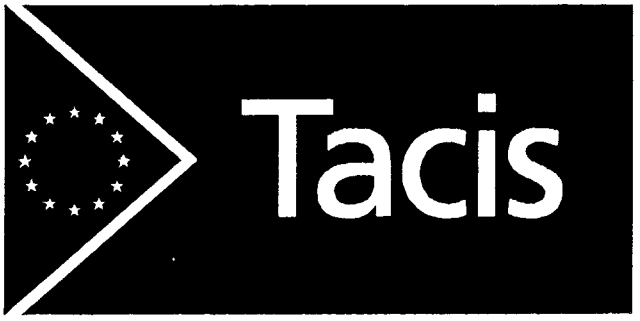

Rail Maintenance Central Asia: Infrastructure

Progress Report

November 1996

Deutsche
Eisenbahn-Consulting
GmbH

DE-Consult

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For the attention of Mr D. Stroobants

Your ref.	Your notice	Our ref.	Contact person	Date
		A2/ 013 / 1997	Mr Kulke Mr Prescha	5 January 1997

Dear Sir

TRACECA Rail Maintenance Central Asia: Infrastructure 2, TNREG 9310

We have pleasure in submitting five bound copies, one loose copy and one diskette of our Progress Report, English version. The translation of the report into Russian is being done at present, and this version will be submitted as soon as possible (anticipated within two weeks).

The Progress Report takes into consideration the situation of the project as at November 1996.

We apologise for the delay in submission, which was caused by the Christmas holidays.

Yours faithfully,

DE-Consult
Deutsche Eisenbahn-Consulting GmbH

Peter Kulke
Regional Managing Director
Europe, CIS States and Mediterranean

Norman Griffiths
Team Leader

c.c. TACIS Units: Kazakstan)
Kyrgyzstan)
Turkmenistan) delivered by hand or mail
Tadjikistan)
Uzbekistan)

Monitoring and Evaluation Unit Central Asia - Almaty) delivered by mail
TRACECA office Tashkent, Mr. Sims) delivered by hand

REPORT COVER PAGE

PROGRESS REPORT

Project Title:	TRACECA Rail Maintenance Central Asia: Infrastructure 2	
Project Number:	TNREG 9310	
Country:	Kazakstan, Turkmenistan, Kyrgyzstan, Tadjikistan, Uzbekistan	
Local operator:	Ministry of Transport and Communication of the Republic of Kazakstan, State Railway Companies of Turkmenistan, Kyrgyzstan, Tadjikistan, Uzbekistan	
	Main local partner	EC Consultant
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Signature:		

Date of report : November 1996

Reporting period : July - November 1996

Author of report : N. D. Griffiths, Team Leader
F. Prescha, Project Manager

EC M & E team	[name]	[signature]	[date]
EC Delegation	[name]	[signature]	[date]
TACIS Bureau [task manager]	[name]	[signature]	[date]

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This project is financed by the European Union's Tacis Programme, which provides grant finance for know-how to foster the development of market economies and democratic societies in the New Independent States and Mongolia.

1. PROJECT SYNOPSIS

Project Title:	TRACECA Rail Maintenance Central Asia: Infrastructure 2
Project Number:	TNREG 9310
Country:	Kazakstan, Turkmenistan, Kyrgyzstan, Tadjikistan, Uzbekistan

PROJECT OBJECTIVE[S]:

A: Conduct a feasibility study for the upgrading of the Aktau - Bejneu line in Kazakstan.

B: Conduct a survey of existing conditions for freight and passenger traffic, make recommendations to improve overall service quality on TRACECA rail corridor. Train selected senior staff in Western Europe.

C: Conduct a feasibility study for the development of the Amudarya road and rail crossing at Chardzhev in Turkmenistan.

PLANNED OUTPUTS:

A: Feasibility study for rehabilitation of Aktau-Bejneu railway line in Kazakstan produced

B: Proposals for improvements in rail passenger and freight traffic in five countries produced; representatives from seven railway administrations trained in Western Europe

C: Feasibility study for rehabilitation, rebuilding or new construction of rail or combined road/rail bridge at Chardzhev in Turkmenistan produced

Equipment to a total value of 240,000 ECU purchased and distributed to project beneficiaries

PROJECT ACTIVITIES:

A: Preparation of feasibility study for rehabilitation of Aktau - Bejneu railway line in Kazakstan including following activities:

- production of traffic forecast
- evaluation of technical feasibility
- evaluation of economic and financial feasibility

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- further selection criteria and ranking of alternatives
- initial engineering design

B: Production of proposals for improvements in rail passenger and freight traffic services in five countries including following activities:

- examination of existing conditions in freight and passenger traffic
- study visit to Western Europe
- recommendations to improve freight and passenger transport

C: Production of feasibility study for rehabilitation, rebuilding or new construction of a rail or combined road/rail bridge at Chardzhev in Turkmenistan including following activities:

- traffic and revenue forecast
- inspection of existing bridge and potential for refurbishment
- review of existing feasibility study
- economic analysis and recommendations
- preparation of preliminary design documents

PROJECT STARTING DATE: 22nd March, 1996

PLANNED PROJECT DURATION: *12 months, to March 1997*

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Summary of Project Progress

2.1 Start Situation

Following an inception mission by the Team Leader in March/April 1996 and subsequent site visits to the region by the Project Manager, the Project commenced with the investigatory work by the Local Consultants as detailed in the Inception Report.

Input by European consultants started on 15th August 1996 when the Team Leader arrived in Almaty, Kazakstan, where a temporary Project Office was established.

Work started first on Module C in Turkmenistan, followed by Module A in Kazakstan. Module B began in Kazakstan on 24.09.96, the team of experts in this module subsequently visiting the other countries in the region.

Arrival of the experts for each module of the Project followed at intervals as described below.

2.2 Relevant Project Context

The project is divided into three modules, to run concurrently. The progress made within the context of each of these modules is as follows:

Module A: Upgrading of Aktau-Bejneu Rail Line

During the period covered by this report, two field visits were made to this area in Western Kazakstan. The first visit involved the Infrastructure Specialist (Permanent Way), the Signalling and Telecom Specialist and the Consultant's local partner, and took place from 9th to 17th September 1996.

During this first field visit, a technical survey of the 400 km route was undertaken by the experts concerned, together with discussions with local railway managers. The Team Leader joined the group on 15th September.

The second field visit took place from 30th September to 5th October and involved the Transport Economist (to 2nd October only) and the Infrastructure Planner. During this time, discussions were held with the local *oblast* administration (Mangistau), representatives of the Port of Aktau and other local interests. Also during this period, the Transport Economist initiated a series of censuses on the passenger trains using the route.

The Transport Economist held a series of interviews with representatives of various Ministries in Almaty, in order to evaluate future traffic potential in the catchment area of the railway route.

The technical experts and the economists worked together with the local experts of Kazgiprozheldortrans before and after the on-site visits based on material supplied by the local partner (based on the questionnaires prepared by expatriate experts).

Investigative work was additionally carried out in Almaty by the Cost and Tariff Specialist and the Specialist for Rolling Stock and Workshops in co-ordination with the local partner and the Almaty Railway. For details see also Annex 3.

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In this Module, input to the following Work Streams (WS) and Work Packages (WP) was undertaken:

WS 1100: Traffic Forecast

WP 1110 Assessment of present transport volume and traffic flows
all field work complete

WP 1120 Development of economy and transport system
field work in Aktau complete; research work in Almaty to be concluded by 22.11.96

WP 1130 Calculation of traffic volume
to be completed in home office

WS 1200 Technical feasibility

WP 1210 Survey of existing situation
complete

WP 1220 Analysis of former development plans
complete

WP 1230 Identification of bottlenecks, definition of upgrading strategies
field work complete, strategies to be defined in home office

WP 1240 Definition of volume and repair of reconstruction works
field work complete, strategies to be defined in home office

WP 1250 Description of proposed works
field work complete, strategies to be defined in home office

WS 1300 Economic and financial feasibility

WP 1310 Definition of construction and equipment costs
partially completed, remainder to be completed in home office

WP 1320 Definition of maintenance costs
to be completed by 22.11.96

WP 1330 Definition of revenues
to be completed by 22.11.96

WP 1340 Economic profitability
to be defined in home office

WP 1350 Financial profitability
to be defined in home office

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WS 1400 **Further selection criteria and ranking**

WP 1410 Examination of further selection criteria
partially completed, remainder to be completed in home office

WP 1420 Ranking of alternatives and recommendations
to be defined in home office

WS 1500 **Initial engineering design**

WP 1510 Initial design and project plan
partially completed, remainder to be completed in home office

WP 1520 Support for procurement and tendering processes
to be defined in home office

WP 1530 Financing strategy and programme
partially completed, remainder to be completed in home office

WP 1540 Proposal and recommendations for the upgrading programme
to be defined in home office

Module B: Proposals and Training to Improve Freight and Passenger Traffic on TRACECA route (Kazakstan, Kyrgyzstan, Uzbekistan, Turkmenistan and Tadjikistan)

Module B required the participation of the Cost and Tariff Specialist, the Rail Operations Specialist and the Rail Marketing Specialist as well as the Team Leader. During the period from 23rd September to 4th November (six weeks), investigative visits, involving discussions with local partners and railway managers, were made to a total of six railway administrations in five different countries.

The programme of visits can be summarised as:

Week 1: Almatinskaya Railway, Almaty, Kazakstan

Week 2: Almatinskaya Railway and Tselinnaya Railway, Akmola, Kazakstan

Week 3: Kyrgyzstan Railway, Bishkek, Kyrgyzstan

Week 4: Tadjikistan Railway, Dushanbe, Tadjikistan

Week 5: Uzbek State Railway, Tashkent, Uzbekistan

Week 6: Turkmenistan Railway, Ashgabat, Turkmenistan

The visits generally followed a standard pattern involving:

- advance supply of a questionnaire, in Russian, for each of the specialist areas, by the Local Consultant
- discussion of the results of the questionnaire

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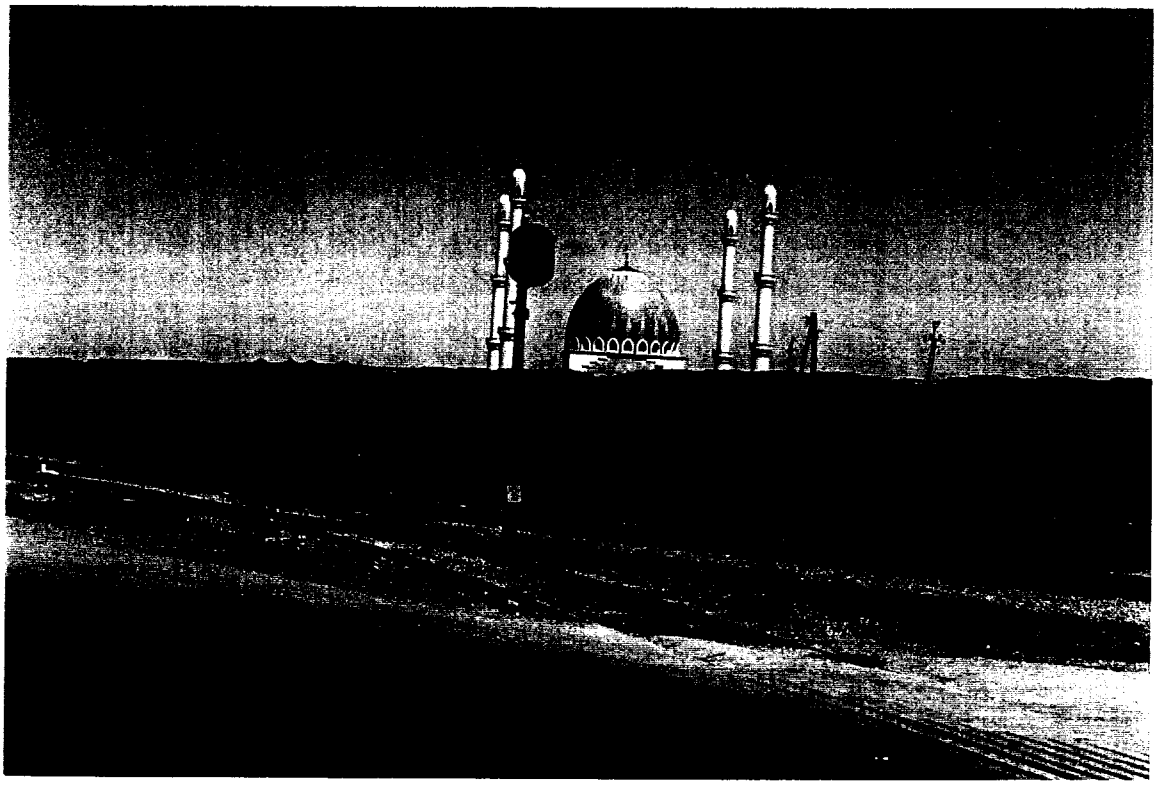
- detailed discussions between the Consultant's specialists and local railway managers and counterparts, involving exchange of experience and verbal suggestions for improvement by the Consultant's specialists

- request for and supply of written information and publications (e.g. graphic timetables, tariffs, financial balance sheets, profit and loss accounts)

- site visits to local railway installations of relevance to the project.

The common history of all of the railways meant that in many cases procedures and practises continue to be common between railways; however, the divergence in political and economic policy of each of the countries since the break up of the USSR has also led to noticeable differences in railway development policy.



In this Module, input to the following Work Streams (WS) and Work Packages (WP) was undertaken:

WS 2100 **Existing conditions in freight and passenger transport**

WP 2110 Assessment of current operational methods; scheduling

WP 2120 Examination of current commercial organisation

WP 2130 Examination of current tariff structure

WP 2140 Evaluation of international co-operation and traffic

The whole of this Work Package has been completed

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WS 2200 **Study visit to Europe**

WP 2210 Development of study visit programme
In preparation at home office

WP 2220 Preparation and performance of study visit
to take place in early 1997

WS 2300 **Recommendations to improve freight and passenger transport**

WP 2310 Operations

WP 2320 Commercial performance

WP 2330 Railway organisation, legal protection, tariffs

This Work Package will be completed in March 1997.

Module C: Feasibility Study for Chardzhev Bridge

The first action in Module C was the performance of the traffic census on the Chardzhev bridge. The material for traffic census and interviews of vehicle drivers crossing the pontoon bridge (counting sheets, questionnaire for survey of users of the pontoon bridge) were prepared by the Economist and the Project Manager and translated into Russian and Farsi (taking into consideration the large number of Iranian trucks). The traffic census and interview survey took place over six days (two surveys of three days each) at the end of July (29th to 31st) and beginning of August (7th to 9th) from 06.00 to 20.00 hrs. The Project Manager was on-site during the second traffic census and was satisfied as to the quality of organisation by the local contractor, the Lebapskoye road operation authority in Chardzhev. The census and interviews were undertakebn with two teams (eacn of three persons), at each approach to the pontoon bridge. The organisation of the counts was supported by local and governmental authorities as well as the shipping company operating the pontoon bridge.

The field work of the expatriate experts on Module C, based entirely in Turkmenistan, commenced on 26th August 1996 with the arrival of the Transport Economist in Ashgabat. The Bridge Infrastructure Specialist followed on 29th August, and both experts undertook detailed discussions with local counterparts, railway managers and the local road authority.

Both experts subsequently transferred to Chardzhev, with the Transport Economist concentrating on discussions with local road authorities and analysing the road and rail traffic survey carried out by the local consultant, as described above. The Bridge Infrastructure Specialist commenced his detailed examination of the structure of the bridge itself.

Both specialists were joined later on site by the Infrastructure Planner.

Concurrently, a copy of the Feasibility Study for the Amudarya River crossing prepared by Giprotransmost of Moscow in 1982 was obtained for translation and study at the Consultant's home office in Europe.

In this Module, input to the following Work Streams (WS) and Work Packages (WP) was undertaken:

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WS 3100 **Traffic and revenue forecast**

WP 3110 Survey of road and rail traffic data
complete

WP 3120 Forecast of demand
awaiting input from TRACECA Regional Traffic Forecasting Model

WP 3130 Forecast of revenue
field work to be completed by 15.11.96; input from WP 3120 required

WS 3200 **Inspection of existing bridge and possible refurbishment**

WP 3210 Assessment of technical situation
field work to be completed by 15.11.96

WP 3220 Evaluation of repair works and maintenance procedures
field work to be completed by 15.11.96

WP 3230 Assessment of feasibility of life extending
field work to be completed by 15.11.96

WS 3300 **Review of existing feasibility study**

WP 3310 Review of technical aspects
to be completed by end November 1996

WP 3320 Review of economic aspects
to be completed by end January 1997

WS 3400 **Economic analysis and recommendations**

WP 3410 Estimation of investment costs
to be completed by end November 1996

WP 3420 Definition of operating costs
to be completed by end December 1996

WP 3430 Cost-benefit analysis
to be completed by end January 1997

WP 3440 Financing strategies. financial development plan
to be completed by end February 1997

WP 3450 Recommendations for implementation
to be completed by end March 1997

WS 3500 **Preparation of preliminary design documents**
to be completed by end March 1997

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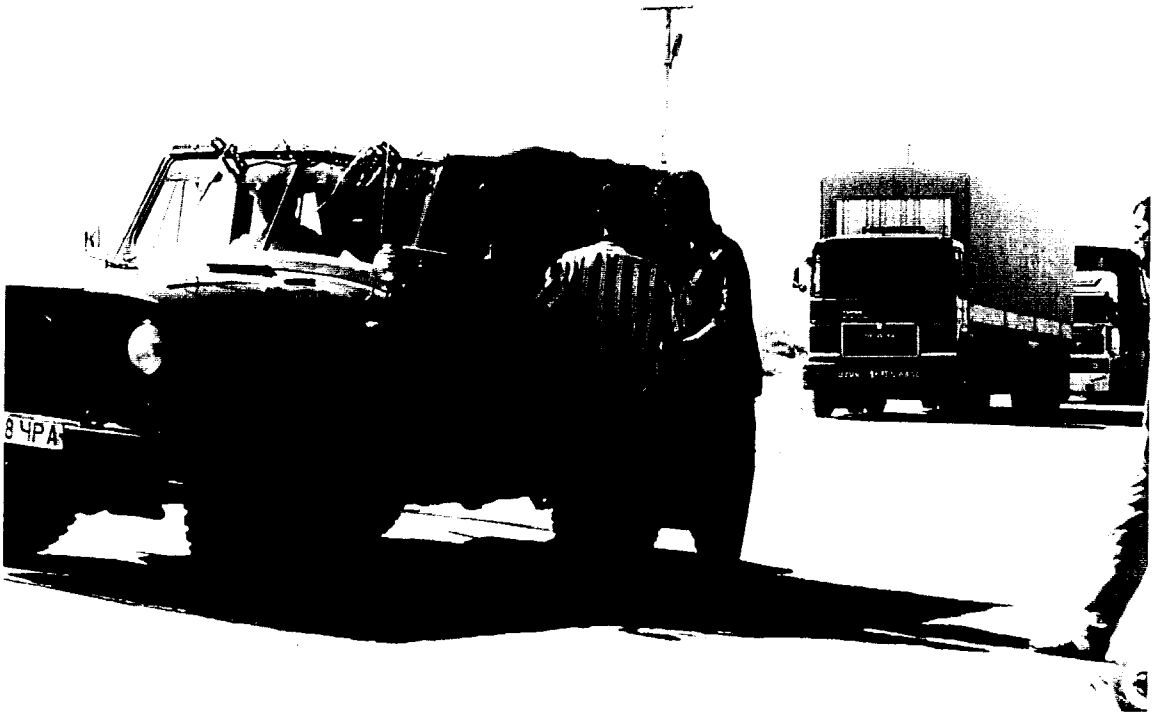
Pontoon bridge



Traffic census and interview survey

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2.3 Main Problems and Deficiencies

The principal problems encountered during these first stages of the project can be summarised for each module as:

- the need to find and appoint local partners in Kyrgyzstan, Uzbekistan and Turkmenistan when the use of a single Kazakh partner proved politically unacceptable (see the Consultant's Inception Report for more detailed information on this subject). ***Modules B and C.***

- the very complex logistics involved in local and interstate travel, particularly in ***Module B***. This manifested itself specifically in:

    - **major problems in obtaining air tickets** (particularly in Tashkent and Almaty); it is normally not possible to book tickets in advance because it is necessary to show passports and visas when purchasing tickets
    - **schedules being changed at short notice** (Kazakstan and Tadjikistan);
    - **infrequent flights** (e.g. Ashgabat-Almaty once per week, no flights Tashkent—Dushanbe, once weekly Bishkek—Dushanbe).

- there were problems in obtaining visas for some experts (specifically for Uzbekistan) and problems arising from the need for local registration (Kazakstan) and visa extension (Turkmenistan). In each case, the difficulties were overcome locally, but at considerable cost in time and often in money. ***All Modules.***

- the time constraints in ***Module B*** meant that the Consultant had to accept information provided by the individual railways without the possibility of further analysis and discussion.

- the reluctance of several railway administrations to supply what they consider as 'sensitive' or 'secret' information, particularly concerning financial performance and operational data. The work of the Cost and Tariff Specialist in particular suffered greatly from this problem: in most cases information was 'promised' for delivery later in the week of the visit, but at the last moment was withheld on the grounds of secrecy, by which time it was generally too late to organise alternative approaches. ***Module B and to some extent Module A and C.***

- the managers within some railway administrations were very difficult to interview, either being unavailable during the (prearranged) visit of the Consultant's team, or else cancelling appointments at short notice and substituting a subordinate, who generally would then claim to have no authority to discuss the subjects concerned. ***Mainly Module B.***

- the overall quality of discussions was inevitably influenced by the quality of the interpreter used; regrettably, some (Tacis-recommended) interpreters did exhibit problems in coping with the terminology of concepts of the market economy, cost-effectiveness, efficiency, etc. ***Module B.***

2.4 Local Support and Commitments

In each country, the Consultant has received the full support of the local Tacis Co-ordinating Unit, for which he is most grateful.

The commitment of the local railway administrations to the Project has been varied and can be summarised as follows:

Kazakstan: full on-site support for Module A by staff of the West Kazakstan Railway
good local co-operation for Module B by the Tselinnaya Railway
some problems from Almaty Railway for Module B particularly in the supply of information on tariffs

Kyrgyzstan: full support in Bishkek for Module B

Tadjikistan: support for Module B in Dushanbe; some problems in supply of data — problem of 'secrecy'

Uzbekistan: good support for Module B in Tashkent in most subjects but some problems in obtaining financial data (refusal to supply written financial information); problem of 'secrecy'

Turkmenistan: excellent on-site support in Chardzhev in Module C
generally good support in Ashgabat for Module B though some difficulty in arranging interviews with responsible staff and problems in obtaining some data, particularly financial.

In Kazakstan, Kyrgyzstan and Uzbekistan, the services of one local consultant in each country were used for the purposes of gathering advance information and arranging visits and meetings. In Turkmenistan it was necessary to use three local consultants in order to cover all aspects of the Project (i.e. both Modules B and C).

In order to solve the problems highlighted in the Inception Report, the organisation of local experts had to be changed as a result of the Project Manager's mission to Kazakstan, Kyrgyzstan, Uzbekistan and Turkmenistan in July/August 1996. The original subcontract with Kazgiprozheldortrans, which envisaged a general subcontracting role for the whole region, had to be re-negotiated and an addendum agreed. Additionally, new contracts were agreed with local organisations and companies in Kyrgyzstan, Uzbekistan and Turkmenistan (see list of local partners involved in the project). The problems of local subcontracting mentioned in the Inception Report have thus been resolved.

In Tadjikistan, it was not possible to locate a suitable local consultant and therefore all arrangements were made direct with the railway organisation.

Section 2.2 above includes a commentary on some of the problems encountered with local railway counterparts and their commitment to the Project.

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However, it should be clearly understood that the somewhat singular nature of this project has affected the identification and therefore the commitment of counterparts, for the following reasons:

- the involvement of local consultants in each country (except Tadjikistan) as required by the Terms of Reference can impose a barrier between the (European) Consultant and local counterparts. One of the objectives of involving local consultants is to ease the access to information and local counterparts: unfortunately, there were cases where the local consultant felt it his role to **replace** the railway counterparts. This was particularly, and understandably, the case where the local consultant's experts were themselves former (or seconded) railway managers.

- the often transitory visits to each railway administration, particularly in Module B where each railway was visited for only one week, meant that the opportunity to conduct meaningful in-depth discussions with counterparts, and therefore to ensure their commitment to the objectives of the Project, was severely limited.

In general terms, it must be stated that the willingness of the counterparts to assist and co-operate, and therefore to be committed to the Project, varied very widely between the three modules.

It was very noticeable that the two 'technical' modules, A and C, have achieved greater success in this context than the more economic and market-oriented Module B. The Consultant is aware that, traditionally, the beneficiary railways have measured their own effectiveness not in terms of economic or financial performance, but in terms of technical excellence.

In the initial research stages of the Project, the Consultant received excellent co-operation from both the Turkmenistan and Western Kazakstan Railways (Modules C and A respectively) in the provision of drawings, diagrams and other technical data relevant to the Project. However, for these modules it became much more difficult to obtain economic data such as costs, traffic forecasts and revenues, partly because such data did not always exist in the form required, but more often because the need to provide such data was not appreciated — despite the Consultant's explanations — and therefore often rejected on the grounds of 'secrecy' or confidentiality.

This unwillingness to supply non-technical data became more manifest as Module B was implemented, since the main subjects of investigation in that module concerned precisely these 'difficult' areas — finance and accountancy, costs, tariffs, traffic levels, marketing, train operations and management structure. At one stage in Tadjikistan the Consultant was refused permission to take notes of permissible trailing loads for different locomotive types, though this refusal was later rescinded. Despite repeated requests, including advance notice in Russian, none of the railways concerned was able or willing to supply a management organisation chart; in many cases financial and accounting statements were promised but never supplied.

An additional problem due to the lack of transparency of the individual railway organisations was that the Consultant could never be absolutely certain that he was always speaking to the relevant personnel. This was particularly the case in matters involving operations and investment costing, where it was suspected that there may have been (inaccessible) information within other railway departments rather than strictly within the finance or accountancy function with whom the Consultant held discussions.

Therefore, assistance which the Consultant has been able to render in the technical field is not only better understood and appreciated but also appears to be more welcome as being something which can be implemented practically. Non-technical assistance (as with Module B) is, with the possible exception of Uzbekistan, met with scepticism and suspicion and a basic misunderstanding of its relevance to the individual railways' needs.

There was regrettably a tendency for the recipient organisations to consider aid projects such as this one only in terms of the supply of hardware and concrete technical assistance, which obviously affects the commitment of the recipient to all aspects of the Project.

List of Local Counterparts

Institution/Organisation	Country	Function
Kazgiprozheldortrans, State Institute for Technical-Economic Research and Projecting of Railway Transport Objects	Kazakstan (Almaty)	main counterpart, responsible for Local Services in Module A, responsible for Kazak part of Module B (data collection, assistance to the expatriate experts), assistance to the Team Leader in overall project organisation, headquarters of the Team Leader at its premises
Turkmentransmost, State-owned scientific and production company of the Turkmenian Railways	Turkmenistan (Ashgabat)	responsible for the railway part in Module C (assessment and rehabilitation of existing bridge, railway questions of feasibility study)
Lebapskoye Road Operation Authority	Turkmenistan (Chardzhev)	responsible for the road traffic part in Module C (assessment of road traffic situation, organisation of traffic census on the existing bridge, road construction and traffic questions of feasibility study)
Turkmendorproject, Branch office Chardzhev, State Institute for Projecting of Roads	Turkmenistan (Chardzhev)	assistance to the Lebapskoye Road Operation Authority (Module C)
Turkmenzheldorproject, Project and Design Institute of the Turkmenian Railways	Turkmenistan (Ashgabat)	responsible for Turkmen part of Module B (data collection, assistance to the expatriate experts)
Kyrgyzdortranstechnika, Scientific and production company	Kyrgyzstan (Bishkek)	responsible for Kyrgyz part of Module B (data collection, assistance to the expatriate experts)
Techvneshtrans, Branch office Tashkent	Uzbekistan (Tashkent)	responsible for Uzbek part of Module B (data collection, assistance to the expatriate experts)

2.5 Special Problems

Study Tour Organisation

At the time of writing this Report, it is still not absolutely clear how many participants will attend the planned European Study Tour for Module B (see comments in the Inception Report).

As mentioned in the Inception Report the Consultant proposed an increase in the number of participants of the study tour from 8 to 11 railway managers. Discussions held with the responsible EC task manager shows that the idea to shift some funds from the equipment budget to finance the additional study tour costs (about 14,500 ECU) cannot be realised.

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An analysis of the current financial state of the project shows that the necessary funds can be transferred from other items of the project budget: "Subcontract: local partner" and "Contingencies". In the event of acceptance of this budget shifting (see item "Operational Budget Management" of the Inception Report).

In order to allow for flexibility in the selection of participants, the Consultant has requested each of the participant railway organisations to nominate a number of participants, from whom the Consultant will make a selection. Those participants not selected will then form a 'reserve' in the event of sickness, passport or visa problems, etc. The nominees will be drawn from the pool of staff who have acted as counterparts[1] for the Project and therefore are considered to have the necessary experience and motivation. The specialist expertise of the nominees will be concentrated in freight and/or passenger traffic (commercial or operations).

The nominations and selections requested by the Consultant can be summarised as:

Country	***Nominations***	***Participants***	
		in case of 8 participants	*in case of 11 participants*
Kazakstan	4-5	2	3
Uzbekistan	4	2	2
Turkmenistan	3-4	2	2
Tadjikistan	3	1	2
Kyrgyzstan	3	1	2

At the time of writing, definite nominations had been received from Turkmenistan[2], Kyrgyzstan and Uzbekistan as well from the Almaty Railway in Kazakstan only but were expected from the other countries imminently.

Nominated railway managers for participation in the study tour

Country	Name	Position
Kazakstan (Almaty Railways)	Mr. Talgat Badanbayev	Head of the Technical Subdepartment in the Operation Department
Kazakstan (Almaty Railways)	Mrs. Saniya Amanchina	Senior Expert for Tariffs and Domestic and International Transport in the Financial-Economic Department
Turkmenistan	Mr. Meret Mamedov	Deputy Head of Operation Department
Turkmenistan	Mr. A. Sakhatov	Head of Ashgabat Station
Kyrgyzstan	Mr. Nikolay Zubov	Deputy Head of Freight Department
Kyrgyzstan	Mr. Baktybek Niyazaliyev	Freight Department
Kyrgyzstan	Mrs. Nina Sviridenko	Freight Department
Uzbekistan	Mr. E. Kovyrnov	Head of Passenger Traffic Department
Uzbekistan	Mr. M. Adylov	Deputy Head of Passenger Traffic Department
Uzbekistan	Mr. V. Gubatchev	Head of International Relations Department
Uzbekistan	Mr. T. Mirmakhmudov	Deputy Head of Freight Traffic and Commercial Department

[1] In this context the term 'counterpart' is understood by the Consultant to refer to members of staff of the recipient organisations, i.e. the railway authorities in each country concerned, and **not** to local consultants.

[2] However, TDDY has only nominated **two** participants at this stage.

It is planned to organise the study tour in February 1997 assuming that the participants will be nominated in time. It has to be taken into consideration that the visit to Austria requires Austrian visas from the Austrian Embassy in Moscow, which requires time. German visas can be obtained much more easily since Germany has embassies in all of the countries involved.

The goal of the study tour is to show the participants the organisation for traffic and operation management of western railway companies. An equal portion of the study tour will take place in Germany at the German Railway Company (DB AG) mainly in Frankfurt-on-Main, organised by DE-Consult, and in Austria at the Austrian Federal Railway (ÖBB) mainly in Vienna, organised by ARE.

The core programme consists of the following key parts:

- operational methods in national and international passenger and freight traffic
- methods and procedures in train formation for national and international passenger and freight traffic and for timetabling
- operation control in passenger and freight traffic, e.g. train monitoring in freight traffic, information system regarding train delays
- supporting EDP-systems for above mentioned systems, operational traffic scheduling
- rolling stock allocation and maintenance, staff rostering
- International freight traffic
- International passenger traffic
- marketing and business management
- competition with other transport modes
- co-operation between EU railways

Concerning rail marketing and railway organisation there is little point for the participants in learning in depth the European orientations for railway operation (directives of EU, national railway law). In accordance with the objectives of Module B emphasis must be put on basic and fundamental concepts such as:

- orientation towards customers' real needs and wishes
- understanding of competition in passenger and freight traffic
- improvement and simplification of customer information, pricing, payment, etc.
- basis for customers' choice of transport modes (role of commercial speed)
- cost reduction by increasing productivity of rolling stock and other railway assets
- cost-oriented assets and stock management (high tech systems and computerisation are not in themselves a source of progress and benefit!)

Tacis

This project is financed by the European Union's Tacis Programme, which provides grant finance for know-how to foster the development of market economies and democratic societies in the New Independent States and Mongolia.

Purchase of Equipment

In the Inception Report, the Consultant made proposals for the disbursement of the 240,000 ECU equipment budget. These proposals take into consideration the political situation in the region and the particularly 'delicate' relations between the countries by splitting the amount between the countries involved in the project proportional to their involvement in the project.

The proposed proportions were as follows:

Kazakstan	40 %	=	96,000 ECU
Turkmenistan	40 %	=	96,000 ECU
Uzbekistan, Kyrgyzstan, Tadjikistan	6.7 % each	=	16,000 ECU each

Additionally, preliminary proposals for using of the budget were presented.

The Consultant has received no official comments or suggestions on these proposals from the EU. On the contrary, the Consultant was confronted with proposals to concentrate the budget on a small number of measures of benefit to one or two countries only.

Taking into consideration the limited amount of the budget, procurement of heavy technical equipment such as locomotives, coaches, track maintenance machines, etc. is impossible.

Concerning the suggestion of leasing locomotives expressed by the EU, the Team Leader and Project Manager held discussions with responsible officers of the Turkmen and Uzbekistan Railways concerning the situation of their locomotive stock:

- The Turkmen Railways (TDDY) management was quite adamant that the railway had an adequate stock of diesel locomotives for existing and potential levels of traffic. The main problem affecting locomotive availability at present is the lack of foreign exchange to obtain essential spare parts from Russia. In the medium and long-term perspectives a re-motorisation of 32 locomotives of the type 2TE10 with new Western diesel motors and construction of a suitable repair facility are planned. Based upon the discussion, it would appear that there is no demand for additional locomotives (e.g. hired from Russia) for TDDY.

- The Uzbekistan Railways are also not interested in hiring or purchasing diesel locomotives, because they will have an overstock of such locomotives following completion of electrification of new sections in 1997. There is a need for additional electric locomotives for operation of the enlarged electrified network. To solve this problem the Uzbekistan Railways need to purchase electric locomotives (new or second hand from Russia or Ukraine); temporary leasing of locomotives has not been considered as an efficient measure.

The Consultant continues to be of the opinion that the budget should be distributed as proposed between all of the countries who are the Project's beneficiaries.

At the present state of the Project, the suggestions for the use of the budget are as follows:

for Kazakstan:

During the field mission to Aktau a rail fastening with ribbed base plates and bolts was demonstrated. The discussions with the railway authorities in Aktau have shown the necessity to buy equipment such as mobile hand tamping machines, generator sets, sleeper screwdrivers and so on.

The Atyrau Region of the Western Kazakstan Railways (responsible for maintenance of Aktau - Bejneu line) needs supplying with two rail cutting and two rail-boring machines (total amount approximately 14,000 USD).

The remainder of the Kazak allocation should be used to procure specialised computer hard- and soft-ware for computer aided design in order to prepare preliminary and detailed design documents for building and reconstruction of railway facilities and installations.

Both of these approaches would be helpful in enabling the railways to create more powerful structures for infrastructure management and maintenance.

for Turkmenistan

The Turkmen Railway and the Cabinet of Ministers express their preference for the procurement of equipment which is necessary for instrument measurement and inspection of railway bridges. Their first draft of a list of such equipment was included in Annex 6 of the Inception Report.

The Bridge Expert comments on the draft list of Turkmentransmost as follows:

1	Tension-compressing testing machine	YES, for laboratory only
2	Impact testing machine	YES, for laboratory only
3	Sclerometer	YES
4	Vibration and deflection measuring equipment	YES
5	Vibrograph	YES
6	Extensometer	YES, but needs special experience to correct usage
7	Echo sounder	YES
8	Microscope	YES
9	Loupe	YES
10	Surveyors' level	YES

The equipment is entirely appropriate for bridge inspections and should be used to check the structure as stated in the Consultant's recommendations. The priorities and available budget will be discussed with the Turkmenistan Railway.

For the three remaining railways it would appear most sensible to supply computer systems (personal computer and software) to support for railway management, especially to improve the work of freight and passenger departments.

The proposals will be finalised during the study tour and discussed with the participants and prepared for implementation during the second mission in Module B.

This project is financed by the European Union's Tacis Programme, which provides grant finance for know-how to foster the development of market economies and democratic societies in the New Independent States and Mongolia.

Deployment of Experts

The following changes in personnel were implemented during this phase of the Project:

Expert 6	Investment Planner	Mr. Francois Cancalon (SYSTRA) replaced by Mr. Frederic Davanture (SYSTRA)
Expert 8	Rail Marketing Specialist	Mr. Pierre Chartier (SYSTRA) replaced by Mr. Jacques Rabouël (SYSTRA)
Expert 9	Infrastructure Specialist (Bridge)	Mr. Hans Krall (ARE) replaced by Mr. Fritz Brandstetter (ARE)

These replacements were confirmed by the European Commission (Side Letter No. 1 of 25 September 1996; Side letter No. 2 of 20.11.1996)

As a result of the site investigation of the Railway Signalling and Telecom Specialist (Expert 3 on the Staffing List), it was considered advisable to undertake a more detailed analysis of the railway communication system along the Aktau-Bejneu route, which was beyond the scope of this Expert.

Given the successful outcome of the investigation of the signalling system on site by the Railway Signalling and Telecom Specialist, a qualified Telecommunications Expert, Mr Alfred Grassl, was engaged for the Project. The remainder of the man-month budget was used for this purpose.

The CV of Mr. Grassl was included in the original Technical Proposal of the consortium; during the contracting phase in January 1996 his position in the project was combined with the position of the Signalling Specialist. The engagement of Mr. Grassl was also confirmed by the European Commission (Side Letter No. 1 of 25 September 1996; Side letter No. 2 of 20.11.1996).

The CV's of Mr. Davanture, Rabouël, Brandstetter and Grassl are attached in Annex 2.

Due to the death of a close relative, Mr. Kontur was unable to undertake his field mission. His tasks were fully covered by a second input by Mr. Wogowitsch.

This project is financed by the European Union's Tacis Programme, which provides grant finance for know-how to foster the development of market economies and democratic societies in the New Independent States and Mongolia.

3. Project Planning

Relation/Co-ordination with Other Projects

During this Phase of the Project, discussions were held with consultants involved in the following TRACECA projects:

Regional Traffic Forecasting Model: meetings were held in Almaty between the Consultant's Transport Economist and Mr. Paul Pezant of W. S. Atkins, specifically concerning regional traffic forecasts for Modules A and C. It had been expected that this project would provide a feed of data into Modules A and C but apparent delays to the Forecasting project now indicate that the reverse will be the case, involving the Consultant in additional work.

Legal and Regulatory Framework: a short meeting was held in Ashgabat with a representative of this project, but there appears to be little project commonality at this stage.

Forwarding/Multimodal Transport Systems: again a short meeting was held in Tashkent between the Consultant's Team to exchange views and experience. Additionally, the Consultant's Project Manager has been personally involved on site with the Multimodal project.

Rolling Stock Maintenance - Railways: discussions took place between the Consultant's Rolling Stock Expert and the Team Leader of this project in Almaty In connection with module A. Subsequently, a discussion was also held in Bishkek with other members of the team, and although not strictly relevant to Module B, a useful exchange of views took place.

Tariff Reform - Railways: a number of discussions took place in Dushanbe and Tashkent with the Team Leader of this project.

In addition a co-ordination meeting was held between the Team Leader and Mr Mike Sims of TRACECA.

Regular contact was maintained with the Tacis Monitoring Unit in Almaty, and one of the meetings in Tashkent with the Uzbek Railway was attended additionally by the monitor.

In general terms, it should be stated that, despite the meetings held with representatives of other TRACECA projects as described above, there does appear to be duplication, overlap and an overall lack of co-ordination within TRACECA. This was particularly apparent in Module B, where the discussions held were more wide-ranging in content, in such responses as 'we discussed this subject with consultant xyz from TRACECA last month....'

3.2 Project Goals or Objectives, Project Approach

The overall ***objectives*** stated in the Terms of Reference and confirmed in the Consultant's Technical Proposal are expected to be achieved at the conclusion of the Project.

It would clearly be premature at this stage of the Project's progress to attempt to anticipate the Project conclusion.

For the period covered by this Report, the Consultant has adopted the following ***approach*** to the implementation of the Project:

- **Advance Questionnaires** on all relevant topics were produced by the Consultant in Russian and supplied to the local partner. In some cases, the local partner himself undertook to supply some of the data, in others the questions were passed to the railways for their responses. Based on prepared interview lists and counting sheet a **traffic census** and interview survey of users of Chardzhev pontoon bridge (Module C) were prepared and performed.

- **On-Site Technical Investigations** took place specifically for Modules A and C. In the case of Module A, this involved a detailed examination of the 400 km railway line from Mangyshlak to Bejneu in Kazakstan. The technical evaluation encompassed the existing condition of permanent way (track, pointwork, sleepers, ballast, structures etc.) and signalling and telecommunications system (signalling, train control, dispatcher, radio etc.). In addition, a concrete sleeper factory near Almaty was visited.

  For Module C, the technical investigation concentrated on the existing rail bridge at Chardzhev, with a detailed examination of the condition of the bridge and the systems of maintenance in use. The examination also included consideration of the hydrological aspects affecting the pillars of the bridge and the effect of the changing currents in the Amudarya River on the bridge pillars. A less detailed evaluation of the existing condition of the parallel road pontoon crossing was also made.

- **Examination of Existing Reports and Documentation** again formed a significant part of the input for Module C, where Giprotransmost of Moscow had in 1982 undertaken a feasibility study concerned with future options for the river crossing at Chardzhev. It was necessary for this feasibility study to be re-evaluated in the context of existing and projected traffic levels (road and rail) and the condition of the existing bridge and pontoon.

  In Module A, the existing documentation was limited to diagrams and plans prepared at the time that the line was constructed in the 1970s. Nevertheless, such documentation proved extremely useful in enabling specific problem areas — both existing and potential — to be pinpointed for more detailed examination.

- **Discussions with Railway Counterparts** was probably the most important input to Module B, as described in section (2) above. It was no great surprise that, despite the supply of advance questionnaires, much more useable and relevant information was forthcoming during face-to-face discussions than was provided in written answers. The methodology adopted in Module B was for all four of the Consultant's team of experts to meet each counterpart; initially, the discussion would take place between a single expert and his counterparts, with the others joining the discussion wherever appropriate with relevant

questions. It was found that, with the overall range of the Consultant's experts' experiences, this proved the most efficient way of gathering and imparting information. It should be stressed that the flow of information, experience and opinions during these discussions was always in two directions (i.e. not simply from the counterpart to the expert), and it was found that in many cases (though unfortunately not all) this stimulated the counterpart to a more fruitful and deeper discussion than may otherwise have been the case.

3.3 Intended Results or Outputs

There was no plan for any outputs or results anticipated during the period covered by this Report.

3.4 Planning for the Whole Duration of the Project

A detailed description of the progress made in each Work Stream and Work Package can be found in section 2.2 above.

The timetable proposed in the Consultant's Technical Proposal and subsequently modified in the Inception Report will be further modified as follows:

Phases 1 and 2 are now complete.

Phase 3 of the Project (Technical and Economic Surveys) will run from 15th August to 22nd November 1996 inclusive. This Phase includes:

Module A: completion of all field research and on-site technical evaluations, plus the completion of a demonstration sleeper replacement using Western European-standard fitments and fastenings

Module B: completion of the first visits to all five countries in the Project area, including research, discussions with local counterparts and obtaining nominations for staff attending the Study Tour in Western Europe

Module C: completion of all field work in Chardzhev, including traffic surveys and technical evaluation of the condition of the existing river crossing.

Phase 4 of the Project (Examination of problems found and development of proposals and solutions) will take place in the Consultant's home office and will involve an analysis of the data collected during the previous Phases of the Project and the development of recommendations for improvement.

Phase 5 of the Project comprises the Study Tour of Western Europe for selected railway managers from the Project countries. This phase will now take place in early 1997 in order to allow more time for the detailed programme to be developed, as well as for the procurement of all necessary visas and other travel documents by the participants.

Phase 6 of the Project is the completion of Module B and will require the Consultant's team of experts to return to the five countries for a total period of three weeks in March 1997.

The purpose of this phase is to observe the participants of the Study Tour in their own work environment, to coach and develop their skills particularly utilising the experience gained on the Study Tour.

The Consultant proposes that, because of the logistical problems experienced so far in visiting Dushanbe in Tadjikistan[3], the team of experts will visit Khodzhand[4] in northern Tadjikistan (located on the transit rail route) and invite the Study Tour participant(s) to meet there.

Phase 6 also involves the completion of all recommendations concerning the Aktau - Bejneu line for Module A and the Charqzhev Bridge in Module C.

The Draft Final Report will be produced at the conclusion of Phase 6.

It should be emphasised that the delays to Phases 5 and 6 of the Project have been instituted by the Consultant in order to meet a specific request by Tacis in Brussels that the total timespan of the Project be extended.

3.5 Planning for Next Reporting Period

The next planned report will be the Draft Final Report which will be produced in the period following the completion of Phase 6.

The detailed plans for the remaining stages of the Project (remainder of Phase 3, Phases 4 to 6) have been discussed above (see "Planning For The Whole Duration Of The Project") and will not be repeated.

3.6 Constraints, Risks and Assumptions

The final weeks of Phase 3 of the Project are not expected to result in any major problem or risk for the Project.

As far as Phase 5 is concerned, the timely completion of the Study Tour, together with the successful training of participants from the relevant target group, is subject to:

— agreement between the Consultant and rail organisations that the staff selected for training are those most likely to benefit from it

— a decision from Tacis on the number of participants

— punctual completion of all necessary travel formalities (including obtaining visas)

Problems in selection of participants and preparation of travel formalities might lead to delay of beginning of the study tour and subsequently to delay of Phase 6 being in correlation with Phase 5.

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[3] For example, the considerable difficulty in purchasing air tickets from and to Almaty (ultimately achieved by the personal intervention of the Deputy Transport Minister of Kazakstan), the lack of flights between Dushanbe and Tashkent or Ashgabat (and only once weekly to Bishkek), the short-notice cancellation of flights, etc.

[4] Khodzhand can be reached easily by road from Tashkent.

For Phase 6, because it will be necessary to visit a total of five countries during a period of three weeks — an average of 2-3 days with eacn railway — the following risks are present:

- the tenuous transport links between some of the countries could result in considerable time being used for travelling rather than project input
- the need to make personal applications[5] to buy air tickets means that advance booking is rarely possible. and therefore there is the risk that seats will not be available on specific flights
- potential delays in obtaining visas for team members
- the tenuous transport links may be further disrupted by bad weather in winter
- there could be time wasted in waiting for appointments with railway counterparts. as already experienced in Phase 3
- the trainees who visited Western Europe may not be available during the precise period of the Consultant's visit.

[5] In all cases, personal applications must be accompanied by the travellers' passports: without a passport, it is not possible to buy a ticket. This clearly cannot be arranged in advance when the Consultant's team is in a different country.

ANNEX 1

Tables

OVERALL PLAN OF OPERATIONS

Project title : **Rail Maintenance Central Asia: Infrastructure**	Project number : **TNREG 9310**	Country : Kazakhstan, Kyrgyzstan, Tadjikistan, Turkmenistan, Uzbekistan	Page : 1
Planning period : March 1996 - March 1997	Prepared on : November 1996	EC Consultant : DE-Consult in association with ARE and SYSTRA	

Project objectives : Provide feasibility studies for upgrading of the Aktau - Bejneu line and for the development of the Amudarya road and rail crossing at the Chardzhev site; survey of existing conditions, recommendations for investigation and improvement of the overall service quality on TRACECA rail corridor; training for senior staff in this regard

No	MAIN ACTIVITIES	TIME FRAME													INPUTS		
		1995				1996				1997					PERSONNEL		EQUIPMENT AND MATERIAL, OTHERS
		1	2	3	4	1	2	3	4	1			2	3	4	EC Consultant	Counterpart (approximately)	
										01	02	03						
1	Inception Phase					X	XX									1.0 MM	1	
2	Data collection by local experts						XXX	X								-	20	see
3	Technical and economic surveys by the expatriate experts							XXX	X							10.5 MM	10	Inception
4	Examination of problems found and development of proposal and technical solutions							X	XXX	X						14.0 MM	5	Report
5	Staff training phase (Study tour)										X					1.0 MM		
6	Completion of technical documentation and outline and discussion of improvement measures								XX	X	X	X				10.0 MM	4	
7	Preparation of Final Report											X	X			1.0 MM		
										TOTAL						37.5 MM	40.0 MM	

Updated list of expatriate experts

Expert	Position in the Project *Company*	Name of Expert as mentioned in the Technical Proposal	Replaced or filled by
Team Leader	Team Leader and Management and Organisation Specialist *DE-Consult*	Norman Griffiths	
PM	Project Manager *DE-Consult*	*not planned*	Frank Prescha *(with Inception Report)*
Expert 1	Transport Economist and Planner *DE-Consult*	Dr. Jutta Völker	
Expert 2a	Infrastructure Specialist (Track) *ARE*	Michael Kontur	Michael Wogowitsch (Position changed with 2b) *(with Inception Report)*
Expert 2b	Infrastructure Specialist (Permanent Way, Stations, Structures) *ARE*	Michael Wogowitsch	Michael Kontur (Position changed with 2a) *(with Inception Report)*
Expert 3	Railway Signalling and Specialist *ARE*	Peter Wegenstein	
Expert 3b	Railway Telecom Specialist *ARE*	*not planned*	Alfred Grassl *(with Side Letter No. 2 to contract)*
Expert 4	Cost and Tariff Specialist *DE-Consult*	Bernard Draper	
Expert 5	Specialist for Rolling Stock and Workshops *DE-Consult*	Hans-Joachim Freitag	
Expert 6	Investment Planner *SYSTRA*	Francois Cancalon	Frederic Davanture *(with Side Letter No. 2 to contract)*
Expert 7	Rail Operations Specialist *DE-Consult*	Walter Hassmann	
Expert 8	Rail Marketing Specialist *SYSTRA*	Pierre Chartier	Jacques Rabouël *(with Side Letter No. 1 to contract)*
Expert 9	Infrastructure Specialist (Bridge) *ARE*	Adolf Staindl	Fritz Brandstetter *(with Side Letter No. 1 to contract)*
Expert 10	Infrastructure Planner *ARE*	Günter Fleischmann	
Expert 11a	Study Visit Manager (Germany) *DE-Consult*	Dr. Erika Müller	
Expert 11b	Study Visit Manager (Austria) *ARE*	Richard Vegricht	

ANNEX 2

CV's of Experts

CURRICULUM VITAE

FULL NAME	**DAVANTURE, Frédéric**
DATE OF BIRTH	**June 22, 1961**
NATIONALITY	**French**
EDUCATION	**Engineer graduated from the Ecole des Ponts et Chaussées, majored in infrastructure and transport.**
LANGUAGES	**French, Spanish, English, German.**

KEY QUALIFICATION

Frederic DAVANTURE has been involved as an economist in various railway transport studies as part of SYSTRA-SOFRETU-SOFRERAIL assignments.

He has also performed the feasibility study of a railway connection in Ecuador, and the economic evaluation of new rail line or modernization projects, mainly for countries of Eastern and Central Europe.

In addition, he has gained experience in the training of architects and civil work technicians in Africa.

PROFESSIONAL EXPERIENCE

PRESENT RESPONSIBILITIES

Since 1995 **SYSTRA-SOFRETU-SOFRERAIL.**

1991-94 **SOFRERAIL, Engineering Department, Marketing Division.**
Project manager.

FRANCE 1996.
Economic analysis of the transfer of railway freight facilities in Poitiers, as part of an INGERAIL assignment.

POLAND 1996.
Managed of a marketing study of the E20 rail line (Berlin-Warsaw).

CURRICULUM VITAE

ALGERIA 1995-96.
Managed a rehabilitation study of Algiers, Annaba, Blida, Constantine, Oran and Sétif's transit systems.

GABON 1994-95.
Managed the feasiblity study of the Mabounié rail line (phosphate mines).

FRANCE/ ITALY 1994-95.
Manageed the feasibility study of the railway connection between Aoste and St-Gervais (tunnel under the Mont-Blanc).

LEBANON 1994.
Economic analysis of the rehabilitation of the railway corridor between Tyr-Beyrouth and Tripoli.

MALAYSIA 1994.
Economic evaluation of the north-south rail line modernization project:
. Economic analysis,
. Railway operation balance sheet,
. Profitability of the project.

HUNGARY 1993
Economic appraisal of Budapest southern by-pass

ECUADOR 1993
Proposals for the institutional future of the national railways in cooperation with ALDIR Ecuadoran economists:
. Economic appraisal of the rehabilitation of railways,
. Alternative proposed: concession and/or total or partial privatization.

CZECHOSLOVAKIA 1992.
Economic appraisal of the project for modernizing the Brno-Bratislava-Sturovo line: economic analysis, operating statements for the Czech and Slovakian railways, analysis of project profitability.

BASQUE COUNTRY (France) 1992.
For Aquitaine and Euskadi regions:: technical coordination of the preliminary study on the Dax-Vitoria key link for the European high-speed network (layout studies, traffic forecasts and economic appraisal).

ARGENTINA 1992.
For the urban networks of Buenos Aires, SUBTE, FEMESA : participation in the preparation of offers for taking over concessions of

CURRICULUM VITAE

underground and suburban railway lines in Buenos Aires (estimate of operating balances for the Mitre, Sarmiento and Urquiza lines and the underground lines.

HUNGARY 1992
Economic assessment of the project for modernizing the line between Budapest and Kelebia: economic analysis, operation balances for the Hungarian railways - MAV, analysis of the project cost efficiency.

ECUADOR 1991
. Management of a team composed of specialists in various disciplines: intermodal, ports and navigation, track, rolling stock, bridges and viaducts.
. Preparation of the economic pre-feasibility study of a link (rail or other) between the rail terminal of Durán and the port of Guayaquil.

PREVIOUS RESPONSIBILITIES

1986-91 **SENEGAL.**
Dakar architects' school

Training of future African architects in technical subjects:

. Devising the training schemes, lecturing on resistance of materials and on design and calculation of structures. Technical advice as to the formulation of projects for architectural workshops.

. Technical assistance provided to those sitting exams. Preparation and organization of visits to sites. Technical studies on transport infrastructure within the scope of a project for an urban centre in the suburbs of Dakar and on the extension of the suburban railway line to downtown.

. Economic study for a tower block accommodation programme.

. Computerizing the Ecole d'Architecture et d'Urbanisme de Dakar.

CURRICULUM VITAE

1983-85 **BURUNDI (GITEGA public works school).**

Within the scope of his national service, Mr DAVANTURE trained technicians, gave lectures on the design of roads and civil engineering structures as well as courses on how to draw roads and civil engineering structures.

CURRICULUM VITAE

NAME	**RABOUËL Jacques**
DATE OF BIRTH	**31 December 1951**
NATIONALITY	**French**
EDUCATION	**Graduate of Ecole Polytechnique, Paris, 1972.**
LANGUAGES	**French, English, German.**

KEY QUALIFICATIONS

After 8 years in the field spent in operational posts in operating centres of all sizes, Mr RABOUËL took over the supervision of an SNCF (French Railways) research team specialising initially in production of computer and computer-aided design tools for freight traffic schedules. Under his influence, the team extended its sphere of activity to the general problem of freight routing and the general field of operating simulation.

At the SNCF High Speeds Department he later managed the TGV Atlantic section, which developed TGV projects as part of the master plan for high-speed lines.

He currently works for SOFRERAIL on technical studies (including traffic forecasts) and economic studies for high-speed line projects throughout the world.

PROFESSIONAL EXPERIENCE

PRESENT RESPONSIBILITIES

Since 1995 **SYSTRA-SOFRETU-SOFRERAIL.**
1994 **SOFRERAIL, Engineering Division.**
Senior railway consultant.

PREVIOUS RESPONSIBILITIES

1993 **SOFRERAIL, resident railway consultant, AUSTIN (USA).**
Texas TGV project. Senior railway consultant with the program manager for engineering studies

CURRICULUM VITAE

1989-92 **SNCF, High Speeds Department, High Speeds and New Infrastructure Section.**
Project manager.

Headed staff responsible for economic studies and operating suppositions for the TGV Atlantic, Aquitaine, Midi-Pyrenees, Brittany, South, Limousin and Auvergne projects:

. In collaboration with the Way and Works Department, analysed layout options with regard to their economic benefits for the company and the community.
. Analysed the pricing suppositions issued by the Marketing Division in order to determine optimum pricing for the company.
. Examined, in collaboration with the Operations Division, problems involving services, line/station saturation, and operating in general.

Acted as adviser to explain the company's position on high-speed matters to elected representatives and the relevant authorities.

SOFRERAIL assignments:

BYELORUSSIA 1993.
Carried out an appraisal of a project for a high-speed line.

ITALY 1992-93.
Responsible for international traffic studies for the planned Turin-Milan-Venice high-speed line.

CZECHOSLOVAKIA 1991-92.
. Responsible for traffic studies as part of a project to increase speeds and improve operating on the Brno-Sturovo railway line.
. In charge of appraising the master plan for high-speed lines in Czechoslovakia.

SPAIN 1991-93
On behalf of the Basque government in Spain, worked on strategy studies for the planned high-speed line through the Basque Country to link France and Spain.

PORTUGAL 1990-91.
Carried out traffic studies for the planned suburban line to connect Lisbon with the Setubal peninsula on the left bank of the Tagus.

CURRICULUM VITAE

KOREA 1989-90.
Adviser to KNR for preparing specifications for the Seoul-Pusan TGV project:
. Liaised with the new-line division at the railway headquarters.
. Drew up numerous reports and instructions in the fields of operating, rolling stock, track and signalling.

1982-89 **SNCF, Research and Operating Department.**
Modelling unit manager.

Headed a unit initially responsible for preparing computer-aided design (CAD) tools for preparing traffic schedules.

In this capacity, worked on studies which led to a reform of distribution plans for individual wagons at SNCF and was involved in the organisation, modification, and application of operating models (e.g. design of freight traffic schedules meeting various constraints).
Was specifically involved in the following projects:
. CHOSE: CAD tool for freight traffic schedules.
. ETNA: new freight routing structure at SNCF.

And also:
. Channel Tunnel: design of a minute-by-minute program to simulate terminal operations for cars, coaches and lorries throughout the year.
. RIHO: program for running on standard microcomputers to determine in a few seconds the train timings between any two stations in France. The quality of the program timetables was such that a thousand such programs were installed throughout stations and information offices.
. COMMUTOR: the unit worked on initial development of this program, which is now being followed by a full-scale worksite representing an investment of FRF 300m. This is a project for automatic apparatus to handle containers in transhipment yards simultaneously and at high speed: train unloading and reloading time of under 15 minutes.

CURRICULUM VITAE

1975-80 **SNCF, Paris North Regional Headquarters.**

Held the following positions without interruption:

1980 Beauvais district operating manager.

1980 Deputy manager of Gare du Nord district control office.

1979 Station organisation manager at Gare du Nord.

1978 Station safety manager at Le Bourget marshalling yard.

1977 Deputy business officer at Saint Denis operating centre.

1976 Station operating manager at Creil.

PUBLICATIONS

"Un outil d'aide à la conception de plans de transport marchandises" (A computer-aided design tool for freight traffic schedules), Révue Générale des Chemins de Fer, 1985.

CURRICULUM VITAE

Proposed position in the programme:	Infrastructure bridge expert On site investigation of bridge substructure and superstructure
1. Family name:	**BRANDSTETTER**
2. First names:	Fritz
3. Date of birth:	April 4th, 1939
4. Nationality:	Austrian
5. Civil status:	married
6. Education:	
Institution:	Elementary school
Date:	1945 - 1949
Institution:	Secondary school
Date:	1949 - 1953
Institution:	Theoretical and practical training outside Waagner-Biró during apprenticeship
Date:	1953 - 1957
Degree(s) or Diploma(s) obtained:	

7. Language skills:

Language	*Reading*	*Speaking*	*Writing*
German	5	5	5
English	3	3	3

8. Membership of professional bodies:	--
9. Other skills:	--
10. Present position:	Chief erection supervisor; Consultant to ARE
11. Years within the firm:	43

12. Key qualifications: Expert in erection of road and railway bridge structural steelwork and mechanical equipment in Europe and Overseas Countries.
Skilled in bridge revisions and repair

13. Specific Eastern Countries experience:

Country: *Date:*

14. Professional Experience Record:
Special experience with great bridges, selected out of a number of various structures

Date: 1994 - up to now
Location: Vienna
Company: PSM - Planning of steel and machinery construction Ltd
Position: Chief erection supervisor
Description: Expertise in the review of steel bridges and their rehabilitation and in the design of new bridges (road, railways)

Date: 1[illegible].12.1994 - 12.3.1995
Location: Austria
Company: Waagner-Biró AG
Position: Chief erection supervisor
Description: Praterbrücke across the Danube / Vienna;
Strengthening and repair of the 320 m /5,000 tons road bridge up to 1.8 m

Date: 1990
Location: Austria
Company: Waagner-Biró AG
Position: Chief erection supervisor
Description: Stadtbahnbrücke Döbling/Vienna
Railway bridge, erection

Date: 1987 - 1988
Location: Iran
Company: Waagner-Biró AG
Position: Chief erection supervisor
Description: Bafq Bandar Abbas Bridge / Iran
Railway bridge, erection

Date:	1972 - 1976
Location:	Germany
Company:	Waagner-Biró AG
Position:	Chief erection supervisor
Description:	König Karls Brücke / Stuttgart Multiple box girder road bridge, erection

Date:	1968 - 1969
Location:	Austria
Company:	Waagner-Biró AG
Position:	Chief erection supervisor
Description:	4. Donaubrücke over the Danube / Vienna 320 m double box girder bridge, road bridge, erection

Date:	1964 - 1965
Location:	Austria
Company:	Waagner-Biró AG
Position:	Chief erection supervisor
Description:	3. Donaubrücke over the Danube / Vienna Composite girder bridge, road bridge, erection

Date:	1965 - 1966
Location:	India
Company:	Waagner-Biró AG
Position:	Chief erection supervisor
Description:	Kidderpore Bridge / Calcutta Double swing road bridge, erection Road bridge box girder, erection

15. Others:

CURRICULUM VITAE

Proposed position in the programme: Telecom and Operation Informatics Specialist

1. Family name: **GRASSL**
2. First names: Alfred
3. Date of birth: July 9, 1941
4. Nationality: Austrian
5. Civil status: married

6. Education:

Institution:	Technical University Vienna
Date:	1959 - 1965
Degree(s) or Diploma(s) obtained:	Telecommunications, Diploma engineer

7. Language skills:

Language	*Reading*	*Speaking*	*Writing*
German	5	5	5
English	5	5	5
French	3	3	3
Hungarian	2	2	2

8. Membership of professional bodies: --
9. Other skills: Telecommunication and informatic
10. Present position: Senior Consultant to AUSTRIA RAIL ENGINEERING (ARE)
11. Years within the firm: 24

12. Key qualifications:

Network analysis consisting of
- Assessment of status quo in telecommunication and data transmission
- Proposal for modernization
- Investment planning
- Project definition

Operational informatics for
- Freight transport
- Passenger transport

Work undertaken which best illustrates capability to handle the tasks assigned:

FROM 1992 : *UP TO* 1994
Head of EURATEL (European Railway Telecommunications) Committee of the Directors for telecommunications of the European Railways.

FROM 1973 : *TO* 1982
Head of the UIC-Subcommittee - data transmission.
Collaboration in the planning and implementation of the data transmission network HERMES

FROM 1991 : *TO* 1993
AUSTRIA RAIL ENGINEERING (ARE)
Technical Assistance to Polish State Railways (PKP) in the planning and tendering phase for data transmission network and a pilot telephone exchange in Tzew (Poland).
Technical Assistance to MAV (Hungarian Railways), SZ (Slovenian Railways), HZ (Croatian Railways), SNCFR (Romanian Railways) for the introduction of new digital telecom equipment.

13. Specific Eastern Countries experience:

Country:	*Date:*
Poland	1991 to 1993
Hungary	1991 up to now
Romania	1992 - 1994
former CSFR	
Slovenia	1991 - 1992
Slovakia	1993 - 1994

14. Professional Experience Record:

Date:	1985 to 1994
Location:	Austria (Vienna)
Company:	Austrian Federal Railways (ÖBB)
Position:	Head of telecom department in the General Directorate of ÖBB
Description:	Modernization of the telecom network of the ÖBB including digital exchanges, optic fibre cables, transmission network; as well as of the ground to train radio, train radio control and data transmission network with 100 nodes Project manager for the development and application of the freight transportation information system and passenger information system

Date:	1980 to 1984
Location:	Austria (Vienna)
Company:	Austrian Federal Railways (ÖBB)
Position:	
Description:	Project Manager for the development and impelementation of EDP-supported train control for Vienna commuter traffic

Date:	1970 to 1979
Location:	Austria (Vienna)
Company:	Austrian Federal Railways (ÖBB)
Position:	
Description:	Project Manager for the integrated Telex and data transmission network of the ÖBB

Date:	1966 to 1970
Location:	Austria (Vienna)
Company:	Technical University of Vienna
Position:	Assistant
Description:	Assistant to the professor for low frequency technics

15. Others: --

ANNEX 3

Short Reports of Technical Experts
Involved in Module A and C

Infrastructure expert (track):
Mr. Wogowitsch (Module A)

The state of the work and the results reached up to now

The two field missions in Kazakhstan (Almaty and railway line) are finished. Also the homework is nearly finished. During the next weeks the reports will be finished and will be included in a complete report with signalling and telecommunication.
The casual issues in the reports will be:

- Infrastructure:

  The train capacity of the line is about the tenfold than the train volume today, so it is not necessary to build up a second track or to extend existing stations

- Track:

  About 80% of the track materials are in bad condition and require refurbishment and/or renewal

- Geometry:

  The profile in the most sections is good, after the renewal of the track it will be possible to raise up the maximum speed

- Bridges:

  The condition of the bridges is good, but the area is a desert area most time without rainfall, but sometime with very heavy rainfall. In this case several bridges are too small. It is proposed to extend them

- Embankments and Cuttings:

  They are in good condition

- Aktau Connection:

  The passenger trains stop all in Mangyshlak, this town is about 18 km outside from Aktau (150.000 inhabitants). To improve the connection for passengers it is suggestive to operate the passenger trains also on the existing private line from Mangyshlak to Aktau station.

- Equipment:

  There are no modern track machines in this area in operation

Signalling Expert:
Mr. Wegenstein (Module A)

1. Survey mission to the project area performed and analysis of the existing situation made. The signalling equipment and safety installations on the line Aktau - Bejneu including the all-electric interlocking cabins in all railway stations, a 100 automatic block systems, signal repetition on the locomotives and remote control as well as the level crossings with technical installations are sufficient not only for the operation of present traffic but also for a larger number of trains in the future. The majority of installations and equipment is about 30 years old and still in good condition. However in the next years the replacement of the equipment will be required due to the reaching of the end of the life cycle of the installations.

2. The upgrading strategy is presently under preparation. In particular the harmonisation with the telecommunications transmission system and cabling is required.

   Basically the systematic replacement of the existing installations is proposed including a reduction of the large number of the block systems. The new installations should in particular reduce the maintenance costs.

   Still open and in discussion are the following questions: cable routing alongside the railway line, technical options to minimise the construction and maintenance costs.

Telecom Expert:
Mr. Grassl (Module A)

1. Based on the results of the survey of the expert on the line Aktau - Bejneu the report will cover the following topics:

   - Existing communication
   - Existing communication systems
   - Proposals for the renewal and modernisation of telecom system
   - Investment costs for the renewal
   - Maintenance costs for the equipment

   The status-quo of the work is as follows:

   - Existing communication
   -

     To understand and describe the existing communication system it is required to document and analyse the communication requirements and needs based on the operational procedures. This chapter will cover the analysis of the

     - communication within operations (communication procedures - railway operations telephone network)
     - communication for administrative requirements (commercial and administrative telephone network)

     This chapter of the report is finished.

   - Existing communication systems

     Based on the material received during the survey and the answers to the questionnaire the existing telecom systems and equipment will be described (quantitative and qualitative description) and will include:

     - open wire line and cables
     - transmission system(carrier frequency equipment)
     - telephone connection alongside the line
     - railway operations telephone network (ROTS)
     - radio systems
     - administrative telephone network
     - telex and data transmission network
     - other installations
     - measuring equipment
     - maintenance staff

     This chapter is finished.

- Proposals for the renewal and modernisation of telecom system
-

  The following key proposals will be made in the report:

  - renewal of the transmission system (open wire lines and cables, carrier frequency equipment)
  - optical fibre cables with digital transmission equipment (in different variants)

  Generally the analysis of the existing installations resulted in the fact, that the installed equipment has sufficient capacity, reliability and is in good working condition. The equipment has reached the end of the life cycle, and spare parts are not any longer available. The railway staff is presently solving this problem by dismantling required parts and components from installations which are presently not required. However, this procedure will come to an natural end in the near future which will result in a collapse of the network.

  This chapter is partly finished.

- Investment costs for the renewal

  This chapter is under preparation, and requires cost estimates in particular for optical fibre cables on open wire line with enlarged specification due to severe climatic conditions.

- Maintenance costs for the equipment

  This chapter is open and will be elaborated in correspondence with the investment costs.

Infrastructure Planning Expert:
Mr. Fleischmann (Module A)

1. Field Mission to Almaty September/October 1996 performed

   - Data collection in Almaty from the different institutes and authorities
   - Information and discussions on the base of existing maps and projects
   - Field mission to Aktau
     Visit of the city of Aktau with an existing station in the centre of Aktau, an interesting solution for the further development of the passenger traffic from Bejneu to Aktau private ownership of the line in the length of about 18 km from Aktau to Mangyshlak

     Visit of the port of Aktau and the railway facilities, owned by the same private company as mentioned above.

     Visit of the about 404 km from Mangyshlak to Bejneu and back by using a normal passenger train in both directions.
     Visit of the station of Bejneu and the existing maintenance facilities in this area.

     Discussions with the local authorities about the further connection from Mangyshlak to Aktau based on the different ownership.

   - Back to Almaty further data and especially collection of the available maps of the Bejneu - Aktau area.
     Procurement of maps at a scale of 1:200.000 of Aktau, 1:100.000 from Mangyshlak to Bejneu and we ordered some additional maps at a scale of 1:25.000 for the existing line passing the Caspian Sea.

2. Studies carried out in Austria

   - Designing of an overlooking length profile with indication of existing stations, of the different curves and according to this a theoretical speed calculation for the existing line after a reconstruction without changing the parameters. Length profile at a scale of 1:200.000/2.000.

   - Elaboration of a pre-feasibility study of the special section along and quite near to the Caspian Sea corresponding to the rising of the sea level within the near future.

Infrastructure (Bridge) Expert:
Mr. Brandstetter (Module C)

1. Visits on site

   Mr. BRANDSTETTER/Vienna has visited the site twice. Written reports are available and more than 200 photographs have been collected to document the state of the existing bridge.

   - A preliminary report
     is available. This report is now to be completed with the results of the second visit of Mr. BRANDSTETTER.
     The available chapters concern with:

     GENERAL ASPECTS:
     - Situation and Technical Characteristic of the Bridge
     - Visit of the Expert Mr. BRANDSTETTER
     - Investigation programme
     - List of Abbreviations which are used in the report

     PRESENT BRIDGE SITUATION:
     - State of the Steel Structure

     DOCUMENTATION:
     - Photo documentation (244 colour photos)
     - Recordings of Expert: Description of spans
       Description of piers
       General notes
     - Proof load results
     - Static check computation to verify the proof load results

     REPORT OF FORMER INSPECTIONS
     - Abridged description, total translated version is also available

     RECOMMENDATIONS OF ACTIVITIES
     - Short time activities: Checking
       Corrosion protection
     - Long time activities: 10 years lifetime

2. The preliminary report will now be completed with some statements (piers, more spans) of our expert and results of the translated Turkmenian reports.

Infrastructure Planning Expert:
Mr. Fleischmann (Module C)

1. Field Mission September/October 1996 performed

   Starting from Almaty to Ashgabat

   - Data collection in Ashgabat from the different institutes and the railway authorities
   - Flight to Chardzhev, discussions with the local authorities as well as with the railway company and city planning office

     Visit of the location of the existing railway bridge, road bridge (pontoon bridge), visit of the designed location of the new road connection to a planned bridge near to the existing one.

     Collecting of the existing maps and projects in Chardzhev as much as possible

2. Studies carried out in Austria

   Studying of the existing documents, elaboration of the three different alternatives for the future bridge design as there are:

   - new railway bridge
   - new road bridge
   - new combined railway and road bridge
   -

   located at three different areas

ANNEX 4

Inspection of Existing Bridge
and Possible Refurbishment
(Module C)

MODULE C - WS 3200

CHARDZHEV BRIDGE

INSPECTION OF EXISTING BRIDGE AND POSSIBLE REFURBISHMENT

GENERAL

Situation and Technical Characteristic of the Bridge

The bridge across the Amudarya River was built in the years 1898 to 1901 to connect the town of Chardzhev on the western with Farap on the eastern bank.

25 truss girder bridges (numbered 1 to 25) with span of 66.136 m are situated on double concrete filled tube piers. All truss spans are of the same type: straight lower chords, upper chords with variable system height, so the axis of the upper chord is between 7.506 and 9.144 m above the lower chord axis. The ascending and descending diagonals and verticals connect the gusset plates in distance of 4.724 m. The axis of the main girders have a distance of 5.537 m. Between the main girder lower chords cross girders are arranged every 4.724 m which carry longitudinal girders 1.829 m distant. Upper and lower wind bracings made of angles and also lurch bracing grant horizontal stiffness.

All connections are riveted except such parts which are added later to replace damaged parts and which are bolted.

The upper chord is built up by double wall riveted hat plate profile and the lower chord by a reversed hat profile like the upper chord. The diagonals and verticals are either formed as a double-T-section laced by flat iron or as laced plate + angle section. The end frame diagonals are of a hat section.

Cross girders and longitudinal girders are made as riveted plate girders with angle flanges, the end cross girders strengthened by additional cover plates.

The bearings are of cast iron. The fixed bearings are on the western pier whereas the movable bearings are on the eastern pier of each span.

A runway with rails to push a little lorry is arranged outside the main girders on upstream side.

The bridge deck between the rails is covered with a wooden floor, partly of corrugated iron. An inspection car is intended to run on I-beam rails below the lower flange but the resistance due to friction is heavy enough to baffle movement other than by force of ten workers.

Some of the spans carry high voltage current masts on their upper flange.

The spans are resting on piers made of concrete filled double tubes with boxes between.

On both banks of the river access spans of plate girders of 11.89 m length are situated.

Schematic drawings with numbering are following in the Appendix.

Visit of Expert

The expert who was concerned to give a comprehensive judgement of the bridge state is an experienced specialist on steel bridges with long time residence in foreign countries. He has documented the general and detail state by written and spoken reports, by sketches and photographs. The summary of his report is given below.

Investigation programme

It was intended to select the spans which are evidently in the worst state. Such spans should be investigated thoroughly, but the remaining only if conspicuous.

The spans which are therefor selected are
- span 0
- span 3
- span 13
- span 15
- span 23

The expert also directed a proof loading of one bridge span and documented the deflection of the structure. The measurement results are checked with program and hand computation.

List of Abbreviations

The following abbreviations are introduced to simplify the report text:

Abbr.	Full text	Abbr.	Full text
MG	Main girder	UC	Upper chord
CG	Cross girder	LC	Lower chord
LG	Longitudinal girder	UF	Upper flange
US	Upstream	LF	Lower flange
DS	Downstream	HV	High voltage

PRESENT BRIDGE SITUATION

State of the Steel Structure

Steel structure:

The steel structure was designed with enough safety to sustain the design loads during a long time period (surely more than 100 years). But the material quality (which could not be judged by the expert) is probably and the workmanship of the execution and the corrosion damages are surely causing reasons for the present state documented in the following description.

Some particular problems are stated by the expert:

The structure shows some weakness if a train passes the bridge which is caused by weak connections (loose rivets, rust swelling etc.). This weakness produces movement in the connections of the elements which will cause further defects as new cracks.

Many of rivets which are found defective were replaced by bolts which are probably high strength friction grip (HSFG) bolts. In normal riveted structures the plate surfaces in the connection itself are coated with minimum 1 layer of painting. If a HSFG bolt is applied on a structure painted between the force bearing surfaces the friction coefficient is not more than 0.20 instead of 0.40 to 0.45 on normal raw (sandblasted) surface.

Therefore it is very probably that these replacing HSFG bolts can not take over the full load of the former rivets if they are not executed as fitting HSFG bolts which are machined and brought into a carefully reamed hole (tolerance hole to shaft 0.01 to 0.02 mm). If not so which can be assumed the remaining rivets have to take over a considerable overload or the whole joint is very weak if load passes over. This can again produce new cracks.

A certain form of strengthening made with round bar welded to a strengthening plate. Such elements are extremely fatigue crack endangered as abrupt cross section changes and poor welding (executed on site) provoke damage especially if they situated near the load carrying track. Strengthening in such form should be avoided.

A very serious problem is the corrosion on the structure and the corrosion protection as executed at present. It is described below that the special cement used for this purpose is not suited. Correct sandblasting and 4 paint coatings of an approved quality should be applied if further defects should be avoided.

DOCUMENTATION

Photo Documentation

The photograph documentation will be presented in the Final Report.

Recordings of Expert

General

The general state of the bridge steel structure can be expressed by the following:
A lot of defects have been detected by the expert but are also documented by inspection reports handed over to the expert.

Apart from this the structure is designed save and its stress level would be low enough to carry also heavier loads if there were not the defects and detail faults which are described in the following. These faults can cause fatigue cracks which cannot be detected due to the special cement coating which is applied at present.

The following report does not give a complete enumeration of all defects but shows characteristic features of the structure.

Concerning all Spans

In all spans the edge stiffening angles of cross frame connecting main girders and upper bracing are cut off to give more clearance for bigger lorries. Not in all cases this angle is built in again, and where so, there are considerable excentricities in the connections.

Many of the connecting angles between cross girder and LC are cracked and therefor strengthened by additional angles, where the rivets are replaced by bolts.

The connection between cross girder and longitudinal girder is strengthened in a more modern way by (indeed bad) welding with round bars going through holes in the cross girder web.

80% of the bolts to fasten the rails are loose.

Bearings

The bearings are made of grey cast iron and are in good state. The movable bearing is situated on the Farap side of every span except the acces spans (see below). It consists of an upper part which rests on a round steel whipper. This is embedded in a central body with flat lower plane running over 6 rollers. The rollers go over a lower plate which is situated on the piers header stone. The fixed bearings (on the Chardzhev side) are rocker bearings. The upper part of every bearing is fixed with 4 bolts on the LC of the MG, the lower plate is secured against shearing with 4 vertical round bars (recorded by the local experts, but not visible).

The 2 mm thick lead inlay between upper plate and LC of MG is squeezed out (which is a common and well known fact of lead inlay).

The lower plates of the bearings are resting on 8 mm thick lead which below is lined with a special concrete under pressure which was executed newly.

High Voltage Cantilevers

These cantilevers are connected to the UC in span 1 between 2' and 3', in the other spans between 12' and 13' by replacing the rivets with bolts, but some of the bolts are missing and not again replaced.

Span 0

This span is a plate girder as described above. All 4 bearings are defective. This is perhaps a consequence of the situation of the bearings: the fixed bearings are arranged diagonally - at Chardzhev end DS and on Farap side US, the movable bearings accordingly opposite. The subsequent constraint could have caused the damages.

The concrete below the bearings sounds to be hollow if hit by hammer. Cracks in the header stone of the piers are filled up with grout but not treated further.

The legs of the LC bracing angles are deformed and bent.

Span 3

This span is over land. The general aspect shows a well designed bridge with the characteristics of a riveted structure.

The piers are riveted double steel tubes with angle bracings between the shafts. They are filled with concrete, but at the surface there seems to be poor cement portion. No signs of reinforcement. The bracing and the tube walls are heavily corroded - estimated 1 mm thickness loss. The box between the tube piles is full with water and also heavily corroded.

The lower plates of the bearings are inserted in the stone of the pile heads and grouted. No shear connectors are visible and it is not known by the local experts if there are any. The lead inlay is squeezed out.

At the end nodes of the main girder there are some bad formed rivet heads. At the verticals and diagonals some rivets were removed and replaced with bolts. No loose rivets or bolts could be detected but in some cases the rivet holes are not filled again. A similar method was used to fix the HV cantilever at the UC. There are also holes which are not filled.

Strengthening of some structure elements (as the connection longitudinal to cross girder) is executed with angles which are bolted or with welded bars and gussets. Such action evidently should improve defects as warping or torsion of angles or plates.

Some deformations (curvature) of bracings between LC elements seem to come from the erection time.

On DS side angle cantilevers which carried the footway are cut off and replaced with bolted and welded consoles.

In many cases the angle which carries the inspection car rails are cracked or deformed heavily. The supporting angle of the telephone console is loose also.

Very frequent signs of corrosion can be seen (except of the UC which is in good state but coating is full of cracks). The present painting consists of a special grout of unknown consistency and is full of cracks and not very resistible. Behind this coating very often the steel is rusty. Sometimes the special grout or cement is used to fill wide gaps.

Span 13

This span shows similar characteristics as the other spans.

Some loose and outstanding rivets have been detected.

At some diagonals deformation of bracing flats can be seen.

LC heavy pitting (localised corrosion) due to acid influence. The suspension angle of the inspection rail is broken.

Corrosion is visible at various locations especially below rail level, but also at the diagonals where narrow gaps filled with special cement exist. Rust has puffed up the angle legs due to volume extension and effects proceeding of corrosion.

Span 15

Every gusset plate of LC shows signs of rust wherever the above mentioned special grout was applied. At LC gusset plate of vertical 11-11' a plate was riveted in which is to 60% bitten away probably due to attack of (battery?)acid or similar. Also from one rivet only remained 14 mm of the shaft and the lower head. The verticals and diagonals do not have loose rivets as some of them were replaced by bolts. The total span is just in state of unrusting but only the surface of the coating is treated as no proper tools are available (no sandblasting, no wire brushes - only little pick axe).

Lower bracing near movable bearing has 3 mm deep rust flaw. The end cross girder at the fixed bearing is not strengthened and is deformed.

Span 23

The inspection car cannot be used as the rails (U 200) are bent due to ships collisions but not repaired (in the spans 22, 23, 24 and 25). The support angles of the inspection rails are deformed. As the rope winch cannot be used up to ten workmen have to move the car.
The cross girder connection to LC DS and also US shows warping. The bracing between the longitudinal girders has loose connections, corroded, some of the rivets are missing. Rivets are also missing at the end girder.

The LC is totally spoiled with birds excrements and other waste.

Corrosion exists at every vertical to LC connection and at cross girders and diaphragms. Strengthening of various elements of the structure is made similar to other spans.

The structure above the rail level is in good condition, no loose rivets detected, riveting was executed very well.

Piers

It is reported that the real state of the piers deviates from the state documented in the original design drawings. Some reinforcing plates or bars could be arranged inside the steel tubes which are not drawn. It is also unknown if the damages and holes which are now strengthened and closed by plates have caused some deterioration inside the piers.

It was also reported that a great amount of rubble stone was brought at the foot of some piers in the main stream which has to be renewed again as it was swept away. The present state is not known exactly. The water depth diagram over the years shows very much changes which indicates enduring changes of the situation. Also the main stream changes between the piers.

Plate cladding of the piers 15 mm thick is on some spots totally bitten due to corrosion and there strengthened with plates. Pier 24 was hit by a ship which damaged and bent the cladding.

Proof Load Measurement

The proof loading was arranged at span No. 1 on 1996-09-11 at 09:30.

Length of the span 66.1 m.

Initial measurement	at point 0	1399 mm
	at point 7	1350 mm
	at point 14	1384 mm
Temperature:	air	36° C
	structure	27° C

Loading:

1. Two locomotives:	length 33 m, total mass 276 metric tons in centric position of span 1
2. Four locomotives:	length 66 m, total mass 552 metric tons over total span 1

Measurement:

1. without locomotives:	left MG	1987 mm
	right MG	1987 mm
with 2 locomotives	left MG	2015 mm
	right MG	2015 mm
	Deflection therefore	28 mm
2. without locomotives	right MG	1971 mm
with 4 locomotives	right MG	2009 mm
	Deflection therefore	38 mm

Longitudinal movement of the bridge end:

Measured between movable bearing of the span 1 to fixed bearing of span 2:

Distance	without load	1063 mm	
	1. With 2 loc.	1058 mm	movement 5 mm
	2. With 4 loc.	1054 mm	movement 9 mm

A comparing computation will appended in Annex C of the Final Report.

Static Computation of the Bridge Main Structure

Will be included in Annex C of the Final Report.

FORMER INSPECTIONS

Results of Inspection of Bridge

It can be stated that the bridge is under permanent supervision as it was reported to the expert and can be read also in the translated report.

This report refers in part I chapter 1.1 of the design and erection of the bridge, in chapter 1.2 of previous inspections which happened in 1928, 1947, 1952, 1959, 1966, 1980, 1984.

Part II refers of the results of the last very thorough inspection at 1990-91 by the experts of „Bridges and laboratory of bridges construction of MIIT" (Moscow Railway Engineer Institute).

In general the results of that inspection are similar with these obtained in the present time but are more extensive.

In Annex D of the Final Report some of the results of that investigation are summarised to have a quick overview for decisions.

RECOMMENDATION OF ACTIVITIES

Short term activities

Within the remaining years but **starting immediately** the following actions should be executed:

The structure should be **checked regularly**, as a minimum every 6 months to detect new cracks, loose bolts and rivets. Such checks should be concentrated to the connection longitudinal girders to cross girders, cross girders to main girder lower chord. The rivets and the straightness of horizontal bracing between the longitudinal girders should be observed. The rivets of lower chord in the region of point 5 to 9 and also the connection of diagonals 0 - 1' and 1' - 2 should be checked.

The **axle loads should not be increased** but better decreased as the number of cracks and loose rivets detected during previous inspection is a caution signal. As the expert stated at site the trains should be divided in parts with less loading of each span - this has the same background.

The **corrosion situation** of the bridge is also **alarming**. Corrosion flaws are serious starting points of fatigue cracks, and as the structure is very carefully enwrapped in the above mentioned special cement envelope which is absolutely intransparent there is a high grade of danger of undetected cracks. A thorough protective treatment is unavoidable and should be done as soon as possible: total removing of the existing coating by means of carefully sandblasting (all other means are insufficient) and subsequent within 24 hours applying of

the first painting. Then three further paintings (including edge protection) should be brought up. Airless spray method has to be used as the design details of some elements show very narrow gaps which could not be protected otherways. Where some pocket holes or boxes exist dewatering borings should be executed to enable water flow.

Long term activities

Lifetime of bridge structures similarly designed could be more than 100 years as examples from Germany or other countries show but very carefully corrosion protection and regular inspection (which is done in this case) is postulated.

It cannot be said how the results are when the bridge is sandblasted and the exact state of the structure is visible.

In knowledge of the above investigations the bridge should be replaced within the next 10 years if not renewed in a high degree. As it is known from similar structures renewing of riveted structures is very complicated and costly so in this case a total new structure would be cheaper. The renewing should enclose all connections between longitudinal and cross girders and to the main girder lower chord and the lower chord itself (due to its very heavy corrosion damages). This is the judgement without knowledge of the result of evidence after sandblasting of the structure.

APPENDIX

TRACECA - MODULE C
CHARDZHEV BRIDGE

BRIDGE SYSTEM AND NOTATIONS