to their geographical location, do only hold water during spring or autumn. As for the rest of the year these rivers would generally fall dry.

Out of these 11 locations a total of 7 are Government property. All of these have been or are in operation and dispose of more or less extensive equipment associated with the screening and crushing of stones. At earlier stage of the design new borrow pit on the river Kura near *Yuhary Salahly* was proposed to be included for material extraction. For the time being and with limited environmental baseline data of hydrogeological and biological factors of the borrow pit site, it is not feasible for the Project. The 7 government owned borrow pits has received their licence of operation from ASCE. According to the present national regulation the licence for operation has to be renewed every two years after the first receive of the permit from ASCE.

Further 4 sites are private property and have not been explored to date. According to the information obtained, the respective owners have received official permits approved by different respective municipal organs and the ASCE, which allows to reserve the respective area for borrow pit operations. According to the national regulations this is the preliminary permit which does not apply for starting the operations in the area. Before commencement of the operations each area has to receive environmental permit from the ASCE. The requirements for to receive this permit include environmental impact assessment or analysis by the ASCE.

Within the borrow pits that are already operating vegetation is generally scarce and restricted to some scattered stands of *Tamarix, Artemisia, Rubus* or (artificial) growths of trees (*Morula, Salix, Populus*). Within the newly proposed sites, which are all located west of *Mingechevir*, riverbeds sometimes contain smaller elevations which can then carry scattered stands of *Salix, Populus, Fraxinus, Ulmus, Quercus longipes* etc.

In terms of animal wildlife there were observations of Black vulture (*Aegypius monachus*) near the borrow pit on the river Agsu. This species which has European conservation status and is also considered a rare species in Azerbaijan has extended its feeding habitat into the valley, including the floodplains of the river *Agsu*. At the *Mingechevir* borrow pit (river Kura) flocks of Pygmy Cormorans (*Phalacrocorax pygmaeus*) were observed, a species which has European conservation status but which is, however, common to Azerbaijan. Artificial lakes within the borrow pit near the *Poylu* railway station were populated by waders (*Tringa ochropus),* egrets *(Egretta garzetta),* moorhen *(Gallinula chloropus),* coots *(Fulica atra)* and grebes *(Tachybaptus ruficollis*). Other species commonly associated to such artificial ponds are *Rana ridibunda* and the Caspian turtle *Mauremia caspica*. During winter season such places have importance as wintering habitats for various species of ducks, further species of grebes and sometimes swans.

The following is a summary of the places that have been visited (from east to west, see also following map):

<u>Government owned borrow pits</u>

1. river *Agsu*
   distance from road: 40 km
   nearest settlement: *Agsu*, in the immediate vicinity

2. river *Girdymanchay*
   distance from road: about 35 km
   nearest settlement: *Padar*, 2km

3. river *Goychay*
   distance from road: 15 km
   nearest settlement: about 1 km north to the township *Goychay*.

4. river *Kura*
   distance from road: 16 km
   nearest settlement: *Mingechevir* (5 km)

5. river *Shamkir*
   distance from Road: immediately to the Road
   nearest settlement: *Muhtarriyat*

6. river *Tovuz*
   distance from Road: 1,5 km
   nearest settlement: *Tovuz*, 1,5 km north

7. river *Kura*
   distance from Road: 14 km
   nearest settlement: *Poylu*

Privately owned borrow pits

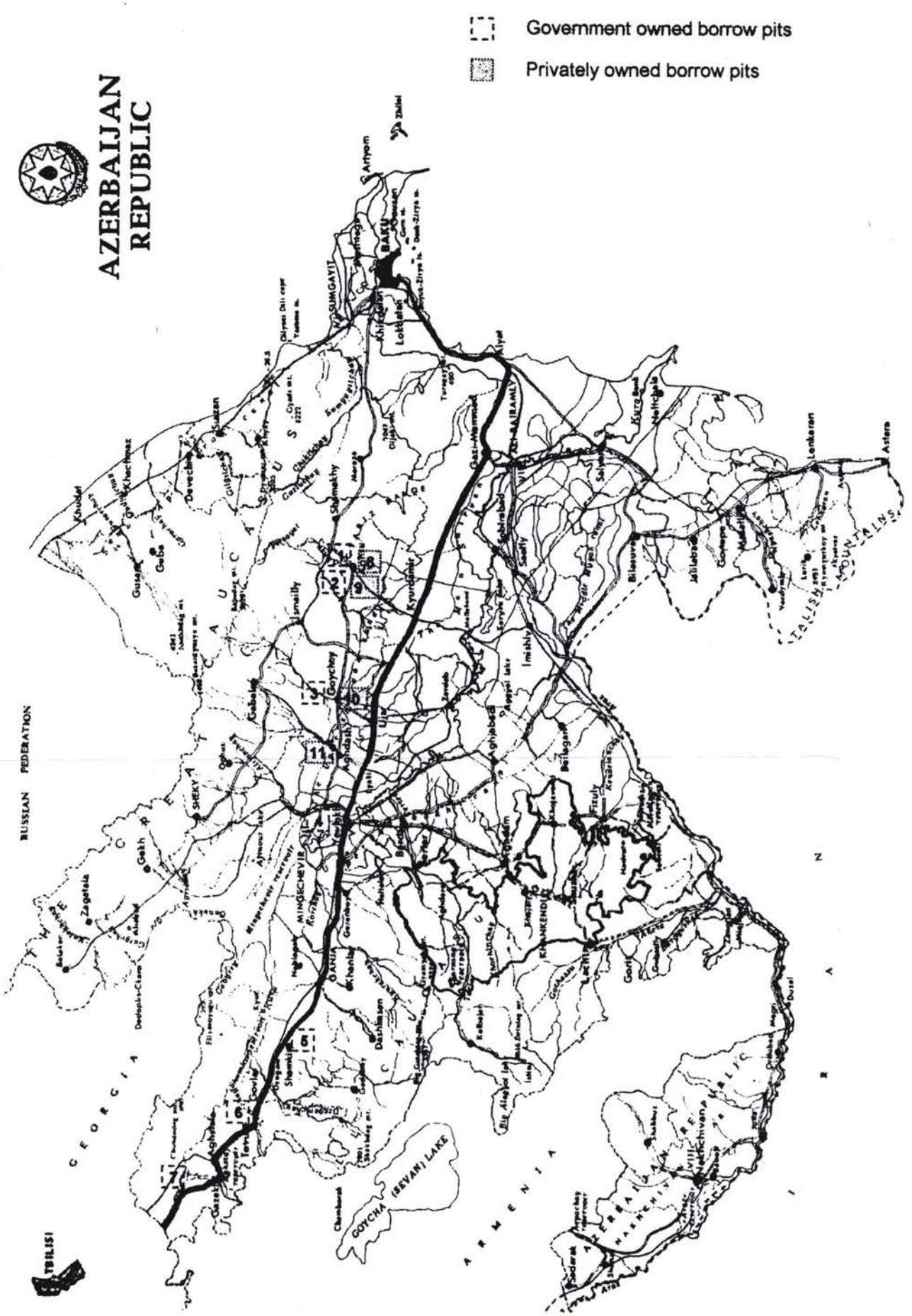
8. river *Agsu*
   distance from road: 20 km
   nearest settlement: Agalarbeyly in the immediate vicinity

9. river Girdymanchay
   distance from Road: 12 km
   nearest settlement: *Gassymbeyly*

10. river *Goychay*
    distance from Road: 7 km
    nearest settlement: *Kyzylagach*

11. river *Turianchay*
    distance from Road: 16 km
    nearest settlement: *Yuhari Agchay*

LOCATION OF QUARRYIES AND BORROW PITS



4 Environmental impacts and mitigation plan

4.1 Conclusions from Site Visits

According to the conditions described above, the land and the few structures that occur alongside the road do only show a very limited ecological value. River Inja, where situates habitat of bee-eaters and rollers at the river embankment, ecological value exists and some limitations during the rehabilitation of the road and bridge need to be considered. Losses or impairment of critical habitats (structures / elements of special value or function for to rare or endangered species) are not to be expected nor in the immediate, nor in the wider corridor along the road.

The impacts will, if at all, mainly consist of the physical intrusion on a 2 – 3 m wide strip of land in average. This strip is identical with the corridor that would be used in the case of any regular maintenance operation. Within this area the impact will be of only temporary nature and result from the clearing of the construction corridor and the movement of heavy machinery together with the associated development of dust, noise and exhaust fumes.

The improvement of the alignment will generally take place within the existing right of way. Within this corridor no features of outstanding value have been identified. It is, however, expected that this activity will result in the loss of trees and shrubs and may also entail works on channels when existing culverts are replaced or expanded.

Borrow Pits

According to impressions obtained during the field visit it can be stated that material extraction as it relates to the proposed Project would not entail the direct loss or impairment of any valuable or outstanding natural structures or habitats.

With respect to material transport traffic may create temporary nuisances for local residents in those cases where settlements lie close to the borrow pit itself or close to the haulage route.

Asphalt plants

Asphalt plans that would be utilised for the Project do not exist yet. During the site visit it was concluded in section *Ganja* bypass- *Tovuz* there are few suitable places for asphalt plants. The vicinity of agricultural land, vineyards and the communities shall be avoided for the installations. According to the ASCE implementing the SNIP regulations the plant should be not sited closer than 300 m of the settlements. In this section the Baku-Tbilisi railway surroundings with industrial installations would be suitable for siting an asphalt plant.

In section *Tovuz-Gasakh* the fertile section before Agstafa community should be avoided. Last section from Gasakh to the border is characterised by agriculture, vineyards, rows of trees and small settlements and thus no recommendable places for asphalt plants exist in the zone 40 km before entering the border.

Summing up, the impacts that are to be expected are of minor importance and can be avoided or mitigated by implementing a series of precautionary measures during rehabilitation / construction.

The following chapter outlines the legally required environmental protection and safety measures and also contains additional measures for environmental improvement or environmental enhancement opportunities, which follow WB recommendations for similar road rehabilitation projects[3]. As for the measures controlled by regulatory requirements, these proposals will then have to be discussed with the appropriate official bodies and, if approved, developed to some more detail in the future planning stages.

4.2 Environmental Impacts, Avoidance and Mitigation Measures

Following to the two site visits (M1 and potential borrow sites) the consultants have discussed the Project features with staff from *Azeravtoyol* and representatives from the *ASCE*. The conclusions are as follows:

Environmental Impacts

Pavement repair or the improvement of drainage facilities on the existing road only very limited environmental impacts are to be expected. Possible adverse impacts would mainly be direct ones, i.e. those that are caused by the purely construction-related activities like the temporary use of land immediately adjacent to the road, some local removal of road-side vegetation, temporary land-take for the siting of contractor's yard(s) and asphalt plants as well as the extraction and the transport of construction material from existing borrow sites.

Impacts on human health

As the Project will improve the surface and 'furniture' of an existing road, potential adverse impacts on human health would be restricted to the construction period where exhaust fumes, noise, dust and potential spills of harmful substances or materials could affect workers or local residents.

Impacts on human safety

With regard to road users travelling safety will be improved through a smoother road surface, the replacement of unsafe bridges and a better road 'furniture' (crash barriers, road marking, traffic signs, sidewalks for pedestrians in the villages etc.).

During construction, however, safety could be adversely affected by construction traffic, activities within the contractor's yard and works related to material extraction and transport.

Impact avoidance / mitigation measures

The mitigation measures are specified for activities within the contractor's yard(s), asphalt plants, borrow pits, earth works, and the management of road and bridge construction works. The mitigation plan address issues like ground and surface water protection, protection of roadside vegetation, dust control, waste management, materials handling and storage, worker's health and safety as well as road safety.

[3] The World Bank 1994: Roads and Environment: A Handbook

The expected project-related impacts as well as a general concept of suitable mitigation measures and proposals for additional environmental enhancement will be discussed in broader terms below. Where norms and regulations exist, these will be stated. Mitigation plan in tabular form is presented in Appendix 5.

Establishment, set-up and operation of the work site

Impacts

The location of work facilities is a key environmental issue during the establishment of the construction site. Depending on the site that is chosen, the installation of equipment and storage of materials may cause traffic disruption, noise and dust affecting road users and neighbouring residential areas (the latter could refer to the peripheries of the villages that exist along the road, if a construction camp was installed there).

During harvest seasons temporary detours or road closures could create additional problems.

Pollution of soils, ground or surface waters could result from the cleaning of equipment and material's storage and handling. Where worker's camps are temporarily erected domestic garbage will be generated.

Finally, site establishment could disturb the breeding sites of endangered species that have been identified in the area.

Impact avoidance / mitigation measures (see Appendix 4)

Reasonable siting of the contractor's yard(s) shall not exclusively take technical or economical measures into account, but would also have to consider environmental requirements. The Project will thus have to develop criteria to this regard, e.g. the avoidance of lands adjacent to settlements, avoidance of wetlands, drinking water sources, avoiding of the disturbance of nesting sites of endangered bird species (e.g. rollers).

Site selection and preparation shall also, as far as possible, avoid the removal of trees and shrubs. Should trees or shrubs be growing in the immediate vicinity of or within a selected site, they should be physically protected against damage by suitable measures (BCH 8-89, no 2.3.4 – 2.3.7). Also, site preparation shall include removal and storage of topsoil according to existing regulations (SNIP 2.05.85, no. 3.4 and 3.5).

Depending on the number of workers and the required mode of accommodation (i.e. construction camp with containers or other accommodation facilities) provisions will also have to be established for the proper treatment of sewage and domestic waste. Where feasible, it could also be considered to temporarily integrate waste collection from worker's camps into existing collection systems and deposal facilities of nearby communities.

If not handled properly, storage and handling of hazardous substances such as detergents, lubricants, oil, fuels, paint etc. within the contractor's yard(s) can be sources of considerable groundwater pollution, the pollution of surface water or soils, or affect worker's health (Safety Regulations for Construction, Rehabilitation and Maintenance of Roads, Chapters 1, 2 ,11 and 17; BCH 8-89 no. 2.2.1, 2.4.11 and 2.5; SNIP III 4-80 no. 2). BCH 8-89 also defines protection zones along rivers, where pollution of soils, storage of waste as well as vehicle parking and cleaning is prohibited. As mentioned in Chapter 2 of this Report, numerous irrigation and drainage channels exist in the imme-

diate and the wider vicinity of the road and it is felt, that the provisions of BCH 8-89 no. 2.2.9, 2.2.10 and 2.4.11 should also be applied to irrigation and drainage channels, since they sooner or later all flow into rivers.

Traffic safety within the contractor's yard shall be ensured by a well designed traffic management plan (only roughly covered by the provisions of SNIP III-4-80 no. 2).

Also, it must be expected that awareness about adverse environmental impacts potentially arising from operations within the contractor's yard (and also construction activities in general) will be very low among the workers. It is therefore recommended that the construction supervision shall provide on-site-training or briefing for the workshop personnel as well as for those operating and maintaining machines and equipment.

Another important aspect of contractor responsibility shall be the restoration of work areas, work depots and material storage sites. Restoration would also include re-spreading of topsoil, removal of all machines and waste material from the work site after completion of works (only very generally / partly covered by BCH 8-89, no. 2.4.2).

In order to ensure the proper implementation of the existing regulations and further suggested measures it is recommended that responsibilities shall be clearly defined and that compliance monitored by an inspector or the construction supervision team. Also, the contractor shall submit a method statement for the establishment, operation, maintenance and restoration of the work site.

Activities within the construction corridor

Impacts

Given the very early planning stage of the Project there is presently only limited information and few baseline data on the various requirements for technical improvement in the individual sections or locations. Thus, only very general presumptions can be presently made with regard to the impacts that could be related to construction activities, the temporary diversion of traffic or traffic management during construction. The following aspects may have to be considered:

Since rehabilitation works will take place while the road is in operation, road hazards may arise from partial closure of lanes and the movement of heavy construction equipment. This may affect both road workers as well as road users (drivers, pedestrians, road side merchants etc.) who can be put at risk by inadequate traffic management and work zone controls during construction.

If appropriate protection measures are not taken into consideration damage to or destruction of road-side vegetation is rather likely to occur where trees and shrubs grow close to the present road edges.

Where existing bridges or culverts will be replaced and new culverts build this may require some major earthworks on the sensitive embankments of the streams and, if no further precautions are taken, soil erosion and water pollution could be caused.

Depending on the local soil properties, soil compaction can be caused by work-site machinery moving around the construction site which may harm the soil's potential for future agricultural or other use.

Refuelling operations may, if effected without further precautionary measures or under inadequate technical conditions entail accidental spills and hence cause the pollution of soil and groundwater.

Dust development could be caused by moving machinery and specifically create annoyances for local residents.

Finally, not reusable waste materials from pavement or bridge reconstruction as well as abandoned machinery could find their ways into waterways and / or disfigure the landscape if not removed from the work sites after completion of construction.

Impact avoidance / mitigation measures

With regard to traffic and the safety of workers and local residents, potential risks and disturbances can be avoided or mitigated through well designed plans for work traffic and management. The latter is partly covered by SNIP III-4-80 (safety provisions for construction activities in general, some of which would also apply to road construction) and also by the Safety Regulations on Construction, Rehabilitation and Maintenance of Roads of 1978 (corresponding to SNIP III A-11-70).

Within or near to settlements, where transport may disturb local residents, minimisation of dust development may be achieved by periodically watering of transport roads and by using covered trucks (see also BCH 8-89, no. 4.1.1).

Roadside trees and shrubs are especially frequent in the section west of *Shamkir*. These often grow in the immediate vicinity of the road so that rehabilitation and further construction activities in these areas should be carried out with special care regarding the protection of roadside vegetation (BCH 8-89, no. 2.3.4 – 2.3.7; 2.7.6). The Project shall work out mechanisms that ensure the implementation of such measures.

Wherever possible, processing and reuse of existing materials (sub-base and surface material or material from demolished bridges for example) should be considered. This would help to avoid or minimise the need of waste disposal and also reduce adverse impacts potentially resulting from material extraction and transport.

In cases the material cannot be reused, the construction waste should be taken to specific site (or official dump) that has received approval from the environmental authorities. Clean, not reusable soil material shall be taken to soil dumping places indicated and designed during detail design of the road rehabilitation.

In cases of bridge rehabilitation safety regulations for workers shall be considered (Safety Regulations on Construction, Rehabilitation and Maintenance of Roads, Chapter 6).

Finally, all land that has been temporarily used for construction will have to be restored to the initial state. This shall also include the removal of all machines and waste material from the construction site after completion of construction activities (only insufficiently covered by BCH 8-89 no. 2.4.2). The waste material during the construction should be divided to untreated wood waste, clean soil, construction waste and chemical waste. The wooden waste and clean soil materials should be reused whenever possible and the construction and chemical waste transported only to waste material disposal sites by defined the authorities.

Material extraction and transport

Impacts

Borrow sites which provide road building materials may generally have substantial impacts on soils, ground- and surface water, the natural environment, landscape and human health.

Any evaluation of the quality and dimension of any potential adverse environmental impacts that would be related to additional amounts of material extraction from existing borrow sites can only be general in the present cases. In general, purely project-related, additional material extraction from existing and operating borrow sites is not expected to create serious additional or new impacts on the natural surroundings, animal or plant life, groundwater or landscape.

Before starting borrow pit operations the new sites has to receive environmental permit from ASCE. It is strongly recommended before contracts to review with ASCE and the local executive organs the official permits for defined emission limits, environmental monitoring and defined depth of material extraction.

Impact avoidance / mitigation measures (see Appendix 4)

As a first step to mitigate transport-related disturbances for local residents and also road users in general it should be considered as to how far transport through villages can be avoided. Should this not be feasible, roads should be periodically watered (BCH 8-89 no. 4.1.1). The use of covered trucks would also minimise dust development when working close to settlements. In both cases a well designed traffic management plan should consider traffic safety and make statements on working hours for material transport. Again a contractor method statement on material handling and transportation should be sought for approval.

Appropriate information on the Project shall be provided to potentially affected local residents. This information shall be given prior to the beginning of construction work in order to allay fears or complaints and comprise the beginning and planned duration of construction works as well as contact points and official responsibilities.

With respect to worker's health or safety the existing safety regulations shall be applied and compliance monitored (Safety Regulations for Construction, Rehabilitation and Maintenance of Roads (corresp. to SNIP III A-11-70) chapter. 12).

At earlier stage of the design *new borrow pit on the river Kura near Yuhary Salahly* was proposed to be included for material extraction. For the time being and with limited environmental baseline data of hydrogeological and biological factors of the borrow pit site, *it is concluded to be not feasible for the Project*.

Asphalt plants

Impacts

Asphalt plants will have potential impacts on air, groundwater, surface water and soil. During mixing the asphalt bitumen is mixed together with the mineral aggregate. The bitumen as well as the mineral aggregate need to be heated before mixing. Bitumen, if accidentally spilled on the ground, will solidify very fast and will not permeate the ground or groundwater. The processing of mineral aggregates causes noise and dust

to the air. Heating gases of the plant emit dust to the air. The exhaust gases should be treated by hydrocyclone or by special filters.

The fuel needed for heating and refuelling the other machinery have a potential impact on groundwater, surface water or soils. Process noise may disturb the surroundings at a distance of 300 m to 500 m depending on the terrain formation. The transport of mineral aggregates to the site causes noise and dust in the air.

Impact avoidance / mitigation measures (see Appendix 4)

To avoid disturbance by noise in the vicinity of the villages, at least 300 m distance to the nearest settlement is required (Sanitary Norms SN 245-71: Regulation concerning air, water and soil discharges). For all asphalt plants Environmental permits need to be applied from Ecological committee who implement Sanitary Norms SN 245-71.

Near to settlements, where transport of materials may disturb local residents, minimisation of dust development is achieved by periodically watering of transport roads and by using covered trucks (see also BCH 8-89, no. 4.1.1).

If not handled properly, storage and handling of oil and fuels. within the contractor's yard(s) can be sources of considerable groundwater pollution, the pollution of surface water or soils, or affect worker's health (Safety Regulations for Construction, Rehabilitation and Maintenance of Roads, Chapters 1, 2 ,11 and 17; BCH 8-89 no. 2.2.1, 2.4.11 and 2.5; SNIP III 4-80 no. 2). BCH 8-89 also defines protection zones along rivers, where pollution of soils, storage of waste as well as vehicle parking and cleaning is prohibited.

Another important aspect of contractor responsibility shall be the restoration of work areas, work depots and material storage sites. Restoration shall include removal of all machines and waste material from the work site after completion of works, landscaping followed by re-spreading of topsoil, (only very generally/partly covered by BCH 8-89, no. 2.4.2).

Enhancement of designed mitigation measures

Proposals for institutional and regulatory measures

The institutional framework for the practical implementation of the legally required environmental considerations and measures in road design as well as the level of implementation of environmental, health and safety regulations during the various phases of road rehabilitation and maintenance was found to be actually inappropriate.

With *Azeravtoyol* being the institution responsible for the development of sector policies in the various areas of its activities it is recommended that:

- a clearly defined staff member be appointed in the medium-term with overall responsibility for environmental matters, with basic ecological understanding and comprehensive knowledge of environmental laws and regulations, having access to senior management and co-ordinating environmental actions throughout the organisation
- detailed procedures, technical guidelines / instructions and standard contract clauses for the consideration of environmental factors be elaborated for road strategies, planning, management and operation.

This would be in line with various statements that were made to this regard on the proposed restructuring of *Azeravtoyol*[4] and will on the longer terms contribute to the practical improvement of this sector in the sense of western quality standards.

For to fulfil the environmental specifications concerning the rehabilitation project and later on the requirements for the maintenance a fulltime environmental engineer is strongly recommended to be hired for to supervise the interests of the Client, i.e. Azeravtoyol. The engineer or specialist should have speciality in at least two disciplines of the following; botany, zoology, environmental engineering (environmental protection, treatment technologies of waste water and solid waste), environmental law and preferably he or she should also have some studies in road construction.

The improvement of road safety

It was especially observed close to or within the villages or townships that small shops and kiosks were installed immediately adjoining to the carriageway. This is felt to be a serious impairment of road safety for both drivers and merchants.

It is therefore suggested that during the design for the widening of the road a concept be provided for the creation of designated roadside market areas and parking. This would help to improve on road safety and at the same time protect local income sources.

Technical measures of the road

The environmental assessment that was carried out for the rehabilitation / upgrading of the section *Gazi-Mammed - Kyurdamir* in 1997 / 98 criticised the conditions at some vehicle repair ramps that exist alongside the road and suggested their demolition to avoid further uncontrolled pollution.

In the meantime a number of new petrol stations have started their operations alongside the M1. Since these are offering a wide scale of technical services it is now suggested to successively eliminate the existing repair rams and to direct drivers to better service facilities.

The soil may be partly heavily contaminated with mineral oils, but the volume of the heavily contaminated soil is estimated to be quite small. The soil can be removed and taken to specific treatment sites whenever feasible. Such treatment facilities in Azerbaijan are rare and transport distances are long. In all cases it is recommended to remove the installation of the ramps and to cover, i.e. isolate the contaminated soil from effects of rainwater and erosion by covering it with asphalt. The existence of the likely contaminated but isolated soil should be documented to the technical guidelines / instructions or files of the maintenance of the road.

5 Environmental Monitoring Plan

During the feasibility a study an Environmental Monitoring Plan was elaborated to ensure that the designated environmental mitigation measures will be efficiently put in practise. Since the expected environmental effects are very limited to the flora, fauna, air, water and soil, the measures to protect them are preventive and mitigative, but no special monitoring of the flora, fauna, groundwater level and quality, climate etc. is

[4] TRACECA Module C: Azerbaijan, Road Sector Restructuring. Dec. 1997

included. The monitoring plan is rather a checklist for certain actions to proceed at the right time in the right phase of the design, reconstruction and maintenance procedure by designated responsible directions. The Monitoring Plan is included in Appendix 5.

Design

Design stage checklist is essential to include proper design for environmental and human impact mitigation measures. The areas of specific environmental interest mentioned before in the feasibility study need to be taken into account for protection of environment during the construction and need to be included into the tender documents. The other measures are design for flooding prevention erosion protection, animal crossings, market places and soil dumping places (clean soil). Contact to local authorities is included to the design phase but may also be done in the rehabilitation phase by the Engineer for to provide feasible siting of the market places and animal crossings.

Rehabilitation

For to fulfil the environmental specifications concerning the rehabilitation project an environmental engineer is strongly recommended to be hired for to supervise the interests of the Client, i.e. Azeravtoyol. This will be monitored by the Project Implementation (or Management) Unit. The Environmental engineer of Specialist shall frequently monitor the requirements of the Project in the Quality inspections.

For to fulfil the environmental specifications of the tender document the Constructor shall have person or persons responsible for monitoring of the fulfilment of the requirements. This is evaluated and noted by the Customer i.e. the Engineer during comparison of the tenders and before contract.

The parameters to be monitored during rehabilitation include mitigation measures elaborated during the feasibility study. All the parameters shall be inspected by the Environmental engineer of the Client and are on the responsibility of the Constructor

The loss in agricultural land or crop is compensated to the owners according to the Law on Automobiles and the responsible organ for compensations is Azeravtoyol.

Maintenance

The environmental engineer shall provide detailed procedures, technical guidelines / instructions for the maintenance concerning the regular maintenance of the drainage system, emergency situations including the actions for hazardous spills and maintenance of the green areas.

APPENDICES

1. **Areas of specific environmental interest (A1)**

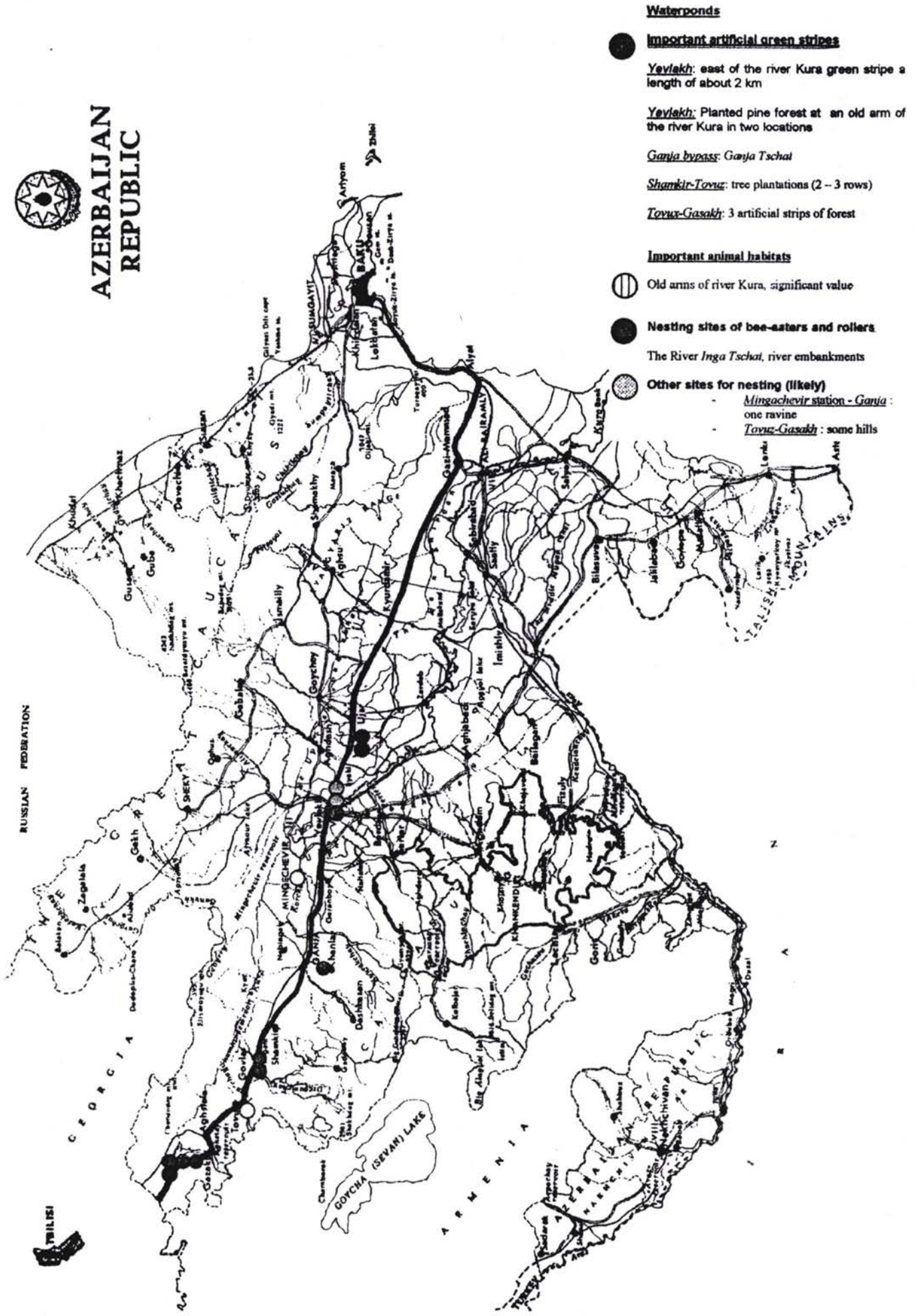
2. **Photos from the site visits (A2)**

3. **Minutes of the Stakeholder Meeting (A3)**

4. **Environmental Mitigation Plan (A4)**

5. **Environmental Monitoring Plan (A5)**

Areas of specific environmental interest



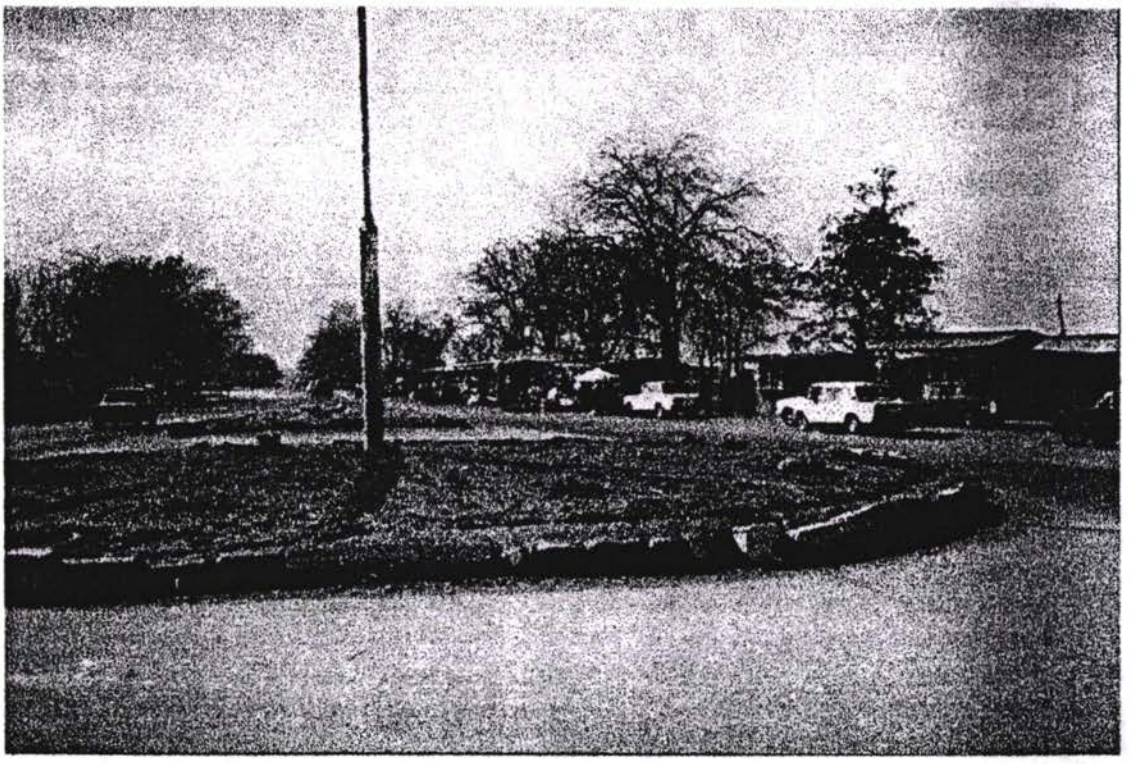


Photo 1. Typical ring-type crossing with merchandise on the road edge.

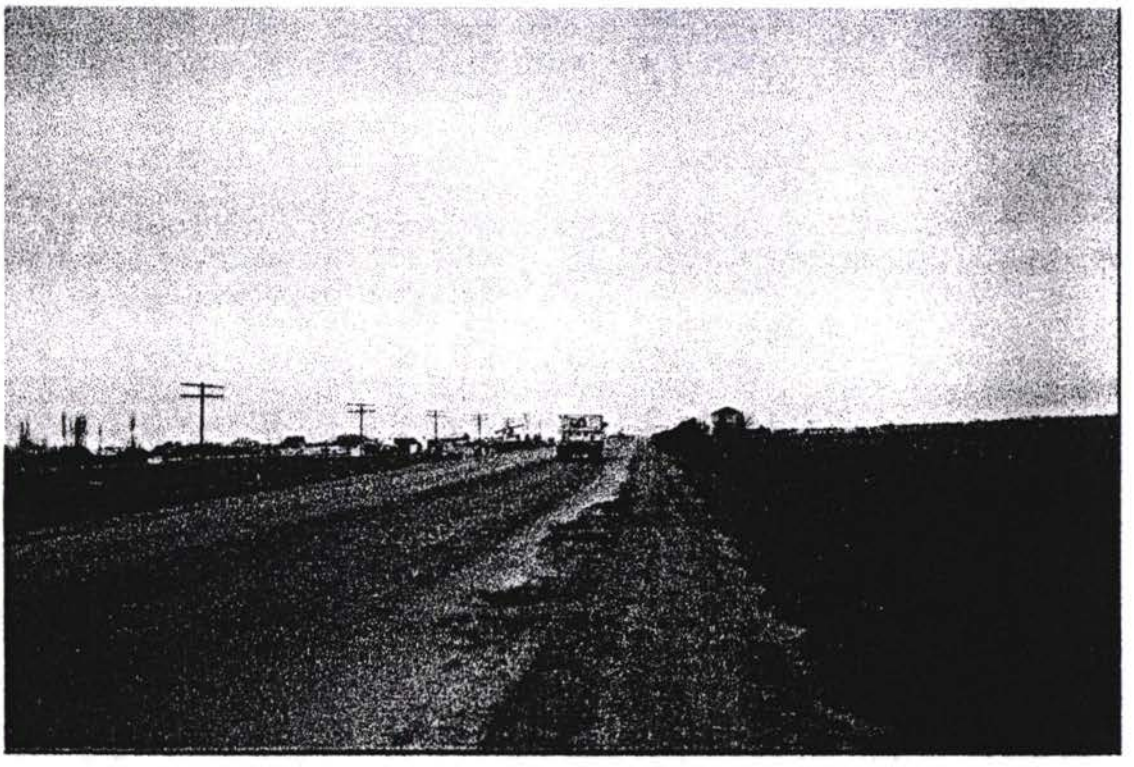


Photo 2. Typical road view between Ganja bypass- Shamkir (at 120 km from border)

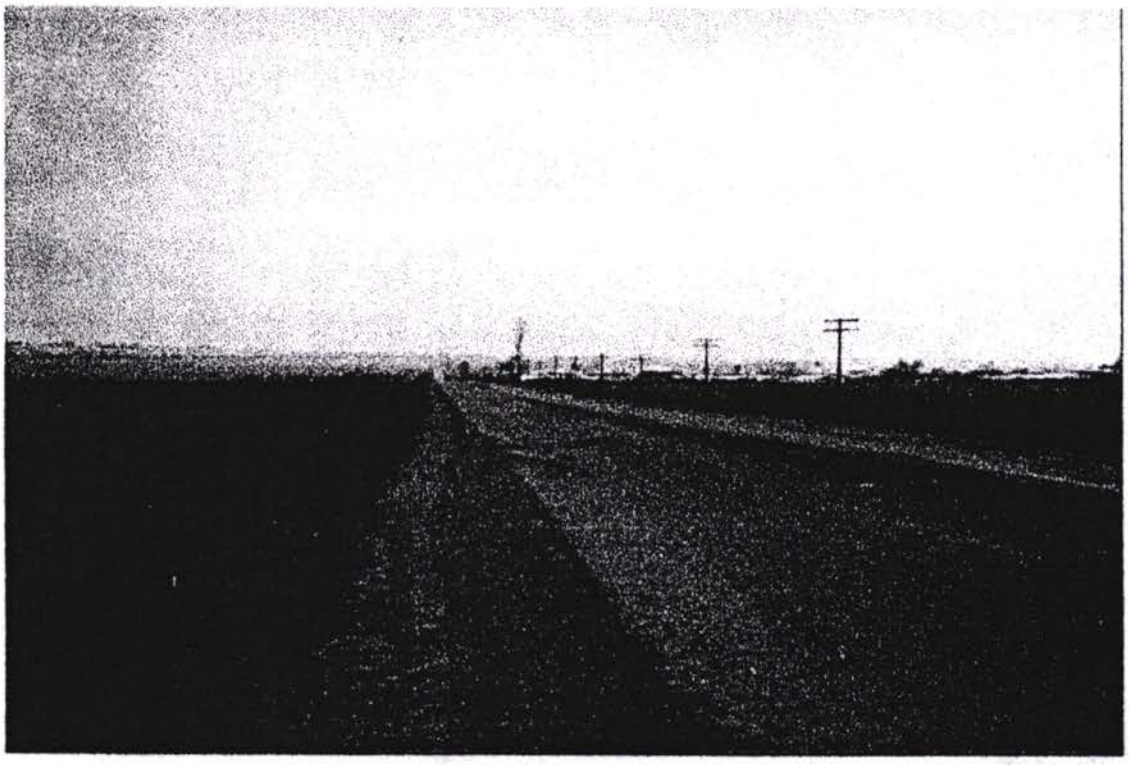


Photo 3. Typical road view between Ganja bypass- Shamkir (at 120 km from border)

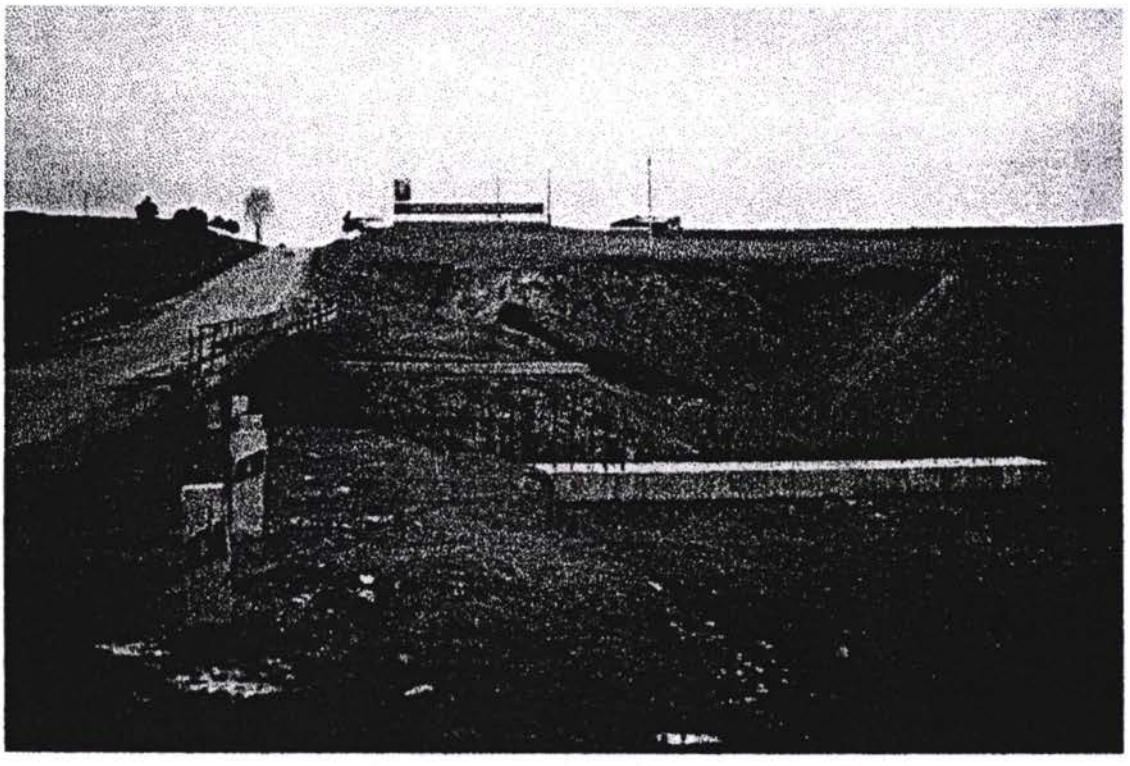


Photo 4. River Tovuz: example of erosion by rainwater.

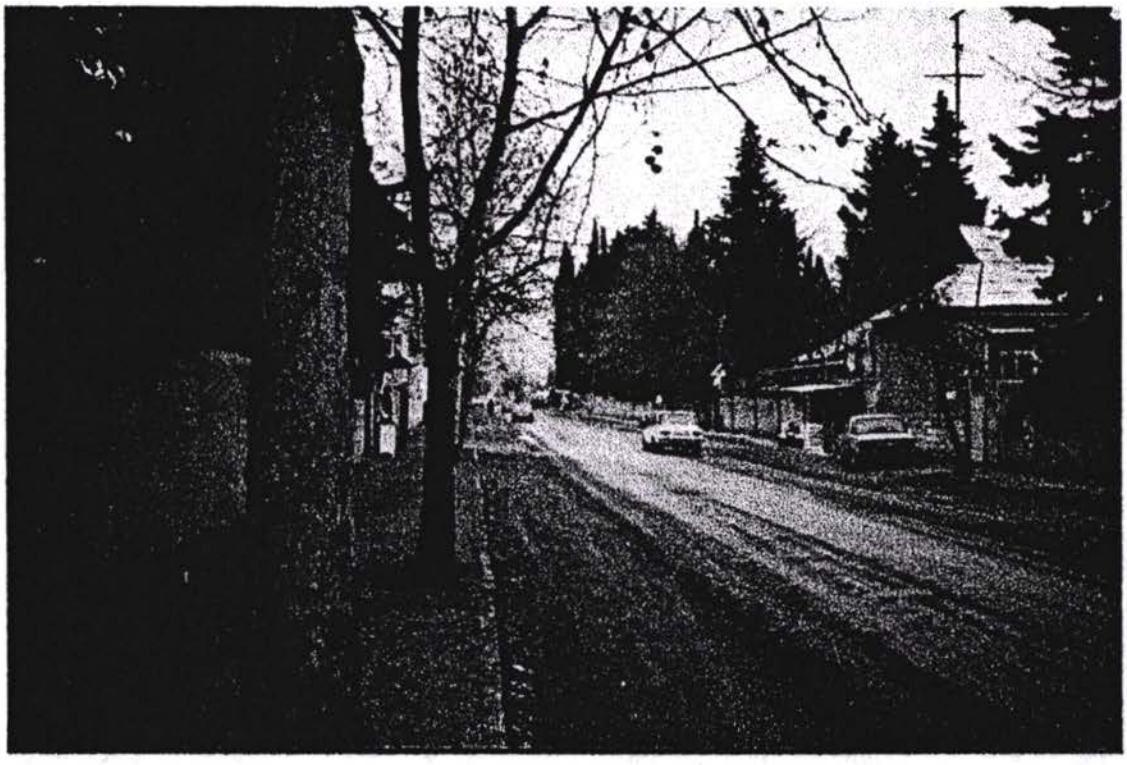


Photo 5. Settlement of Tovuz.

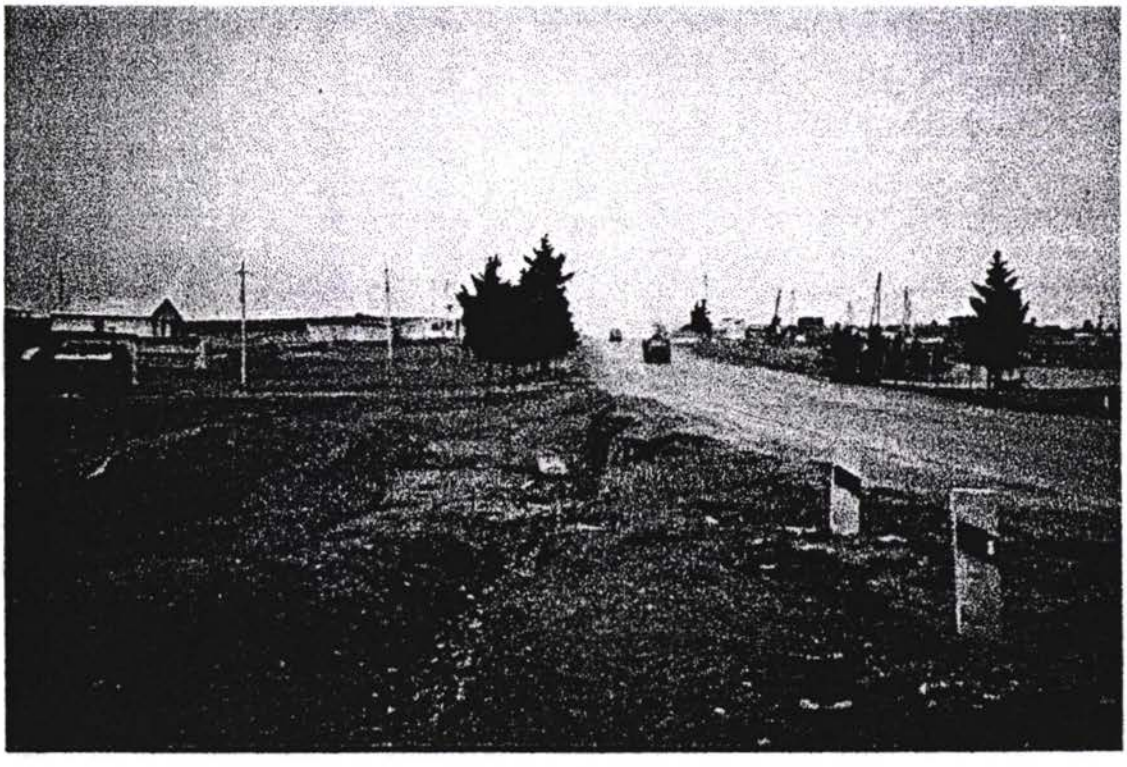


Photo 6. Example of possible dangerous dig and erosion at the road embankment

Photo 7. Gasakh-border, the pastures at about 25 km distance from the border.

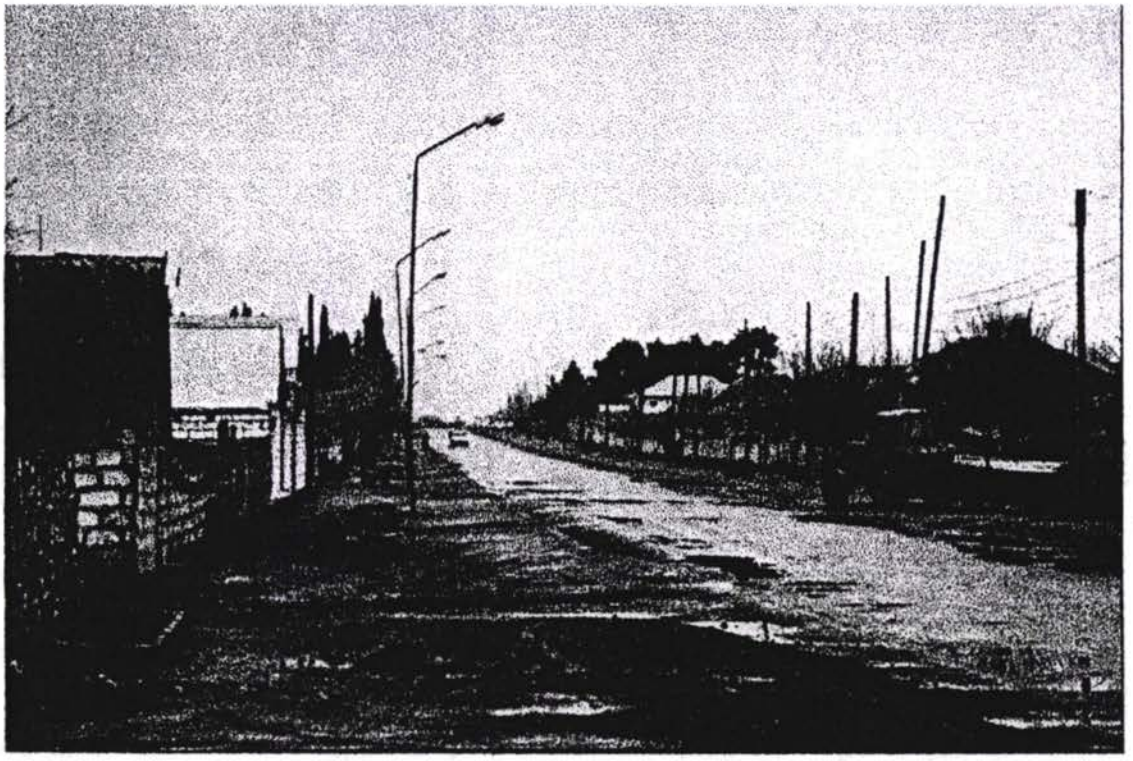


Photo 8. Settlement at about 20 kms distance from the border, sidewalks for pedestrians and drainage shall be prepared during the rehabilitation.

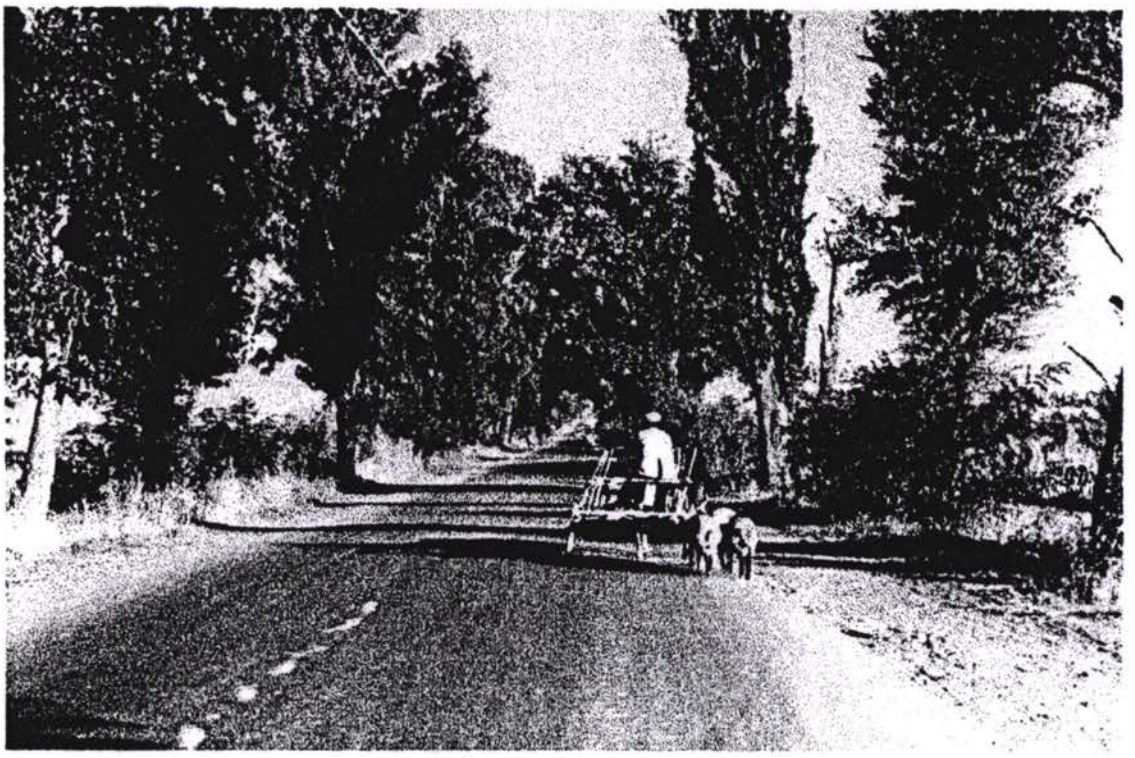


Photo 9. Typical roadside trees (*Populus alba)* in the section between *Tovuz* and the Georgian border

Photo 10. River Inja Tschai: the high and steep embankments have significant numbers of nesting tubes of rollers and bee-eaters.

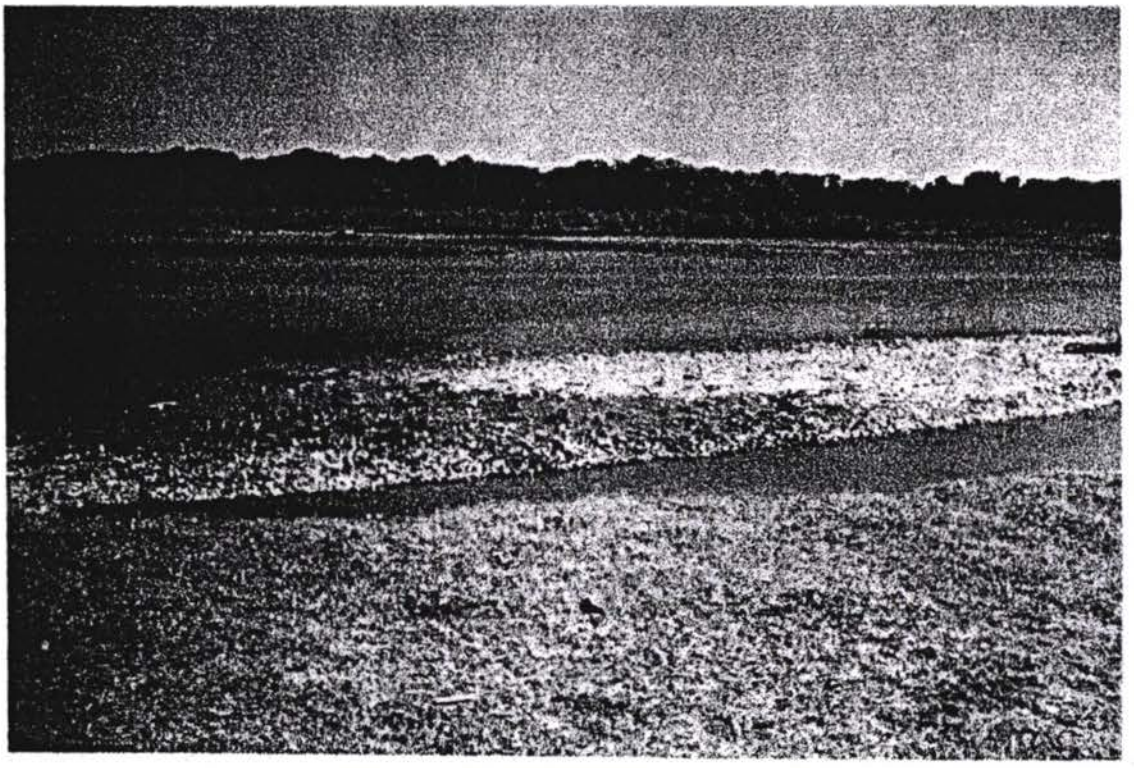


Photo 11. Private owned, yet unexploited borrow pit within the river Goychay, south of the town Goychay (Borrow pit no 3)

Photo 12. See above.

Photo 13. State owned borrow pit within the river Girdymanchay near the village Padar (Borrow pit no 2)

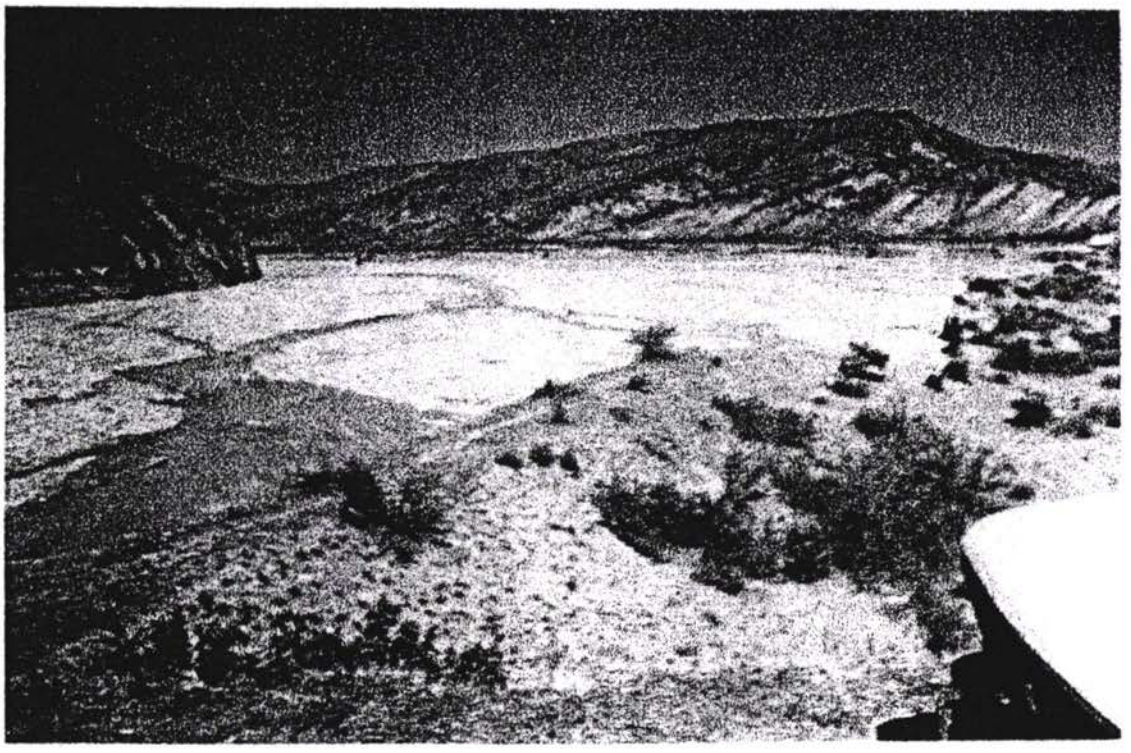


Photo 14. See above

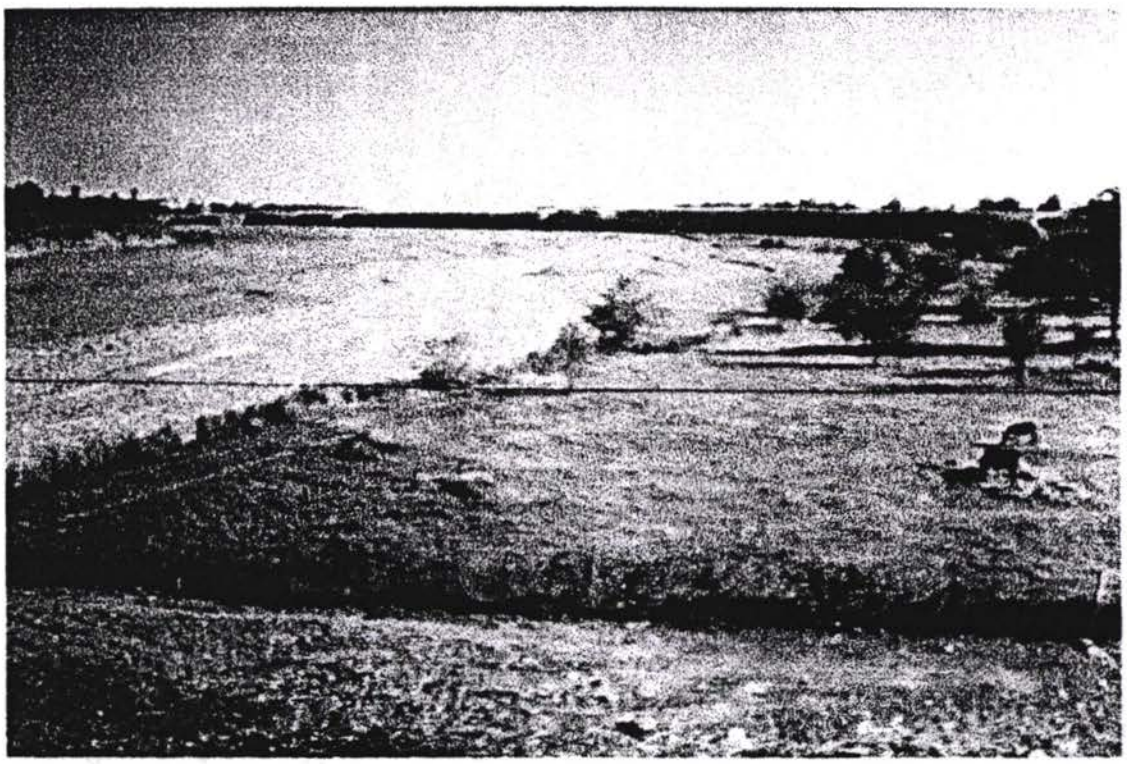


Photo 17. State owned borrow pit within the river Shamkir (Borrow pit no 5)

Photo 18. See above

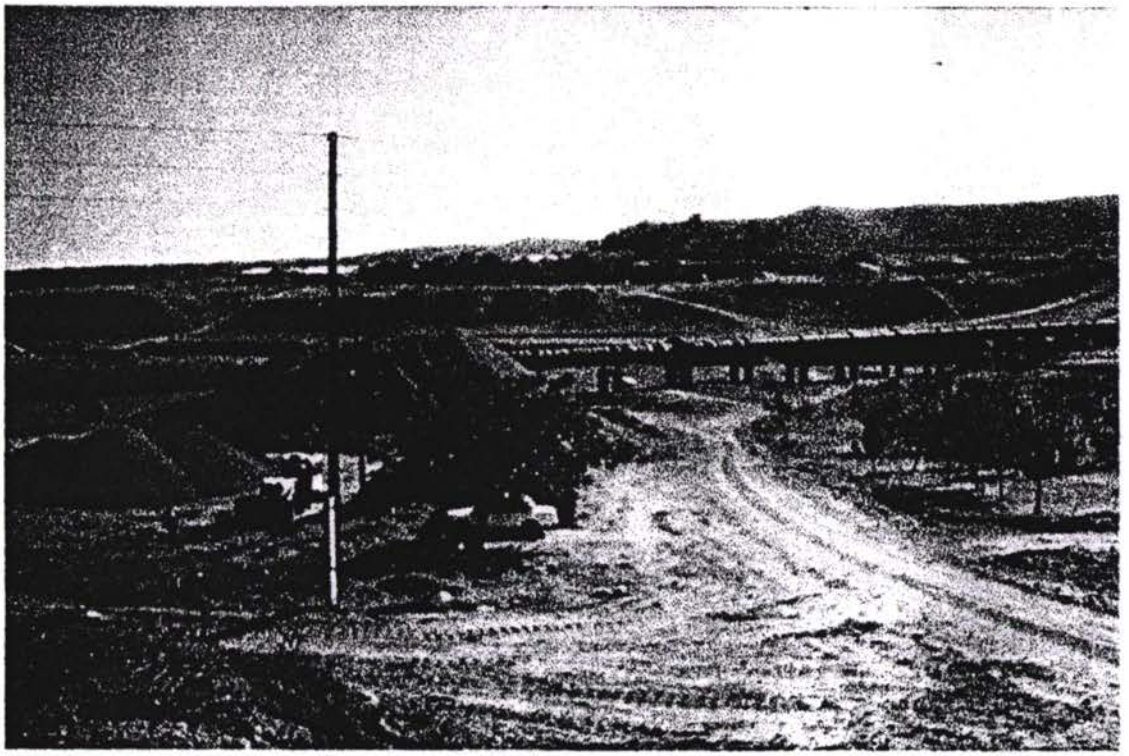


Photo 15. State owned borrow pit within the river Tovuz north of the town Tovuz (Borrow pit no 6)

Photo 16. See above

Azeravtoyol State Concern

Discussion of the Proposed Environmental Management Plan for Ganja – Gazakh Road Project

Stakeholder Meeting

MINUTES OF THE MEETING

Place: Ganja, Azerbaijan
Date: March 15, 2001
Time: 15:00 – 17:45

The Chairman of the Meeting – Mr. Nizami Garaisayev, Vice President of Azeravtoyol.

Other presenters

G. Sultanov – Chief Lawyer of Azervtoyol State Concern
Hijran Valehov – Local Team Leader, Consortium Kocks Consult GmbH – FINNROAD Ltd – BCEOM
Erja Vallila – Environmental Expert, Consortium Kocks Consult GmbH – FINNROAD Ltd – BCEOM
Elchin Sultanov – Local Environmental Expert, Head of the Ornithological Laboratory of the Institute of Zoology of Azerbaijan Academy of Sciences

Agenda

1. Discussion of the World Bank future Credit for the proposed rehabilitation of Ganja – Gazakh road (speakers: N. Garaisayev, Vice President of Azeravtoyol, H. Valehov, Local Team Leader)

2. Environmental Mitigation Plan for the proposed project (speaker: E. Vallila, environmental expert, Consortium Kocks Consult GmbH – FINNROAD Ltd – BCEOM)

Mr. N.Garaisayev, the chairman, opened the meeting. He gave brief information to participants about present situation on the road sector of Azerbaijan. He pointed out that the World Bank is prepared to finance the rehabilitation and reconstruction of the road section from Ganja to Gazakh. The length of this road section is about 94 km. The opening speech is attached in Annex 6.

Mr. Valehov informed the participants about proposed road improvement and rehabilitation measures. Improvement will include (i) the reconstruction, resurfacing, and/or leveling of selected sections as necessary to achieve a high quality road, (ii) widening of the road to an uniform road width, (iii) replacement, widening or strengthening of bridges in need of repair, (iv) improvement of drainage and (v) installation of road markings and road signs

Ms. Erja Vallila presented an introduction to the environmental impacts of road construction and road rehabilitation in general. Environmental analysis of the road rehabilitation is part of the requirements of the World Bank. She described in general the mitigation plan for the various activities during the proposed project and explained that impact analysis includes physical and natural environment such as soil erosion, impacts on water, air quality, flora and fauna. She also mentioned necessity of potential human and social impacts to be considered. All measures will be considered taking into account the legal aspects considering the environment. She also explained the meaning of public

consultation: to deliver information and to collect information, opinions and concerns about the project from participants. Public consultation gives the opportunity to ensure that things are done in right way. The transparencies of the presentation are given also in Annex 7.

Discussion:

1. Mr Isayev asked if there is any budget in the project for planting trees. Vice president of Azeravtoyol, Nisami Garaisayev, answered that when tree planting is necessary from the environmental point of view the cost for tree planting will be included in the budget of the construction works.

2. Mr. G. Huseynov wanted to have more information concerning the environmental impacts of the asphalt plants and borrow pits related to the project and the construction of the new bridges. Ms. Vallila explained the possible environmental impacts from asphalt plant and borrow pits (i.e. noise, dust, possible impact on groundwater, flora and fauna). Mitigative measures are included in the designs and in the tender requirements of the constructor. For new borrow pits it is necessary to apply environmental permits from Ecological Committee.

3. Mr.Valiyev asked if the local committees for Ecology and Control of Natural Resources Utilisation are going to be involved during construction. Vice president of Azeravtoyol, Nisami Garaisayev, answered that all necessary questions will be discussed with the central Ecological Committee of Azerbaijan, which organises the co-operation with the local committees.

4. Mr. Aliyev asked if animal passages or crossings has been considered to be implemented during the project. Mr Valehov explained that possibilities for animal crossings will be investigated in the detail design stage. Requests for animals crossings should be made in written form to Azeravtoyol.

5. Mr. Mammadov wanted to know how many bridges are going to be replaced and widened by the project. Mr. Nizami Garaisayev informed the participants about construction of new bridges. Approximately 3 bridges will be replaced and 20 bridges will be rehabilitated.

There were also questions presented concerning the bypass of Tovuz, fruit tree planting, and rehabilitation of the steel structure of the bridge in Gasakh. The bypass of Tovuz is not part of the project and the bridge does not situate on the Ganja - Gazakh Road. Fruit tree planting in the vicinity of the road is not recommendable and not part of the project.

Mr. N.Garaisayev, the chairman, concluded the meeting saying that your proposals and suggestions will be considered during the next stages of the project. All participants are most welcome to send further question concerning the project to Azeravtoyol. He thanked the guests for participation and wished all the best.

Prepared by: Fuad Ahmedov, Azeravtoyol State Concern

Annex:

1. List of Participants
2. Invitation Letter by Azeravtoyol
3. List of invited Governmental and Non-Govermental organisations
4. Copy of the announcement in local newspaper (Respublika, March 10, 2001)
5. Agenda of the stakeholder meeting with project description delivered to the participants in the meeting
6. Copy of the speech hold by Mr. Nizami Garaisaye, Vice president of Azeravtoyol
7. Transparencies of the speech hold by Ms. Erja Vallila, Environmental Expert

ANNEX 1

Stakeholder meeting, March 15, 2001, Ganja, Azerbaijan

Project: Ganja – Gazakh Road Project

List of Participants

Representatives Local Executive organizations, Municipalities, local Committees for Ecology and Control of Natural Resources Utilization etc.
(57 persons), among them:

S.Guliyev – Head of Shamkir Executive Body
I.Guliyev – Head of Construction Department of Tovuz Executive Body
J.Valiyev - Head of State Committee for Ecology and Control of Natural Resources Utilization in Goranboy
A.Mammadov – Head of Bridge Construction Unit in Ganja
D.Dilenov – Head of Road Maintenance Unit in Khanlar
H.Hasanov – Head Road Maintenance Unit in Gazakh
I.Isayev –Head of Municipality in Shamkir
C.Huseynov – Head of Municipality in Tovuz
F.Huseynov and T.Mammadov - Representatives of Tovuz Municipality
Y.Aliyev – Head of Municipality in Deller
S.Jafarov - Head of State Committee for Ecology and Control of Natural Resources Utilization in Ganja
A. Safarov – Deputy Head of State Committee for Ecology and Control of Natural Resources Utilization in Ganja
G.Gasimov – Head of department of Excutive Body of Ganja
M.Malikova - Head of cultural department of Excutive Body of Ganja
V.Rustamov – Deputy Head of Municipality in Nizami
A.Aliyev - Deputy Head of Municipality in Kapaz
A.Guliyev – Director of glay and soil production unit
B.Humbatov – Head of Ganja Road Police
S.Mehtiyev – Head of Kapaz Road Police
J.Gurbanaliyev – Head of Ganja Road Construction Unit

and 37 others

ANNEX 3

Stakeholder meeting, March 15, 2001, Ganja, Azerbaijan

Project: Ganja – Gazakh Road Project

List of invited Governmental and Non-Governmental organization

1) Ecology Committees of Baku, Ganja, Goranboy, Gazakh, Shamkir (see copy).

2) Addresses and contact numbers of the Azerbaijan State Committee for Ecology and Control of Natural Resources Utilization
Head Office: Moscow pr-t, 50. Tel: 41-56-84

   Branch Offices:

   Biyan str.83. 374724, **Ganja**. Tel: 4-7916 or 4-37-08

   Dada-Gorgud str.2. 374601, **Geranboy**. Tel: 5-11-67

   Sabir str.60. 374840, **Kazakh**. Tel: 2-36-68 or 2-12-49

   Nizami str.4. 374660, **Shamkir**. Tel: 2-56-23

3) Administrative bodies of Ganja, Kazakh, Agstafa, Shamkir, Tovuz, Khanlar

4) Municipalities of Ganja, Kazakh, Agstafa, Shamkir, Tovuz, Khanlar

5) NGOs – Invitation to ISAR - Azerbaijan – Baku, Jafar Jabbarli st.24, ap.2.

   Tel: 95-25-57; 95-30-37

6) ISAR-Mingechevir office – Mingechevir, Nizami st.19, ap.21., Tel: (147) 5-33-74

ANNEX 4

Copy of the announcement in local newspaper (Respublika, March 10, 2001)

Елан

Авропа Бирлијинин ТАСИС-ТРАСЕКА програмлары чәрчивәсиндә "Кәнчә-Күрчүстан сәрһәдди автомобил јолунун јенидәнгурулмасы" лајиһәсинин һәјата кечирилмәси заманы әтраф мүһитә көстәрилә биләчәк тә'сири мүзакирә етмәк мәгсәдилә "Азәравтојол" Дөвләт Ширкәти 15 март 2001-чи ил тарихдә саат 15.00-да Кәнчә шәһәр Ичра Һакимијјәтинин инзибати бинасында ичлас кечирәчәк. Әлагәдар, мараглы тәшкилаталрын иштиракы арзу олунур.

"Азәравтојол" ДШ-нин рәһбәрлији.

ANNEX 5

Azerbaijan Highway Project
Rehabilitation and Reconstruction of the Ganja to Georgian border Road

STAKEHOLDER MEETING

Date: 15th March 2001
Time: 15.00

Agenda and programme schedule

15.00 Nizami Garaisayev, Vice President Azeravtoyol
Words of welcome, introduction of the proposed World Bank Highway Project, brief presentation of the project

15.15 Erja Vallila, Environmental Expert, Consortium Kocks Consult GmbH – Finnroad Ltd – BCEOM
Presentation of the Environmental Mitigation Plan for the proposed project

15.30 Discussion

towards 16.30 Nizami Garaisayev
Summary of discussions, concluding the meeting, words of farewell

Introduction and project objective

The East-West road link from Baku through Alyat to the Georgian border is the main access route for entry and export of goods to and from Azerbaijan and is considered by TRACECA (**Tra**nsport **C**orridor **E**urope **C**aucasus Central **A**sia) be a main link in the proposed revival of the Silk Road connecting Central Asia with Europe.

A shortage of budget resources since 1990 has reduced the amount of road maintenance to an inadequate level, resulting in roads that are in poor condition and a large backlog of deferred maintenance. Therefore, extensive road rehabilitation and improvement programs are required. The World Bank and other International Financing Institutions are planning now major investments in road works to improve the main transit route to the Georgian border.

The Tacis Inter-State programme TRACECA has involved Azerbaijan in a number of technical assistance projects since 1995 and is now supporting also this project. Tacis is financing the technical assistance to Azeravtoyol for the preparation of design and tender documents of the Ujar to Georgian border road in order to prepare loans by International Financial Institutions.

The Word Bank is prepared to finance the rehabilitation and reconstruction of the road section from Ganja (end of bypass) to Gazakh. The length of this road section is about 94 km. Rehabilitation will improve the road condition, reduce the rate of deterioration and keeps the road open on a continuous basis by preventing it from becoming impassable. The overall objective of the project is to improve access and lower transport costs for passengers and goods moving along the East-West highway between Ganja and the town of Gazakh.

Present road condition

The existing road from Ganja to the Georgian border is mainly a 2-lane road with 7.50 m carriageway and 3.75 m shoulder. (category II standard). The road was constructed to a generally adequate design standard for the reduced traffic. However, poor drainage provisions, poor compaction, poor control of vertical finish, incorrect grading aggregate and use of poor quality bitumen have resulted in a road with many problematic areas where strengthening/reconstruction is now required.

The present condition of the pavement is subject of large variations. Some parts of the sections along the road are still in acceptable working condition whilst others already reach a critical phase with typical indications such as cracking, potholing and the advanced disintegration of the structural layers.

Proposed road improvement and rehabilitation measures

In a first step the existing carriageway will be rehabilitated/reconstructed. Improvement will include:

- reconstruction, resurfacing, and/or levelling of selected sections as necessary to achieve a high quality road
- widening of the road to an uniform road width
- replacement, widening or strengthening of bridges in need of repair
- improvement of drainage
- installation of road markings and road signs

The work to be performed on each section is based on detailed testing for roughness of the surface, strength of the base and sub-base, alignment in accordance with maximum radius of curvature, widening of bridges to be adequate for a subsequent four lane road, replacement of culverts that are of inadequate diameter for satisfactory water drainage, and designs at intersections that will take into account best road safety design practice.

The design elements for the cross section width for the rehabilitation of the existing two road are half the width for a four lane road:

- Carriageway: 2 x 3.75 m = 7.50 m
- Width of shoulder: 3.75 m (0.75 m paved)

At some location the pavement width of the existing carriageway is less than the required standard width. Therefore is in road sections, where the pavement width does not corresponded to the standard, a widening of the existing carriageway is necessary.

The horizontal alignment generally follows the existing road. The improvement of individual curves to remove safety hazards will be considered.

Depending on the existing road condition, rehabilitation cases have been identified, ranging from pavement repair and surface sealing to overlay and to reconstruction. Referring to preliminary studies following rehabilitation measures are required:

Section	Length of Rehabilitation Measures (km)		
	Overlay	Reconstruction	Realignment
Ganja – Shemkir / Deliler	4.6	10.9	5.8
Shemkir / Deliler - Tovuz	14.7	16.7	8.8
Tovuz - Agstafa	3.0	14.4	8.1
Agstafa - Gazakh	3.2	1.4	2.4

At this time detailed investigations are going on to update and finalise the rehabilitation measures.

Environmental assessment

In general any road project will have an impact on the environment. Of course, the impact of road rehabilitation or improvement projects are limited but should still considered. Therefore an environmental assessment was conducted to identify key concerns with regard to impacts on the natural environment, human health and safety as they may relate to the rehabilitation of the carriageway.

At this point the environmental analysis is concerning the rehabilitation and reconstruction of the road. Upgrading the road to four lanes will be analysed later on when project becomes of current interest.

The purpose of the environmental analysis is to identify and quantify the likely negative and positive impacts of the proposed road work as it is presently designed. This impact analysis will include physical and natural environment like soil erosion, impacts on water (also groundwater), air quality, flora and fauna . Potential human and social impacts need to be considered too: community life and economic activities, land acquisition, noise and road safety. To avoid harmful negative impacts prevention and mitigating measures will be then identified. All measures will considered taking into account the legal aspects considering the environment. These means for mitigation and prevention will be discussed in this public consultation.

Road rehabilitation will include several work phases like for example excavation of the road materials, crushing the material, transport and store of the materials, building of temporary roads for road works, and paving the rehabilitated embankment and soil dumping of the soil materials that cannot be utilised in rehabilitation. The road may have to be broaden, the vertical and horizontal lining may have to be changed and crossings may have to rehabilitated or reconstructed. Some old bridges will be deconstructed and replaced with new ones.

The purpose of the public consultation will be to deliver information about the project and to collect information, opinions and concerns about the environmental issues related to the project and the ways for prevention and mitigation of the negative impacts.

ANNEX 6

Stakeholder meeting, March 15, 2001, Ganja, Azerbaijan

Project: Ganja – Gazakh Road Project

Opening of the stakeholder meeting by Nizami Garaisayev, the Vice President of the Azeravtoyol

The International Financial Institutes finance some projects in different sectors in Azerbaijan. Last year we have signed the contract with the Contractor for the construction of Alat- Gazi Mammed road, which is a part of the Silk Road and now construction works are going on. The World Bank is prepared to finance the rehabilitation and reconstruction of the road section from Ganja to Gazakh, which is also part of the Silk Road. The length of this road is 94 km. The overall objective of the project is to improve access and lower transport costs for passengers and goods moving along the East-West highway between Ganja and the town of Gazakh.

Today we are here to participate at the Stakeholder meeting to discuss the Environmental Mitigation Plan for the Ganja - Gazakh road project. Now I would like that Local Team Leader Mr. Hijran Valehov gave us some information about the project. Then environmental expert of Consortium Kocks Consult GmbH –Finnroad Ltd – BCEOM can present the prepared Environmental Mitigation Plan. After we can start discussion. Thank you for your attention.

Environmental impacts

- Physical and natural environment
  - soil
  - water, groundwater
  - air quality
  - flora and fauna
- Human and social environment
  - community life, economic activities
  - land acquisition
  - aesthetics, landscape
  - noise
  - road safety

Public consultation

- To deliver information
- To collect information, opinions, concerns

Ganja-Georgian border

- Borrow pits
- Asphalt plants
- Temporary construction routes, camps
- Bridges
- Excess soil dumping
- Waste material existing in the road embankments
- Flora and fauna

ENVIRONMENTAL MANAGEMENT PLAN FORMAT

A. MITIGATION PLAN/AZERBAIJAN, *Ganja*-Georgian border/ 25.4.2001

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Design							
Bridges	• construction of new bridges: closing of channels	• design parameters to prevent flooding during closing of the channels	to be included in the design costs	--	project manager of the design project	--	
	• erosion	• design of erosion protection: slope and pier protection with gabion, concrete	to be included in the design costs	--	project manager of the design project		
Road environment	• social impacts related to lost market places now situating in the right of way: for road safety reasons replacement of the market opportunities	• During the design phase a specific concern should be put on designing new market places and parking	to be included in the design costs	--	project manager of the design project	--	Contact: the local authorities and representatives of the community
	• improve animal crossing safety	• Include animal crossings in the road design					

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (Design continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Road environment (continues)	• Erosion	• slope inclination, protective vegetation etc.	to be included in the design costs		project manager of the design project/environ mental specialist	--	
	• Green areas in the vicinity of the roads (rows of trees, shrubs), vicinity of communities, settlements, vicinity of vine yards and agricultural land. Special interest (see A1) ❑ Ganja bypass- Samkir. recommendable placement fro asphalt plant close to Baku/Tbilisi railway. Vineyards, agricultural land and vicinity of settlements should be avoided ❑ Tovuz-Qasakh Artificial forest 70 kms before border and a fertile zone ❑ Gasakh-border stripes of trees, River Inja important habitat of bee-eaters and rollers	• Protected areas to be implemented in the design	to be included in the design costs		project manager of the design project/environ mental specialist	--	

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (Design continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Earth works	• Soil dumping: If improperly designed, loss of agricultural land, impaired view	• Design of the soil dumping sites for materials that cannot be reused (location, drainage system, covering)	to be included in the design costs	--	project manager of the design project/environ mental specialist	--	Contact: local authorities and people
Asphalt plants	• placement of asphalt plants may endanger the green areas in the vicinity of the roads (rows of trees, shrubs), vicinity of communities, settlements, vicinity of vine yards and agricultural land	• areas of specific interest are identified during the design phase and included to the tender documents	to be included in the design costs	--	project manager of the design project/environ mental specialist	--	
	• storage of hazardous materials	• requirements concerning the location to be included in the design (Safety regulations, BCH-89, SNIP)	included in the design	--	project manager of the design project/environ mental specialist	--	Contact: local /environmen tal authorities

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Rehabilitation/ Reconstruction	• Present institutional capacity of the supervisory body Azeravtoyol is not able to meet the environmental requirements of the rehabilitation project	• to fulfil the institutional responsibilities Azeravtoyol has to strengthen its institutional capacity to supervise the environmental activities of the project (30 months)	USD 45 000 (30 months)	--	President of Azeravtoyol	--	
	• Constructor requirements demand for specialization in environmental aspects of the contract	• To fulfil the environmental requirements of the contract the constructor is required to have define environmental engineer responsible for env. aspects of the contract	included in the requirements for constructor	--	Contractor/environmental engineer	--	
Construction of new bridges	• Waste material disposal areas	• Waste material is properly disposed as accepted by the environmental authorities	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
	• Erosion	• Erosion protection: slope and pier protection with gabion, concrete • see below: constructing during the dry season	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (Rehabilitation/ Reconstruction continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Construction of new bridges (continues)	• Disturbance and lose of habitat for flora and fauna in the rivers and river embankments (fish egging starting in February, bird nesting in April)	• Bridges are built and rehabilitated during the dry season (i.e. late summer to middle of winter) to avoid adverse impacts for fishery, birds, river water quality (turbidity). • Special interest for River Inja bird life habitat	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
	• Storage of harmfull or toxic chemicals (i.e. paints, lubricants, oils, explosives)	• Proper storing of the chemicals (Safety regulations, BCH-89, SNIP)	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
	• Noise	• Noise control measures (BCH 8-89)	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (Rehabilitation/ Reconstruction continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Construction of new bridges (continues)	• Dust	• Watering of the transport roads close to settlements, use of covered trucks for material transportation (BCH 8-89)	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
	• Dredged material or removed soil	• see soil dumping	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (R/R continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Construction site roads and construction camps	• Green areas in the vicinity of road (rows of trees, shrubs): Important stripes of rows of trees along Ganja-Georgian border, especially between Shamkir-Border • Important bird life habitats: River Inja	• Avoid the immediate vicinity and removal of trees and shrubs (BCH 8-89). Protection against damages (BCH-8-89) • Planting of trees where trees are destroyed. • Avoid the vicinity of bird life habitats during nesting time (April-May): River Indza	• Planting and watering (2 yr): USD 190 per tree, estimated need for USD 150 000 • Protection against damages included to the requirements of the constructor	--	Contractor/environmental engineer	--	Contact: local /environmental authorities Monitoring by environmental specialist of Azeravtoyol
	• Storage of harmfull or toxic chemicals (i.e. paints, lubricants, oils)	• Proper storing of the chemicals (Safety regulations, BCH-89, SNIP) • Protection zones along rivers (BCH 8-89): parking, cleaning, pollution of soil, storage of waste prohibited	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (R/R continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Construction site roads and construction camps (continues)	• Incidents related to spills of chemicals during the work: lost of fertile stratum of soil , elements of flora and fauna, workers health may be endangered	• Protection zones along rivers (BCH 8-89): parking, cleaning, pollution of soil, storage of waste prohibited • Reserve for incidents close to rivers, channels, groundwater, agricultural areas • specific emergency plan required from the constructor	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
	• Dust	• Watering of the transport roads close to settlements, use of covered trucks for material transportation (BCH 8-89)	included to the requirements for constructor	--	Contractor/environmental engineer	--	Contact: local /environmental authorities
	• Noise	• Noise control measures (BCH 8-89)	included to the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
	• Loss in crop by the agricultural land reserved for the construction site road	• Avoiding the use of agricultural land and in other case compensation (Law on Automobile Roads)	USD 20 000	--	Azeravtoyol	--	
	• Waste water from camps causes impairment of the river or groundwater quality	• Requirements for waste water treatment	included to the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (R/R continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Construction site roads and construction camps (continues)	• Impairment of view	• Removal and storage of topsoil (SNIP) • Restoration of works sites and roads, and storage sites	included to the requirements for the constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol
Construction of the road environment	• Existing ramps possess possible negative impact on soil and groundwater	• Implementation as a separate project • Removal and proper discharge of the contaminated material.	--	--	--	--	Cooperation with the road project
Earth works	• Soil dumping: if improperly followed the design, loss of agricultural land, impaired view • Improper soil dumping into the rivers	• control during the construction, fines included to the agreements	included to the requirements for the constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol Economical damage as result of lost agricultural lands

			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase (R/R continues)	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Borrow pits	• Noise • Dust	• Noise control measures (BCH 8-89) • Watering of the transport roads close to settlements, use of covered trucks for material transportation (BCH 8-89) • Secure appropriate environmental permits	included in the requirements for the borrow pit operator	--	Contractor/environmental engineer	--	
Siting of the asphalt plants	• Noise, dust • Possible harmful impacts on the groundwater, water	• To avoid disturbance by noise in the vicinity of the villages, at least 300 m distance (Sanitary Norms SN 245-71). For all asphalt plants Environmental permits need to be applied from Ecological committee who implement Sanitary Norms SN 245-71 (Regulation concerning air, water and soil discharges)	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol

	• Green areas in the vicinity of the roads (rows of trees, shrubs) are destroyed, vicinity of communities, settlements, vicinity of vine yards and agricultural land is not avoided	• Requirements for protection and avoiding the specific areas to be included in the design phase and added to the invitation of tender documents • control during the construction, fines included to the agreements	included in the requirements for constructor	--	Contractor/environmental engineer	--	Monitoring by environmental specialist of Azeravtoyol Economical damage from lost agricultural land
			Cost		Institutional Responsibility		Comments (e.g. secondary impacts)
Phase	Issue	Mitigating Measure	Install	Operate	Install	Operate	
Operation							
Maintenance of the drainage system	• improper maintenance may cause floodings, erosion of the road embankment or bridge embankments	• plan for regular maintenance of the drainage system: preparation of the plan by environmental specialist of Azeravtoyol • adequate funding, equipment and skills for road maintenance			Environmental specialist of Azeravtoyol	Maintenance department	Monitoring by environmental specialist of Azeravtoyol
Transport of the hazardous chemicals	• in case of accident hazardous spills may enter the soil, irrigation water, drinking water and groundwater	• emergency plan including the actions for hazardous spills: preparation of the plan by environmental specialist of Azeravtoyol • adequate funding, equipment and skills for road maintenance			Environmental specialist of Azeravtoyol	Maintenance department	Contact: Ecological Committee of Azerbaijan in planning phase

Decommissioning	• N/A						

ENVIRONMENTAL MANAGEMENT PLAN FORMAT

B. MONITORING PLAN *Ganja* bypass-Georgian border/26.4.2001

Phase	What *parameter is to be monitored?*	Where *is the parameter to be monitored?*	How *is the parameter to be monitored/ type of monitoring equipment?*	When *is the parameter to be monitored- frequency of measurement or continuous?*	Why *Is the parameter to be monitored (optional)?*	Cost		Responsibility	
						Install	Operate	Install	Operate
Baseline									
Design									
▪ Bridge design	Design of flood prevention	Design office	Check list	Before handing in the design for approval		To be included to the design costs		Project manager	
▪ Bridges and Road Environment	Design of erosion protection	Design office	Check list	Before handing in the design for approval		To be included to the design costs		Project manager	
▪ Road environment design	Design of animal crossings and market places	Design office	Check list	At the beginning of the design and at the end of design		To be included to the design costs		Project manager	
▪ Road environment design	Contact to the local authorities and communities	Design office	Check list	At the beginning of the design and at the end of design	To provide feasible design and siting of market places, parking, animal crossings	To be included to the design costs		Project manager	
▪ Road environment design	Termination specifications for ramps included to the tender documents	Design office	Check list	At the beginning of the design and at the end of design	To mitigate the effect of the ramps to the environment	To be included to the design costs		Project manager	

						Cost		Responsibility	
Phase	**What** *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored/ type of monitoring equipment?*	**When** *is the parameter to be monitored- frequency of measurement or continuous?*	**Why** *Is the parameter to be monitored (optional)?*	**Install**	**Operate**	**Install**	**Operate**
▪ All design	Defined sensitive green areas included to the design and to the invitation of tender (indicated in the preliminary study)	Design office	Check list	At the beginning of the design and at the end of design	To include protected areas in the constructors requirements (see preliminary study)	Mapping included in to the design		Project manager	
▪ All design	Specifications include requirement for specifying a person responsible for environmental details of the rehabilitation tender	Design office	Check list	At the end of design		To be included to the design costs		Project manager	
▪ Earth works design	Design of soil dumping places	Design office	Check list	At the beginning of the design and at the end of design	To prevent impaired view, loss of agricultural land, erosion, drinking water pollution	To be included to the design costs		Project manager	

						Cost		Responsibility	
Phase	**What** *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored/ type of monitoring equipment?*	**When** *is the parameter to be monitored- frequency of measurement or continuous?*	**Why** *Is the parameter to be monitored (optional)?*	**Install**	**Operate**	**Install**	**Operate**
▪ Asphalt plants	Requirements of the EMP included to the invitation of tender	Design office	Check list	At the beginning of the design and at the end of design	To prevent soil, water and air pollution, to mitigate the disturbance of noise, to mitigate the impacts on important flora and fauna	To be included to the design costs		Project manager	
Rehabilitation/ reconstruction									
Institutional capacity of Azeravtoyol	A fulltime environmental engineer	PMU			For to secure the environmental requirements of the Project	USD 45 000 (30 months)		President of Azeravtoyol	
Specific requirements for the constructor capacity	Specialization on environmental matters	Before agreement	Quality checklist for the agreements	Before agreement with the contractor	To provide full understanding and fulfillment of the environmental requirements of the contract	Included in the requirements of the constructor		President of Azeravtoyol	
▪ Construction, rehabilitation of road, bridges ▪ Earth works	Accepted disposal of waste material, dredged material or removed soil	At the work site	Quality Inspections	Regurarily by inspections		Included in the requirements of the constructor		Constructor/environmental engineer	

,-,	Erosion protection installed	At the work site	Final Quality Inspection	Once in Final Quality Inspection	To prevent adverse impacts on river water quality	Included in the requirements of the constructor		Constructor/environmental engineer	

						Cost		Responsibility	
Phase	**What** *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored/ type of monitoring equipment?*	**When** *is the parameter to be monitored- frequency of measurement or continuous?*	**Why** *Is the parameter to be monitored (optional)?*	**Install**	**Operate**	**Install**	**Operate**
▪ Construction, rehabilitation of road, bridges ▪ Earth works ▪ Asphalt plants	Proper storing of harmful chemicals including safety zones and emergency plan	At the work site	Quality Inspections	At the beginning of the activities and continuous	Safety regulations, BCH 8-89, SNIP	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Asphalt plants ▪ Construction, rehabilitation of bridges	Spills and accidents with hazardous chemicals	At the work site	Inspection	In case of accident/Quality Inspections	Safety regulations, BCH 8-89, SNIP	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Construction, rehabilitation of road, bridges ▪ Construction site roads	Noise control measures	At the work site	Noise measuring equipment	Quality Inspections	BCH 8-89, to minimise the disturbance of noise to inhabitants	Included in the requirements of the constructor		Constructor/environmental engineer	

▪ Asphalt plant ▪ Borrow pits	Noise control measures	At the work site	Noise measuring equipment	Frequency as required by the environmental authorities/Quality Inspections	BCH 8-89, to minimise the disturbance of noise to inhabitants	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Asphalt plant ▪ Borrow pits ▪ Construction site roads	Watering of the transport roads close to settlements	At the work site	Quality Inspections	Continuous	BCH 8-89	Included in the requirements of the constructor		Constructor/environmental engineer	

						Cost		Responsibility	
Phase	**What** *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored/ type of monitoring equipment?*	**When** *is the parameter to be monitored- frequency of measurement or continuous?*	**Why** *Is the parameter to be monitored (optional)?*	**Install**	**Operate**	**Install**	**Operate**
▪ Asphalt plant ▪ Borrow pits ▪ Construction site roads	Use of covered trucks for material transportation close to settlements	At the work site	Quality Inspections	Continuous	BCH 8-89	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Asphalt plant ▪ Borrow pits ▪ Construction site roads	Avoid immediate vicinity and removal of trees and shrubs	At the work site	Quality Inspections	Continuous	BCH 8-89	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Construction site roads ▪ Earth works	Protection of trees against damages	At the work site	Quality Inspections	Quality Inspection of the installed work site	BCH 8-89	Included in the requirements of the constructor		Constructor/environmental engineer	

▪ Construction	Planting of trees	At the work site	Quality Inspections			Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Asphalt plants ▪ Construction, rehabilitation of bridges ▪ Borrow pits	Fauna: Avoidance of bird life habitats. Construction in the vicinity forbidden during bird nesting.	At the work site	Quality Inspections	April –May continuous. Quality Inspections after Installation of Asphalt plants	To ensure undisturbed nesting of birds in April-May.	Included in the requirements of the constructor		Constructor/environmental engineer	

Phase	What *parameter is to be monitored?*	Where *is the parameter to be monitored?*	How *is the parameter to be monitored/ type of monitoring equipment?*	When *is the parameter to be monitored- frequency of measurement or continuous?*	Why *Is the parameter to be monitored (optional)?*	Cost		Responsibility	
						Install	**Operate**	**Install**	**Operate**
▪ Construction, rehabilitation of bridges	Fauna: construction forbidden during fish spawning (see EMP)	At the work site	Quality Inspections	February-May continuous	To ensure livelihood of the inhabitants and biodiversity	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Construction, rehabilitation of bridges	Flora: avoidance of the destruction of fauna in river and river embankments (bird life habitats River Inja) (see EMP)	At the River Inga work site	Quality Inspections	Implementation of Section River Inja		Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Asphalt plant ▪ Borrow pits ▪ Construction site roads ▪ Soil dumping	Avoiding the unnecessary use of agricultural land	At the work site	Quality Inspections	Continuous	To prevent loss in crop, Law on Automobile Roads	Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Asphalt plant ▪ Borrow pits ▪ Construction site roads ▪ Soil dumping	Compensation of the loss in agricultural land or crop	At the work site			Law on Automobile Roads	USD 20 000		Azeravtoyol	
▪ Construction camps	Accepted disposal of waste water and household waste	At the work site	Quality Inspection	Before accepting the construction camp		Included in the requirements of the constructor		Constructor/environmental engineer	

Phase	What *parameter is to be monitored?*	Where *is the parameter to be monitored?*	How *is the parameter to be monitored/ type of monitoring equipment?*	When *is the parameter to be monitored- frequency of measurement or continuous?*	Why *Is the parameter to be monitored (optional)?*	Cost		Responsibility	
						Install	**Operate**	**Install**	**Operate**
▪ Construction site roads and camps ▪ Asphalt plants	Removal of topsoil for storage	At the work site	Quality Inspection	Before accepting the construction camp		Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Construction site roads and camps ▪ Asphalt plants	Restoration of work and storage sites, construction site roads	At the work site	Final Quality Inspections	During termination of each site		Included in the requirements of the constructor		Constructor/environmental engineer	
▪ Construction, rehabilitation of road	Ramps: termination by removal of ramps and isolation of the contaminated ground by surfacing it with asphalt	At the work site		During the rehabilitation		Included in the requirements of the constructor		Constructor/environmental engineer	

						Cost		Responsibility	
Phase	**What** *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored/ type of monitoring equipment?*	**When** *is the parameter to be monitored- frequency of measurement or continuous?*	**Why** *Is the parameter to be monitored (optional)?*	**Install**	**Operate**	**Install**	**Operate**
Operation									
	Plan for regular maintenance system of the drainage system	Azeravtoyol		2004		Env. specialist for 30 months (see rehabilitation)	Regular maintenance	Environmental specialist or engineer of the Azeravtoyol	Maintenance department
	Emergency plan including the actions for hazardous spills	Azeravtoyol		2004		,,		Environmental specialist or engineer of the Azeravtoyol	Maintenance department
	Plan for maintenance of the green areas	Azeravtoyol		2002		,,	Regular maintenance	Environmental specialist or engineer of the Azeravtoyol	
	Removal of waste material from the road embankments	Azeravtoyol		2002				Communities and Azeravtoyol Maintenance Department	Communities and Azeravtoyol Maintenance Department
Decommission	N/A								

C. INSTITUTIONAL STRENGTHENING

1. Equipment Purchases (Tabular Presentation Preferred)

List:

- **Type of equipment**
- **Number of Units**
- **Unit cost**
- **Total Cost**
- **Local or International Purchase**

2. Training/Study Tours

List:

- **Type of Training (Mitigation, Monitoring, Environmental Management, Other)**
- **Number of Students**
  Current and Future Organizational Unit in Which They Work or
  Current and Future Title/Job Description
- **Duration of Training**
- **Start Date/End Date (for each student)**
- **Venue of Training (Domestic or Abroad)**
- **Institute or Organization to Provide Training**
- **Cost (Local and Foreign)**

3. Consultant Services

- **Type of Service**
- **Terms of Reference**
- **Justification**
- **Cost**

4. Special Studies

- **Justification**
- **Terms of Reference**
- **Cost**

D. SCHEDULE

Present (preferably in Chart Form) Start Dates and Finish Dates for:

- **Mitigation Activities**
- **Monitoring Activities**
- **Training Activities**

This information should be on the same chart defining the overall project schedule (Project Implementation Plan)

E. INSTITUTIONAL ARRANGEMENTS

A narrative discussion supported by organizational charts detailing:

- **Responsibilities for mitigation and monitoring**
- **Environmental information flow (reporting—from who and to who and how often)**
- **Decision making chain of command for environmental management (to take action, to authorize expenditures, to shut down, etc.)**

In short, how is all the monitoring data going to be used to maintain sound environmental performance—who collects the data, who analyzes it, who prepares reports, who are the reports sent to and how often, and who does that person send it to, or what does he/she do with the information—who has the authority to spend, shutdown, change operations etc.

F. CONSULTATION WITH LOCAL NGOs AND PROJECT-AFFECTED GROUPS

Provide documentation of the following:

- **Date(s) consultation(s) was (were) held**
- **Location(s) consultation(s) was (were) held**
- **Who was invited**
  Name, Organization or Occupation, Telephone/Fax/e-mail number/address (home and/or office)
- **Who attended**
  Name, Organization or Occupation, Telephone/Fax/e-mail number/address (home and/or office)
- **Meeting Program/Schedule**
  What is to be presented and by whom
- **Summary Meeting Minutes (Comments, Questions and Response by Presenters)**