Contract Agreement # SRAMP/CW/NCB-05

THIS AGREEMENT made the 02 day of May 2017, between the Roads Department of the Ministry of Regional Development and Infrastructure (hereinafter "the Employer"), of the one part, and ***AGT MENEGMENT, MESLEHET, TIKINTI, XIDMETLERI MMC ID2000676411*** (hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works and Services known as Procurement of **Design – Build and Take-Over of Khidistavi – Ateni – Boshuri Road Section Rehabilitation from km 12.4 to km 22.5 under Output- and Performance-based Contracting (OPCR) Methodology (SRAMP/CW/NCB-05**) should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

(i) the Letter of Acceptance

(ii) the Letter of Bid

(iii) Bidder Information Sheet

(iv) Performance Security

(v) Power of Attorney to Sign the Agreement

(vi) the Particular Conditions

(vii) the General Conditions;

(viii) the Specification

(ix) Summary Bill of Quantities

(x) Construction Schedules,

3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and Services, and to remedy defects therein in conformity in all respects with the provisions of the Contract.

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4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and Services, and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Georgia on the day, month and year indicated above.

Signed by _____ (for the Employer)

Aleksandre Tevdoradze
Acting Deputy Chairman of RDMRDI

Signed by _____ (for the Contractor)

Ahmet Murat Turkoglu
Authorized Representative of
AGT MENEGMENT, MESLEHET, TIKINTI XIDMETLERI MMC

Design-Build and Take-Over of Khidistavi – Ateni – Boshuri Road Section Rehabilitation (km 12.4 - km 22.5)

საქართველოს რეგიონული
განვითარებისა და
ინფრასტრუქტურის სამინისტრო
საქართველოს საავტომობილო
გზების დეპარტამენტი

0160, თბილისი, ალ. ყაზბეგის გამზ. №12
ტელ: (995 32) 237-62-16
E-mail: info@georoad.ge

Ministry of Regional
Development and Infrastructure of Georgia

ROADS DEPARTMENT
OF GEORGIA

12 Kazbegi ave., 0160 Tbilisi, Georgia
Tel: (995 32) 237-62-16
E-mail: info@georoad.ge

N 2-10/3274
04/04/2017

3274-2-10-2-201704042104

LETTER OF ACCEPTANCE

To: ***AGT MENEGMENT, MESLEHET, TIKINTI XIDMETLERI MMC (ID 20000676411)***
Address: 2231/2232 NOBEL AVENUE, KHATAI DISTRICT, BAKU CITY AZ1026, AZERBAIJAN

This is to notify you that your Bid dated November 25, 2016 for execution of **Design – Build and Take-Over of Khidistavi – Ateni – Boshuri Road Section Rehabilitation from km 12.4 to km 22.5 under Output and Performance-based Contracting (OPCR) Methodology (SRAMP/CW/NCB-05)** for the Accepted Contract Amount of the equivalent of **GEL 6,155,842.02** (Six Million and One Hundred and Fifty Five Thousand and Eight Hundred and Forty Two Georgian Lari and Two Tetri), as corrected and modified in accordance with the Instructions to Bidders, is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section IX, Annex to the Particular Conditions - Contract Forms, of the Bidding Document

Name and Title of Signatory: Aleksandre Tevdoradze, Deputy Chairman
Name of Agency: RDMRDI

Attachment: **(i)** **Contract Agreement**
(ii) **Forms for Required Securities**

Authorized Signature:

Letter of Bid

Date: 25.11.2016
ICB No.: SRAMP/CW/NCB-05
Invitation for Bid No: SRAMP/CW/NCB-05
To: **: Roads Department of the Ministry of Regional Development and Infrastructure of Georgia, Kazbegi Avenue 12, 0160 Tbilisi, Georgia**
We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Document, including Addenda issued in accordance with Instructions to Bidders (ITB)8

(b) We offer to execute in conformity with the Bidding Document the following Works:**Desig – Build and Take-Over of Khidistavi – Ateni – Boshuri Road Section Rehabilitation from km 12.4 to km 22.5**

(c) Our bid price, excluding any discounts offered in item (d) below, is composed of the following components:

- A single Lump Sum price for the Works and Services included in the Contract comprising the Detailed Design and Rehabilitation of the subject road section;
- A Sum for Emergency / Physical Contingency Works;
- A Provisional Sum for Unforseen Conditions.

Description	Amount (in numbers)
A. Contract Works	
(a) Detailed Design and Rehabilitation Works in an amount of *[amount in words]* **Georgian Lari (GEL).**	5 024 696.61GEL
(b) Emergency Works in an amount of *[amount in words]* **Georgian Lari (GEL).**	65 000 GEL
B. Provisional Sums	
(c) Provisonal Sum for Unforeseen Condition in an amount of one hundred fifty thousand **Georgian Lari (GEL).**	150,000.00 GEL
Note: Provisional Sum includes VAT.	
TOTAL = A+B	**5 239 696.61 GEL**
C. VAT (18%) = A*18%	**943 145.39 GEL**
TOTAL BID PRICE = A+B+C	**6 182 842 GEL**

z.zubashvili

"AGT Menegment, Məsləhət və Tikinti Xidmətləri" Azərbaycan Respublikası Bakı şəhəri Məhdud Məsuliyyətli Cəmiyyəti Azerbaijan Republic Baku city Limited Responsible Society

(d) The discounts offered and the methodology for their application is: N/E

(e) Our bid shall be valid for a period of **90 days** from the date fixed for the bid submission deadline in accordance with the Bidding Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;

(g) We, including any subcontractors or suppliers for any part of the contract, have or will have nationalities from eligible countries, in accordance with ITB-4.2;

(h) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB-4.3;

(i) Weare not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB-4.3, other than alternative offers submitted in accordance with ITB-13;

(j) We, including any of our subcontractors or suppliers for any part of the contract,have not been declared ineligible by the Bank,under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;

(k) **We are not a government owned entity/We are a government owned entity but meet the requirements of ITB-4.5;**[12]

(l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount
NONE			

(If none has been paid or is to be paid, indicate "none.")

(m) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and

2. Zubashvili

Azərbaycan Respublikası Bakı şəhəri Məhdud Məsuliyyətli Cəmiyyəti "AGT Menegment, Məsləhət və Tikinti Xidmətləri" Azerbaijan Republic Baku city Limited Responsible Society

(n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

(o) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery.

Name : **ZURAB ZUBASHVILI** In the capacity of **Autorized representative**

Signed _____

Duly authorized to sign the bid for and on behalf of
AGT MENEGMENT, MESLEHET TIKINTI XIDMETLERI MMC

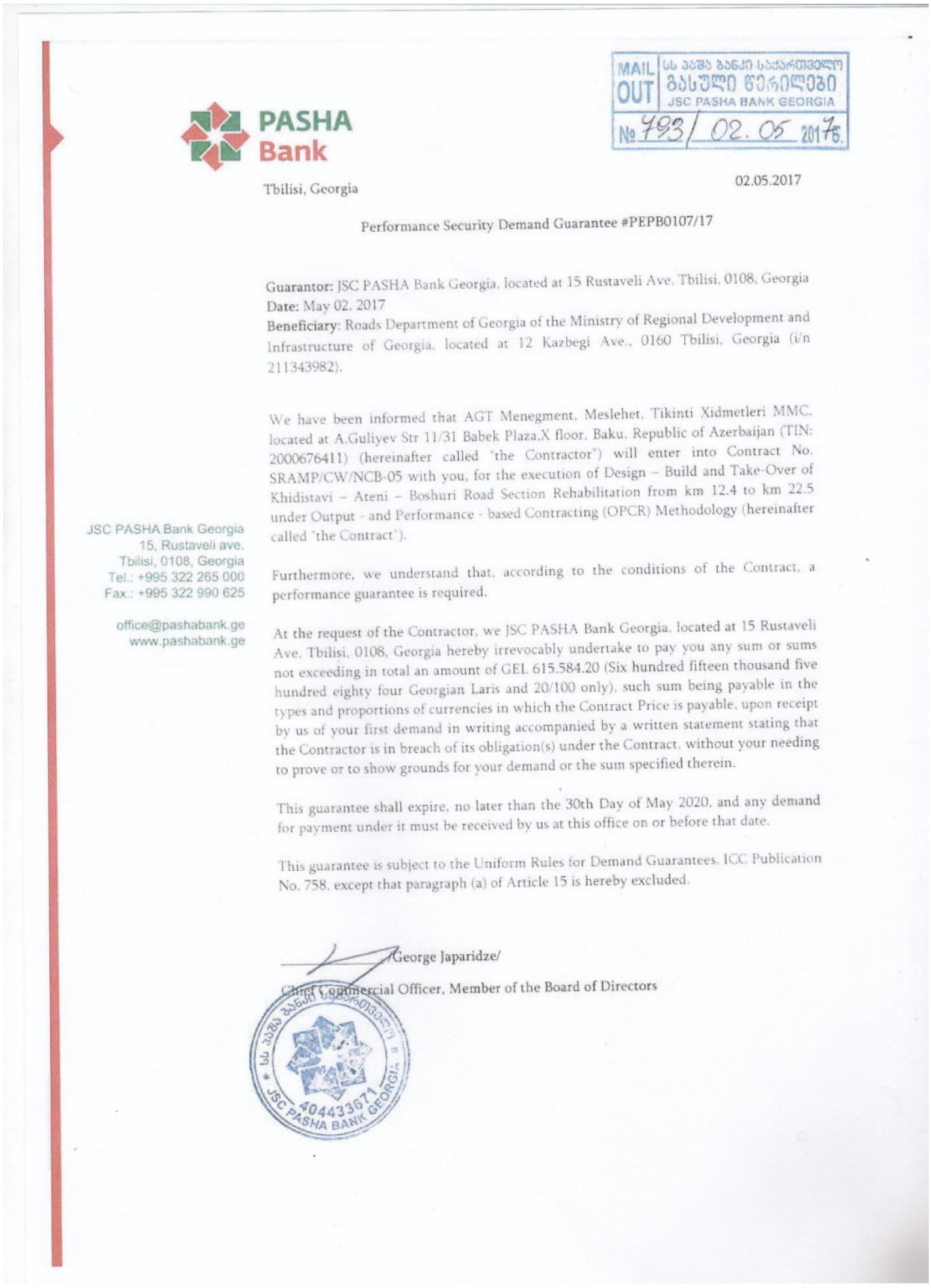
Dated on 25 day of November ,2016

Form ELI – 1.1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	**AGT MENEGMENT, MESLEHET,TIKINTI XIDMETLERI MMC**
In case of JV, legal name of each partner	N/A
Bidder's country of constitution	AZERBAIJAN
Bidder's year of constitution	2006
Bidder's legal address in country of constitution	BAKI CITY,NOBEL AVENUE 2231-2231 BAKU AZERBAIJAN
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	Zurab Zubashvili 23 U.Chkeidze str. Tbilisi Georgia +995 577 221717 Zura.zubashvili@agt-construction.com
Attached are copies of the following original documents. ☒ 1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. ☒ 2. Authorization to represent the firm or JV named in above, in accordance with ITB 20.2. ☐ 3. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. ☐ 4. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITB 4.5.	

Z.zubashvili

Azərbaycan Respublikası Bakı şəhəri Məhdud Məsuliyyətli Cəmiyyəti "AGT Menegment, Məsləhət və Tikinti Xidmətləri" Limited Responsible Society • Azerbaijan Republic Baku city •



PASHA Bank

MAIL OUT სს პაშა ბანკი საქართველო გასული წერილები JSC PASHA BANK GEORGIA № 793/ 02. 05 2017წ.

Tbilisi, Georgia

02.05.2017

Performance Security Demand Guarantee #PEPB0107/17

Guarantor: JSC PASHA Bank Georgia, located at 15 Rustaveli Ave. Tbilisi, 0108, Georgia
Date: May 02, 2017
Beneficiary: Roads Department of Georgia of the Ministry of Regional Development and Infrastructure of Georgia, located at 12 Kazbegi Ave., 0160 Tbilisi, Georgia (i/n 211343982).

We have been informed that AGT Menegment, Meslehet, Tikinti Xidmetleri MMC, located at A.Guliyev Str 11/31 Babek Plaza,X floor, Baku, Republic of Azerbaijan (TIN: 2000676411) (hereinafter called "the Contractor") will enter into Contract No. SRAMP/CW/NCB-05 with you, for the execution of Design – Build and Take-Over of Khidistavi – Ateni – Boshuri Road Section Rehabilitation from km 12.4 to km 22.5 under Output - and Performance - based Contracting (OPCR) Methodology (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we JSC PASHA Bank Georgia, located at 15 Rustaveli Ave. Tbilisi, 0108, Georgia hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of GEL 615,584.20 (Six hundred fifteen thousand five hundred eighty four Georgian Laris and 20/100 only), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the 30th Day of May 2020, and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 758, except that paragraph (a) of Article 15 is hereby excluded.

/George Japaridze/

Chief Commercial Officer, Member of the Board of Directors

JSC PASHA BANK GEORGIA 404433671

JSC PASHA Bank Georgia
15, Rustaveli ave.
Tbilisi, 0108, Georgia
Tel.: +995 322 265 000
Fax.: +995 322 990 625

office@pashabank.ge
www.pashabank.ge

AZƏRBAYCAN RESPUBLİKASI
VERGİLƏR NAZİRLİYİ

Kommersiya qurumunun

DÖVLƏT REYESTRİNDƏN ÇIXARIŞ

Vergilər Nazirliyi yanında Milli Gəlirlər Departamentinin Hüquqi şəxslərin dövlət qeydiyyatı idarəsi

Qurumun adı "AGT MENEGMENT, MƏSLƏHƏT VƏ TİKİNTİ XİDMƏTLƏRİ" MƏHDUD MƏSULİYYƏTLİ CƏMİYYƏTİ

Qeydiyyata alındığı tarix 06.10.2006

Əvvəlki dövlət qeydiyyat № 1106-T21-4230

Dövlət qeydiyyat № (VÖEN) 2000676411

Təşkilati-hüquqi forması Məhdud məsuliyyətli cəmiyyət

Maliyyə ili 1 yanvar-31 dekabr

Hüquqi ünvanı AZ1026, BAKI ŞƏHƏRİ XƏTAİ RAYONU, NOBEL PR., ev 2231/2232-Cİ MƏHƏLLƏ

Nizamnamə kapitalının miqdarı (ödənilmiş) 1,000,000.00 manat

Çıxarışın verildiyi tarix və № 13.02.2017, 17010200042057OO

Qurum Azərbaycan Respublikası Prezidenti İlham Əliyevin 30.04.2007-ci il tarixli Fərmanına əsasən "bir pəncərə" prinsipi ilə dövlət qeydiyyatına alınmışdır.

Seyidəhmədli S.Ə.

Qeydiyyat orqanının rəhbəri

AZƏRBAYCAN RESPUBLİKASI
VERGİLƏR NAZİRLİYİ

Kommersiya qurumunun

DÖVLƏT REYESTRİNDƏN ÇIXARIŞ

Vergilər Nazirliyi yanında Milli Gəlirlər Departamentinin Hüquqi şəxslərin dövlət qeydiyyatı idarəsi

Qurumun adı "AGT MENEGMENT, MƏSLƏHƏT VƏ TİKİNTİ XİDMƏTLƏRİ" MƏHDUD MƏSULİYYƏTLİ CƏMİYYƏTİ

Dövlət qeydiyyat № (VOEN) 2000676411

Təsisçilər və nizamnamə kapitalında mayalarının miqdarı

ƏLİYEV KAMİL ƏLİ OĞLU - 12.5 %, "M.D.M. İNŞAAT TAAHHÜT MÜHƏNDİSLİK DANIŞMANLIK HİZMETLERİ TİCARET LİMİTED" ŞİRKETİ (Türkiyə Respublikası) - 50 %, "MANMAR UNİPESSOAL LDA & COMANDİTA" KOMMANDİT ORTAQLIĞI (Portuqaliya Respublikası) - 25 % və ƏLİYEV ELNUR ƏLİ OĞLU - 12.5 %

Qanuni təmsilçi TÜRKOĞLU AHMET MURAT

Çıxarışın verildiyi tarix və № 13.02.2017, 17010200042057OO

Qurum Azərbaycan Respublikası Prezidenti İlham Əliyevin 30.04.2007-ci il tarixli Fərmanına əsasən "bir pəncərə" prinsipi ilə dövlət qeydiyyatına alınmışdır.

Seyidəhmədli S.Ə.

Qeydiyyat orqanının rəhbəri

Ministry of Taxes of Azerbaijan Republic
Extract from State Registration
of commercial juridical persons

Baku City Tax Department State Registration Office of commercial juridical persons

Name of institution
"AGT MANAGEMENT, CONSULTING AND CONSTRUCTION SERVICES"
LIMITED LIABILITY COMPANY
Date of registration
06.10.2006
Previous state registration number
1106-T21-4230
State registration No (TIN)
2000676411
Organizational-legal form of institution
Limited Liability Company
Fiscal year
January 1- December 31
Legal address
Quarter 2232, building 2231, Nobel Avenue, Khatai district, Baku city AZ1026
Amount of the authorized capital (paid)
1,000,000.00 manats
Date of issue and No. of the extract
13.02.2017, 1701020004205700

The juridical person was registered with the principle of "single window" in accordance with the Decree of President of Azerbaijan Republic, Mr. Ilham Aliyev, dated on 30.04.2007.

Seyidahmadli S.A.
Chief of registrar
/signed/
Seal: Azerbaijan Republic - Ministry of Taxes– Baku City Tax Department
Registration Service

Ministry of Taxes of Azerbaijan Republic
Extract from State Registration
of commercial juridical persons

Baku City Tax Department State Registration Office of commercial juridical persons

Name of institution
"AGT MANAGEMENT, CONSULTING AND CONSTRUCTION SERVICES" LIMITED LIABILITY COMPANY
COMPANY IN AZERBAIJAN REPUBLIC
State registration No. (TIN)
2000676411
Shareholders and the amount of shares in the authorized capital
ALIYEV KAMIL ALI – 12.5%, "M.D.M.INSHAAT TAAHHUT MUHENDISLIK DANISHMANLIK HIZMETLIERI TIJARET LIMITED" COMPANY (Turkey Republic) – 50%, "MANMAR UNIPESSOAL LDA&COMANDITA" KOMMANDIT PARTNERSHIP (Republic of Portugal) – 25% and ALIYEV ELNUR ALI – 12.5%
Legal representative:
Turkoglu Ahmet Murat
Date of issue of extract and No.
13.02.2017, 1701020004205700

The juridical person was registered with the principle of "single window" in accordance with the Decree of President of Azerbaijan Republic, Mr. Ilham Aliyev, dated on 30.04.2007.

Alimova N.A.
Chief of registrar
/signed/
Seal: Azerbaijan Republic - Ministry of Taxes– Baku City Tax Department Registration Service

Sənədi Azərbaycan dilindən ingilis dilinə tərcümə etdi: Əliyeva G.M.
Document translated from Azerbaijani into English by Aliyeva G.M.

15.02.2019

Mən, Bakı şəhəri 1 saylı notariat kontorunun notariusu Əliyeva S.S. bu surətin sənədin əsli ilə düzgünlüyünü təsdiq edirəm.
I, Aliyeva S.S., Notary to Notary Office No.1 in and for Baku, hereby certify, that this is an exact copy of the original.

Surəti öz əsli ilə tutuşdurarkən sonuncuda pozulmuş, əlavə yazılmış, üstündən qələm çəkilmiş sözlər və digər şərtləndirilməmiş düzəlişlər aşkar edilməyib.
Neither erasures nor crossed out words nor postscripts nor any other unmentioned corrections nor unspecified irregularities are found in the latter.

Həmçinin mənə məlum olan tərcüməçi Əliyeva G.M. imzasının həqiqiliyini təsdiq edirəm.
I also certify the authenticity of signature of translator Aliyeva G.M.

Reyestrdə 6lər/8434 № ilə qeyd edilib
Register No. 8435

05.00+02.00 manat haqq tutulub/AZN was paid.

Notarius/Notary Əliyeva S.S./Aliyeva S.S.

TRANSLATION OF THE SEAL: The Ministry of Justice of Azerbaijan Republic
Baku city Notary Office No. 1
Notary Aliyeva Sudaba Safar-Certificate No.051

Section VI. Particular Conditions (PC)

Reference to GC clauses

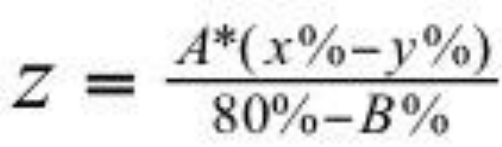
1.	At the start of Clause 1 insert the following additional definition: "**Adjudicator** shall mean either **Dispute Review Board (DRB)** or **Dispute Review Expert (DRE)** as appropriate in accordance with the terms of Clause 6." **The site** is the road betweenKhidistavi and Boshuri as detailed in the conceptual design and shown on the drawings. The area of the site shall extend for the full length of road and, at any location, shall extend to the width on either side of the road centre line which is required for the execution of permanent works. **Start Date:** Delete the definition in Clause 1.1 and substitute: The **Start Date** is the date upon which the Contractor should have started the physical execution of the Works and Services on the site in accordance with an instruction of the Employer. It does not necessarily coincide with any of the dates on which the Employer has given the Contractor possession of the site or part of the site under Subclause 14.2. The name of the Project Manager is: **to be advised when the Project Manager is appointed**.
3.	The following documents are also part of the Contract: **No special document is annexed to this contract**
4.	The language of the Contract is English and the laws governing the Contract arethe laws of Georgia
5.	The address of the Employer is: Roads Department of the Ministry of Regional Development and Infrastructure of Georgia, Kazbegi Avenue 12 0160 Tbilisi, Georgia Telephone: (+995 32) 37-05-08 E-mail: info@georoad.ge Fax: (+995 32) 31-30-34 Attention: Mr. Givi Chochia Note: All correspondence exchange should be in English with attached Georgian translation.

	The address of the Contractor is: *[insert exact **street address**, including **telephone** and **fax numbers**, and **E-Mail address**]* *To be completed following the selection of the perfered bidder*
6.	Dispute Resolution Method used: **DRE** *(Dispute Review Expert)* based on GCC Clauses 6.1.1 up to and including GCC Clause 6.1.8 will be applicable
6.1.2	The Appointing Authority is: Georgian Chamber of Commerce
6.2.3	Arbitration Proceedings shall be conducted in accordance with the following rules of procedure: Any dispute not settled amicably and in respect of which the decision of the Dispute Review Expert (DRE) (if any) has not become final and binding shall be finally settled by arbitration. Unless otherwise agreed by both Parties: (a) Institution whose arbitration procedures shall be used: "International Arbitration Court of the Georgian Chamber of Commerce and Industry". Address: 29 Berdzeni Str, Tbilisi, Georgia The place of arbitration shall be: Tbilisi, Georgia The arbitration shall be conducted in the language of the Contract. The arbitrators shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Project Manager, and any decision of the DRE, relevant to the dispute. Nothing shall disqualify representatives of the Parties and the Project Manager from being called as a witness and giving evidence before the arbitrators on any matter whatsoever relevant to the dispute. Neither Party shall be limited in the proceedings before the arbitrators to the evidence nor arguments previously put before the DRE to obtain its decision, or to the reasons for dissatisfaction given in its notice of dissatisfaction. Any decision of the DB shall be admissible in evidence in the arbitration. Arbitration may be commenced prior to or after completion of the Project. The obligations of the Parties, the Project Manager and the DRE shall not be altered by reason of any arbitration being conducted during the progress of the Project.
8.4.1	At the Start of the Contract and thereafter when required by the contract or requested by the Project Manager the Contractor shall provide for Comment/Approval: • Programme of Performance with associated Plans o Quality Assurance Plan o Traffic Management Plan o Health and Safety Plan o Emergency Procedures and Contingency Plan

	When putting forward for approval his proposals for the Rehabilitation the Contractor shall prepare and to furnish to the Project Manager for Approval, as a minimum, documents and drawings showing the following: • Geometric design, alignments and cross-sections • Detailed calculation and design for pavement structure • Junction designs • Hydrological survey and calculations • Drainage and Culvert designs • Geotechnical survey • Topographical survey • Proposed Material Sources • Detailed designs for Bridges and Structures • Proposed road signage and pavement markings • Any other required safety provisions
9.1	Delete the whole of Clause 9 and replace with the following: "The copyright in all drawings, documents and other materials containing data and information prepared for or gathered in the course of this contract and furnished to the Employer by the Contractor, whether prepared by the Contractor or by a third party acting on the Contractor's instructions, shall remain vested in the Employer or, if they are materials, not prepared specifically for this Contract, furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party."
10.1	The Start Date shall be: upon notification by the Employer & Project Manager.
10.2	Completion Date of Rehabilitation Works is after **12 months** from the start date or as amended as per the provisions of the Contract.
12.1	Activity under the contract may be subcontracted only when approved by the Project Manager and the Engineer.
12.2	The Contractor may subcontract under his own responsibility and without prior approval of the Employer, small works related to culverts, guardrail, minor concrete works and vegetation cleaning provided that the value of any such subcontract shall not exceed 10% of the contract value.
14.2	The Employer shall give full possession of and access to the Site not later than **1** week from Start Date. Full possession of and access to the Site will be done partially.
16.1	Delete the whole of Clause 16.1 and replace with the following: The Employer will appoint a Supervision Consultant as "The Project Manager". The Project Manager shall recommend to the Employer the approval of all of the designs and drawings prepared by the Contractor however no construction work will start until the Project Manager has been authorized by the Employer, in writing, to issue to the Contractor permission to proceed. The Employer shall not, unreasonably, withhold the approval. If the approval is not provided within 28 days, following the request to the Project Manager, the request shall be deemed to have been approved.

	The Project Manager may also test and inspect the works in progress or cause it to be done by its delegates. In case the Project Manager determines, at any time, that the work is either not in accordance with the specifications / approved design or not being done in a manner that is likely to achieve the requirements of the approved design, specifications or levels of service, the Project Manager will advise the undertaking of either or both of the following actions: • Stopping the work until corrections are made to its satisfaction • Rejecting the work and requiring that defective work is removed within 5 working days of its instruction to do so.
16.2	If the Road Manager named in the Bidding forms (schedule F) cannot, for any reason, fulfill his designated post, then the Contractor shall appoint a different Road Manager, which must be approved by the Employer in advance, before the start Date. The Project Manager will review the Contractor´s request will be in accordance with sub-clause 19.1. Nothing set forth in Clause 16.2 shall be deemed as relieving Contractor of any of its obligations, including but not limited to completing all the applicable Works and Services, in a timely manner.
17.2	At the end of sub-lause 17.2 insert the following additional wording to supplement the clause: The Programme of Performance shall be submitted within 28 days of signing the Agreement or by the Start Date, whichever shall be the later. The Programme of Performance shall include milestones for completion of Rehabilitation works for the following items: • First 4 km of road rehabilitation • Remaining 6.01 km of road rehabilitation • Bridge #1 – at km 7+596 • Bridge #2 – at km 7+912 • Bridge #3 – at km 8+253 • Bridge #4 – at km 9+600 The Programme of Performance shall be agreed with the Project Manager and the Employer and any of its revisions related to Times for Completion and/or Milestones shall not come into force until agreed with the same procedure as the original Programme.
19.2 (h) and (i)	The provisions concerning HIV-AIDS prevention apply.
21.	The Contractor shall carry out the following Rehabilitation Works, which are detailed in the Specifications:

	Khidistavi – Ateni – Boshuri Road Section (km 12.4 – km 22.5)from Project Chainage 0+0000 to 10+010
22.	Improvement works do not apply.
23.1	No maintenance works are included in the Contract.
25.2	The Contractor shall not establish a Self Control Unit.
26.	Insert sub-clause 26.1 (d) with the following wording: The Contract is obligated to comply with the environmental legislation of Georgia and the Environmental and Social Management Plan of the Client, which is part of the present Contract.
35.1	The Contractor shall take out and maintain in effect the following insurances in the sums and deductibles shown below: (a) *Professional indemnity insurance for design liability* Covering 110% of the contract value (b) *Loss of or damage to the Plant and Materials* Covering loss or damage occurring prior to Completion. An amount equal to the estimated cost of the Plant and Materials and their transportation cost to the site shall be insured. (c) Third Party Liability Insurance Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property occurring in connection with Works and Services for not less than GEL 500,000.00 (d) Automobile Liability Insurance Covering use of all vehicles used by the Contractor or its Subcontractors (whether or not owned by them) in connection with the execution of the Contract with a minimum coverage of GEL 50,000.00 per vehicle
39.3	The liquidated damages are 0.1% of the total value of the works affected per calendar day of delay beyond the period permitted for completion of all contract works. The total amount of liquidated damages under the Contract shall not exceed 10% of the Contract Price.
41.2	The Defect Liability Period shall be twenty-four (24) months from the date of Completion of the Contract.
42.1	The aggregate liability of the Contractor to the Employer shall not exceed the contract amount.
44.1	The payment of the Contract Price will be made in the following currencies*:* **Georgian Laris (GEL)**
44.2 **46.3** **47.2**	The Contract price for rehabilitation Works shall be paid according to work progress as follows: • Road rehabilitation - paid by each two-kilometre section completed (excluding road signage, marking & furniture, as these are paid for separately); • Bridges - paid for each bridge completed; • Road Signage, Marking & Furniture – paid for every two kilometre section completed

	In the event of minor outstanding works related to Road Construction and/or Bridges, payment for respective two-kilometre section and/or each bridge completed will be made with a 10% reduction – releasable when all outstanding work is complete. Payment for Road Signage, Marking & Furniture will be made only after fully completing any two kilometre section.
45.1	The amount of the Advance Payment is 20 % of the total value of the lump sum bid for Rehabilitation Works (item A. Contract Works of the Letter of Bid plus respective amount of VAT). The Advance payment will be made in two equal installments, 10% + 10% in the following manner: **Installment I** – will be paid not later than 28 days after receipt and approval of the Advance Payment Guarantee on the same amount and currencies as the Advance Payment (first 10%). **Installment II** – payment of the second 10% of the Advance Payment has two preconditions: 1. Receipt and approval by the Project Manager and the Employer of the Detailed Design for first 4km section of the road (as per sub-clause 1 SERVICE LEVELS: DESIGN of PART A3: LEVEL OF SERVICE of Section VI: Specifications) 2. Receipt and approval of the respective Advance Payment Guarantee on the same amount and currencies as the Advance Payment (second 10%). The payment will be made not later than 28 days after both (latest) of above preconditions will be fulfilled.
45.2	First sentence of Clause 45.2 of the GCC is deleted and replaced by the following: The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for the execution of the Contract and expenses incurred for and during preparation of Detailed Design for the execution of the Contract.
45.3	Formula to calculate the amount of advance payment to be deducted in each payment:  Z= The amount to be deducted in the calculated period; A= Expresses amount of deposited Advance Payment; X= Cumulative value of works performed in the calculated period divided by the initial total value of the lump sum bid for Rehabilitation Workse xpressed in percentage. This value shall not exceed 80%. Y= The same as above but for the previous period.

	B= 20% The Employer will start deduction of the Advance Payment when the value of the Works executed reaches 20% of the works value and will finish deduction when the same reaches 80%.
47.1	Not applicable
47.2	Rehabilitation Works (including road signage, marking & furniture) will be measured on the basis of lengths (units in case of bridges) as defined in the Specifications, Section VI, and Clause 44.2 of Particular Conditions
47.3	Not applicable
48.	Price adjustment **does not** apply.
51.	The retention for Rehabilitation Works is fixed at five percent (5%).
51.2	Delete the whole clause 51.2 and substitute with the following: On completion of the Rehabilitation and Improvement Works, half the total amount retained shall be repaid to the Contractor and the other half after **twenty-four (24) months** have passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor have been corrected before the end of this period
53.2.1	The amount of the Advance Payment security shall be of the same value and currency as the Advance Payment amount, and shall be in the form provided in the bidding documents Advance Payment Security can be submitted either for the whole 20% of the total value of the contract (Covering both installment I & II) or separately for each installment as per PCC 45.1Advance Payment Security shall be issued ONLY from local commercial Banks operating on the territory of Georgia.
53.3.1 **53.3.2**	The form of the Performance Security shall be in the form provided in the bidding documents in the amount of ten percent 10% of the Total Contract amount. Performance Security shall be issued ONLY from local commercial Banks operating on the territory of Georgia.
53.3.3	Delete the whole sub-clause 53.3.3 and substitute with the following: The security shall automatically become null and void, **twenty-four (24) months** after Completion of all Works and Services under the Contract, provided however, that if the Defects Liability Period has been extended on any part of the Works pursuant to GC Sub-Clause 41.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration.
57.1	The following Drawings and/or Manuals are required at the following dates: As-built drawings of all Rehabilitation Works are to be submitted within 30 (Thirty) days after the Project Manager has certified payment for whole Road Section.

57.2	If the required documents are not supplied in accordance with PC 57.1, the amount to be withheld is **GEL 500** per day of delay.
59.2.2(c)	The condition of persistent failure to execute the contract is reached if the Contractor has failed to achieve any milestone of the Rehabilitation Works as specified in PCC sub-clause 17.2 within sixty (60) days after the date when the Milestone should have been reached according to the agreed Programme of Performance. The condition of persistent failure to execute the contract is also reached if and when the total amount of payment reductions and liquidated damages applied under the contract reaches ten (10) percent of the total contract amount.
63.1.1	The Employer has the right to propose a change in the contract: Yes
63.1.2	Contractor's right to propose a change in the contract: Yes
63.1.4	Delete the words "further details and sample forms are provided in the Sample Forms and Procedures section in the bidding documents" and replace with "Proposals and Instructions for Changes shall be in a format instructed by the Project Manager."

Section VII. General Conditions (GC)

Table of Clauses

A. CONTRACT AND INTERPRETATION

1. Definitions 1.1 Boldface type is used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Contractor's Bid.

The **Certificate of Completion** is a document issued by the Project Manager upon completion of Rehabilitation Works, Improvement Works and Emergency Works, or parts thereof, as applicable, in accordance with GC 54.1

The **Completion Date** is the date of completion of the Services and Works as certified by the Project Manager, in accordance with Sub-Clause 10.2.

The **Contract** is the Contract between the Employer and the Contractor to perform the services to be provided by the Contractor, and to execute, complete, and maintain the Works. It consists of the documents listed in Clause 3 below.

The **Contractor** is a person or corporate body whose Bid to carry out the Works and Services has been accepted by the Employer.

The **Contractor's Bid** is the completed bidding document submitted by the Contractor to the Employer.

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; **months** are calendar months.

A **Defect** is any part of the Works and Services not completed in accordance with the Contract.

The **Defects Liability Certificate** is the certificate issued by Project Manager upon correction of defects by the Contractor.

The **Defects Liability Period** is the period specified in the Contract and is applicable for Rehabilitation Works and Improvement Works, with exclusions identified in the PC, if any..

Dispute Review Board (DRB) is a board of three members selected and act in accordance with rules and procedures defined in the Contract to seek to resolve any dispute of any kind that may arise between the Employer and the Contractor in connection with or arising out of the Contract, as provided for in Clause 6 hereunder.

Dispute Review Expert (DRE) is one expert selected and acting in accordance with rules and procedures defined in the Contract to seek to resolve any dispute of any kind that may arise between the

Employer and the Contractor in connection with or arising out of the contract, as provided for in Clause 6 hereunder.

Drawings include calculations and other information provided by the Contractor for the execution of the Contract.

Emergency Works is a set of necessary and sufficient activities to reinstate the Road and reconstruct its structure or right of way strip damaged as a result of natural phenomena with imponderable consequences, such as strong storms, flooding and earthquakes. The need for execution of Emergency Works is jointly identified by the Employer and the Contractor and for starting of execution of Emergency Works the Employer shall issue a Work Order.

The **Employer** is the party who employs the Contractor to carry out the Works and Services.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works and to carry out the Services.

Improvement Works consists of a set of interventions that add new characteristics to the Road in response to existing or new traffic, safety or other conditions, as defined in the Specifications.

Rehabilitation Works are specific and clearly defined civil works the Contractor is required to carry out under the conditions of the Contract, as defined in the Specifications. Rehabilitation Works quantities were estimated by the Contractor to achieve the performance standards defined by the Service Levels and offered at a Lump-Sum price.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works and Services. The Intended Completion Date is specified in the Particular Conditions (PC). The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time.

Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works and for provision of Services.

The **Project Manager** is the person named in the PC who is responsible for the overall administration of the Contract on behalf of the Employer, and the supervision of works and services to be performed thereunder. The Project Manager may delegate through a written instrument some of his functions to any other competent person, retaining however the overall responsibility for the actions of that person. The Project Manager may not delegate the overall administrative control of the Contract.

Road means the road or network of roads for which the Works and Services are contracted under the Contract.

The **Road Management Office** is the location indicated by the Contractor from which the Road Manager operates, and where the Contractor shall receive notifications.

The **Road Manager** is a person appointed by the Contractor who is in charge of managing all activities of the Contractor under the Contract. He is also the Contractor's Representative for the purposes of this contract.

Services means all interventions on the Road under the Contract and all activities related to the management and evaluation of the Road which shall be carried out by the Contractor in order to achieve and keep the Road Performance Standards as defined by the Service Levels, and to receive full payment of the monthly fee under the contract

Service Levels are the minimum performance standards for the level of quality of conditions of the Road defined in the Specifications which the Contractor shall comply with.

The **Site** is the area defined as such in the PC.

Site Investigation Reports are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.

The **Start Date** is the date when the Contractor has started the physical execution of the Works and Services on the site. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a contractual agreement with the Contractor to carry out certain activities related to the services to be provided under the contract, which may include work on the Site.

Specifications means the Specifications of the Works and Services included in the Contract and any modification or addition made or approved by the Project Manager.

A **Variation** is an instruction given by the Project Manager which varies the Works or Services.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as covered under Rehabilitation Works, Improvement Works and Emergency Works.

Work Order is an order issued by the Project Manager to the Contractor authorizing the execution of Improvement Works and Emergency Works, as provided for in Clause 27 hereunder.

2. Interpretation

2.1 In interpreting these General Conditions (GC), singular also means plural, male also means female or neuter, and vice versa. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager will provide instructions clarifying queries about theseGeneral Conditions (GC).

3. Documents Forming the Contract

3.1 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement,

(2) Letter of Acceptance,

(3) Contractor's Bid,

(4) Particular Conditions (PC),

(5) General Conditions (GC),

(6) Specifications,

(7) Drawings,

(8) Bill of Quantities, and

(9) any other document listed in the PC as forming part of the Contract.

4. Language and Law

4.1 The language of the Contract and the law governing the Contract are stated in the PC.

5. Notices

5.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by personal delivery, airmail post, special courier, fax or E-mail to the address of the relevant party set out in the PC, with the following provisions:

5.1.1 Any notice sent by fax or E-mail shall be confirmed within two (2) days after dispatch by notice sent by airmail post or special courier, except as otherwise specified in the Contract.

5.1.2 Any notice sent by airmail post or special courier shall be deemed (in the absence of evidence of earlier receipt) to have been delivered ten (10) days after dispatch. In proving the fact of dispatch, it shall be sufficient to show that the envelope containing such notice was properly addressed, stamped and conveyed to the postal authorities or courier service for transmission by airmail or special courier.

5.1.3 Any notice delivered personally or sent by fax or E-mail shall be deemed to have been delivered on date of its dispatch.

5.1.4 Either party may change its postal, fax or E-mail address or addressee for receipt of such notices by ten (10) days' notice to the other party in writing.

5.2 Notices shall be deemed to include any approvals, consents, instructions, orders and certificates to be given under the Contract.

5.3 The Contractor shall provide at its own cost, and maintain in operation permanently during the duration of the Contract, such communications equipment which ensures that both written (fax or E-mail) and oral (voice) communications can be established at all times

(a) between the Road Manager and his senior field staff;

(b) between the Project Manager and the Road Manager;

(c) between the public telephone system and the Road Manager;

(d) The equipment to be provided and maintained includes the equipment located at the Project Manager's office.

5.4 At the Start Date of the Contract, the Contractor must communicate to the Employer the address of his office, including the postal, fax and E-mail address, which for the purposes of this contact is called the Road Management Office, where Notices will be addressed to. The Employer may require that the physical location of the Road Management Office is within the close geographical area of the Road. If the Contractor fails to communicate the address of his Road Management Office, and the Employer is otherwise unable to locate the Road Manager, all notifications to the Contractor shall be valid if they are deposited at a designated location within the office of the Project Manager, and if a copy is sent to the Contractor's legal address.

6. Settlement of Disputes (Alternative when using a Dispute Review Board)

6.1 Dispute Review Board

6.1.1 If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the Works and Services—whether during the progress of the execution or after completion and whether before or after the termination, abandonment or breach of the Contract—the parties shall seek to resolve any such dispute or difference by mutual consultation. If the parties fail to resolve such a dispute or difference by mutual consultation, then the matter in dispute shall, in the first place, be referred in writing by either party to the Disputes Review Board ('the Board'), with a copy to the other party.

6.1.2 The Board shall be established when each of the three Board Members has signed a Board Member's Declaration of Acceptance as required by the DRB's Rules and Procedures (which, along with the Declaration of Acceptance form, are attached to the Contract). The Board shall comprise three Members experienced with the type of construction and services involved in the Contract and with the interpretation of contractual documents. One Member shall be selected by each of the Employer and the Contractor and approved by the other. If either

of these Members is not so selected and approved within 28 days of the date of the Letter of Acceptance, then upon the request of either or both parties such Member shall be selected as soon as practicable by the Appointing Authority specified in the PC. The third Member shall be selected by the other two and approved by the parties. If the two Members selected by or on behalf of the parties fail to select the third Member within 14 days after the later of their selections, or if within 14 days after the selection of the third Member, the parties fail to approve that Member, then upon the request of either or both parties such third Member shall be selected promptly by the same Appointing Authority specified in the PC who shall seek the approval of the proposed third Member by the parties before selection but, failing such approval, nevertheless shall select the third Member. The third Member shall serve as Chairman of the Board.

6.1.3 In the event of death, disability, or resignation of any Member, such Member shall be replaced in the same manner as the Member being replaced was selected. If for whatever other reason a Member shall fail or be unable to serve, the Chairman (or failing the action of the Chairman then either of the other Members) shall inform the parties and such nonserving Member shall be replaced in the same manner as the Member being replaced was selected. Any replacement made by the parties shall be completed within 28 days after the event giving rise to the vacancy on the Board, failing which the replacement shall be made by the Appointing Authority in the same manner as described above. Replacement shall be considered completed when the new Member signs the Board Member's Declaration of Acceptance. Throughout any replacement process the Members not being replaced shall continue to serve and the Board shall continue to function and its activities shall have the same force and effect as if the vacancy had not occurred, provided, however, that the Board shall not conduct a hearing nor issue a Recommendation until the replacement is completed.

6.1.4 Either the Employer or the Contractor may refer a dispute to the Board in accordance with the provisions of the DRB's Rules and Procedures, attached to the Contract. The Recommendation of the Board shall be binding on both parties, who shall promptly give effect to it unless and until the same shall be revised, as hereinafter provided, in an arbitral award. Unless the Contract has already been repudiated or terminated, the Contractor shall continue to proceed with the Works and Services in accordance with the Contract.

6.1.5 If either the Employer or the Contractor is dissatisfied with any Recommendation of the Board, or if the Board fails to issue its Recommendation within 56 days after receipt by the Chairman of the Board of the written Request for Recommendation, then

either the Employer or the Contractor may, within 14 days after his receipt of the Recommendation, or within 14 days after the expiry of the said 56-day period, as the case may be, give notice to the other party of his intention to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 6.3, no arbitration in respect thereof may be commenced unless such notice is given.

6.1.6 If the Board has issued a Recommendation to the Employer and the Contractor within the said 56 days and no notice of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor within 14 days after the parties received such Recommendation from the Board, the Recommendation shall become final and binding upon the Employer and the Contractor.

6.1.7 Whether or not it has become final and binding upon the Employer and the Contractor, a Recommendation shall be admissible as evidence in any subsequent dispute resolution procedure, including any arbitration or litigation having any relation to the dispute to which the Recommendation relates.

6.1.8 All Recommendations that have become final and binding shall be implemented by the parties forthwith.

6.2 Arbitration

6.2.1 If either the Employer or the Contractor is dissatisfied with the Board's decision, then either the Employer or the Contractor may, in accordance with Sub-Clause 6.1.5, give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. The arbitral tribunal shall have full power to open up, review, and revise any decision, opinion, instruction, determination, certificate, and any Recommendation(s) of the Board.

6.2.2 Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GC Sub-Clause 6.2.1, shall be finally settled by arbitration. Neither party shall be limited in the proceedings before such arbitration tribunal to the evidence or arguments put before the Board for the purpose of obtaining his Recommendation(s) pursuant to Sub-Clause 6.2.1. No Recommendation shall disqualify the Board from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute Arbitration may be commenced prior to or after completion of the Works and Services.

6.2.3 Arbitration proceedings shall be conducted in accordance with the rules of procedure designated in the PC.

6.3 Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 6.1.5 and the related Recommendation has become final and binding, either party may, if the other party fails to comply with such Recommendation and without prejudice to any other right it may have, refer the failure to arbitration in accordance with Sub-Clause 6.2. The provisions of Sub-Clause 6.1 shall not apply to any such reference

6.4 Notwithstanding any reference to the Board or Arbitration herein,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree

(b) the Employer shall pay the Contractor any monies due the Contractor.

6. Settlement of Disputes (Alternative when using a Dispute Review Expert)

6.1 Dispute Review Expert

6.1.1 If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the Works and Services—whether during the progress of the execution or after completion and whether before or after the termination, abandonment or

breach of the Contract—the parties shall seek to resolve any such dispute or difference by mutual consultation. If the parties fail to resolve such a dispute or difference by mutual consultation, then the matter in dispute shall, in the first place, be referred in writing by either party to the Disputes Review Expert ('DRE'), with a copy to the other party.

6.1.2 The DRE shall take up his functions after having signed a DRE's Declaration of Acceptance as required by the DRE's Rules and Procedures (which, along with the Declaration of Acceptance form, are attached to the Contract). The DRE shall be a person experienced with the type of construction and services involved in the Contract and with the interpretation of contractual documents and shall be selected by agreement between the Employer and the Contractor. If the DRE is not selected within 28 days of the date of the Letter of Acceptance, then upon the request of either or both parties the DRE shall be selected as soon as practicable by the Appointing Authority specified in thePC.

6.1.3 In the event of death, disability, or resignation of the DRE, the latter shall be replaced by agreement between the Employer and the Contractor. Any replacement made by the parties shall be completed within 28 days after the event giving rise to the need for a replacement, failing which the replacement shall be made by the same international appointing authority as above.

6.1.4 Either the Employer or the Contractor may refer a dispute to the DRE in accordance with the provisions of the DRE's Rules and Procedures, attached to the Contract. The Recommendation of the DRE shall be binding on both parties, who shall promptly give effect to it unless and until the same shall be revised, as hereinafter provided, in an arbitral award. Unless the Contract has already been repudiated or terminated, the Contractor shall continue to proceed with the Works and Services in accordance with the Contract.

6.1.5 If either the Employer or the Contractor is dissatisfied with any Recommendation of the DRE, or if the DRE fails to issue his Recommendation within 56 days after he has received the written Request for Recommendation, then either the Employer or the Contractor may, within 14 days after his receipt of the Recommendation, or within 14 days after the expiry of the said 56-day period, as the case may be, give notice to the other party of his intention to commence arbitration, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute and, subject to Sub-Clause 6.3, no arbitration in respect thereof may be commenced unless such notice is given.

6.1.6 If the DRE has issued a Recommendation to the Employer and the Contractor within the said 56 days and no notice of intention to commence arbitration as to such dispute has been given by either the Employer or the Contractor within 14 days after the parties received such Recommendation from the DRE, the Recommendation shall become final and binding upon the Employer and the Contractor.

6.1.7 Whether or not it has become final and binding upon the Employer and the Contractor, a Recommendation shall be admissible as evidence in any subsequent dispute resolution procedure, including any arbitration or litigation having any relation to the dispute to which the Recommendation relates.

6.1.8 All Recommendations that have become final and binding shall be implemented by the parties forthwith.

6.2 Arbitration

6.2.1 If either the Employer or the Contractor is dissatisfied with the DRE's decision, then either the Employer or the Contractor may, in accordance with Sub-Clause 6.1.5, give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. The arbitral tribunal shall have full power to open up, review, and revise any decision, opinion, instruction, determination, certificate, and any Recommendation(s) of the DRE.

6.2.2 Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GC Sub-Clause 6.2.1, shall be finally settled by arbitration. Neither party shall be limited in the proceedings before such arbitration tribunal to the evidence or arguments put before the DRE for the purpose of obtaining his Recommendation(s) pursuant to Sub-Clause 6.2.1. No Recommendation shall disqualify the DRE from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the dispute Arbitration may be commenced prior to or after completion of the Works and Services.

6.2.3 Arbitration proceedings shall be conducted in accordance with the rules of procedure designated in the PC.

6.3 Where neither the Employer nor the Contractor has given notice of intention to commence arbitration of a dispute within the period stated in Sub-Clause 6.1.5 and the related Recommendation has become final and binding, either party may, if the other party fails to comply with such Recommendation and without prejudice to any other right it may have, refer the failure to arbitration in accordance

with Sub-Clause 6.2. The provisions of Sub-Clause 6.1 shall not apply to any such reference

6.4 Notwithstanding any reference to the DRE or Arbitration herein,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree

(b) the Employer shall pay the Contractor any monies due the Contractor.

B. ASSIGNMENT OF RESPONSIBILITIES

7. Scope of Works and Services

7.1 Unless otherwise expressly limited in the Specifications, the Contractor's obligations cover the Design, the carrying out of all Works and the performance of all Services required for keeping the Road in accordance with the Service Levels defined in the Specifications, while at the same time respecting the plans, procedures, specifications, drawings, codes and any other documents as identified in the Specifications. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labor, materials, equipment; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including, without limitation, unloading and hauling to, from and at the Site); and storage, except for those supplies, works and services that will be provided or performed by the Employer, if any, as set forth in the corresponding Specifications.

7.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work, services and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining the Performance Standards (as specified in Clause 24 of GC) as if such work, services and/or items and materials were expressly mentioned in the Contract.

8. Design Responsibility

8.1 The Contractor shall be responsible for the design and programming of the Works and Services, and for the accuracy and completeness of the information used for that design and programming in accordance with the requirements established in the Specifications.

8.2 Specifications and Drawings

8.2.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract and the Specifications, or where not so specified, in accordance with good engineering practice.

The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other

technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

8.2.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof, provided or designated by, or on behalf of, the Employer, by giving a notice of such disclaimer to the Project Manager.

8.3 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied after approval by the Employer and shall be treated in accordance with GC Clause 63.

8.4 Approval/Review of Technical Documents by Project Manager

8.4.1 For those Works specified in the PC, the Contractor shall prepare (or cause its Subcontractors to prepare) and furnish to the Project Manager the documents listed in the Specifications (List of Documents for Approval or Review) for its approval or review.

Unless otherwise specified in the PC, the Contractor shall not be required to submit for the Employer's approval the Design or other technical documents concerning the Maintenance Services remunerated through monthly lump-sum payments.

Any part of the Works covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.

GC Sub-Clauses 8.4.2 through 8.4.7 shall apply only to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for his information or review only.

8.4.2 Within fourteen (14) days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GC Sub-Clause 8.4.1, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the

reasons therefore and the modifications that the Project Manager proposes.

If the Project Manager fails to take such action within the said fourteen (14) days, then the said document shall be deemed to have been approved by the Project Manager.

8.4.3 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

8.4.4 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager's approval in accordance with GC Sub-Clause 8.4.2. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), whereupon the document shall be deemed to have been approved.

8.4.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be referred to the DRB (or DRE) for determination in accordance with GC Sub-Clause 6.1 hereof. If such dispute or difference is referred to the DRB (or DRE), the Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the DRB (or DRE) upholds the Contractor's view on the dispute and if the Employer has not given notice under GC Sub-Clause 6.1.5 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the DRB (or DRE) shall decide, and the Time for Completion shall be extended accordingly.

8.4.6 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager.

8.4.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manageran amended document and obtained the Project

Manager's approval thereof, pursuant to the provisions of this GC Sub-Clause 8.4.

If the Project Manager requests any change in any already approved document and/or in any document based thereon, the provisions of GC Clause 63.2 shall apply to such request.

9. Copyright

9.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

10. Start Date and Completion

10.1 The Contractor shall start the Works and Services within the period specified in the PC. Upon request from the Contractor, the Employer shall confirm in writing the Start Date, after verifying that works and services have started on the Site.

10.2 The Contractor shall attain the required Service Levels and the Completion of the Rehabilitation and Improvement Works (or of a part where a separate time for Completion of such part is specified in the Contract) within the time schedules included in the PC and the Specifications, or within such extended time to which the Contractor shall be entitled under GC Clause 64 hereof.

11. Contractor's Responsibilities

11.1 The Contractor shall design and carry out the Works and Services (including associated purchases and/or subcontracting) necessary to comply with the requirements established in the Specifications with due care and diligence in accordance with the Contract.

11.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Works and Services required, including any data and tests provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site and of other data readily available to it relating to the Road as of the date twenty-eight (28) days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Works and Services.

11.3 The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country of the Employer that are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of

the Employer under GC Sub-Clause 14.3 hereof and that are necessary for the performance of the Contract.

11.4 The Contractor shall comply with all laws in force in the country of the Employer and where the Works and Services are carried out. The laws will include all local, state, national or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GC Sub-Clause 14.1 hereof.

11.5 Any Plant, Material and Services that will be incorporated in or be required for the Works and Services and other supplies shall have their origin in an eligible Country as defined under the Bank's procurement guidelines.

11.6 The Contractor shall permit the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records of the Contractor and its subcontractors relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the Bank if required by the Bank. The Contractor's attention is drawn to Sub-Clause 59.2.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 11.6 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility under the Procurement Guidelines).

12. Subcontracting

12.1 The Contractor may subcontract activities listed in the PC. Any other activity under the Contract may be subcontracted only when approved by the Project Manager. The Contractor may not assign the entire Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations nor relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any Subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen.

12.2 Notwithstanding GC Sub-Clause 12.1, the Contractor may subcontract under his own responsibility and without prior approval of the Employer the small Works and Services also listed in the PC.

13. Assignment of Contract

13.1 Neither the Employer nor the Contractor shall, without the express prior written consent of the other party (which consent shall not be unreasonably withheld), assign to any third party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign

either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

14. Employer's Responsibilities

14.1 The Employer shall apply due diligence to ensure the accuracy of all information and/or data to be supplied to the Contractor as described in the Specifications, except when otherwise expressly stated in the Contract.

14.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way, as specified in the corresponding Specifications. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in the PC.

14.3 The Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located, when such authorities or undertakings require the Employer to obtain them in the Employer's name, are necessary for the execution of the Contract, and are specified in the corresponding Specifications.

14.4 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state or national government authorities or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.

14.5 The Employer shall be responsible for the continued operation of the Road after Completion, in accordance with GC Sub-Clause 28, and shall be responsible for facilitating the Guarantee Test(s) for the Road, in accordance with GC Sub-Clause 20.

14.6 All costs and expenses involved in the performance of the obligations under this GC Clause 14 shall be the responsibility of the Employer, save those to be incurred by the Contractor with respect to the performance of Guarantee Tests, in accordance with GC Sub-Clause 20.

15. Confidential Information

15.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall

obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GC Clause 15.

15.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Road. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant and Equipment, construction or such Works and Services as are required for the performance of the Contract.

15.3 The obligation of a party under GC Sub-Clauses 15.1 and 15.2 above, however, shall not apply to that information which

(a) now or hereafter enters the public domain through no fault of that party;

(b) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto;

(c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

15.4 The above provisions of this GC Clause 15 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Works and Services or any part thereof.

15.5 The provisions of this GC Clause 15 shall survive termination, for whatever reason, of the Contract.

C. EXECUTION OF WORKS AND SERVICES

16.Representatives 16.1 Project Manager

If the Project Manager is not named in the Contract, then within fourteen (14) days of the issuance of the Letter of Acceptance by the Employer, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as the Project Manager in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of the Works and Services. Such appointment shall only take effect upon receipt of such notice by the Contractor. The Project Manager shall represent and act for the Employer at all times during the period of the Contract. All notices, instructions, orders, certificates, approvals and all other

communications under the Contract shall be given by the Project Manager, except as herein otherwise provided.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager, except as herein otherwise provided.

The Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.

16.2 Road Manager

16.2.1 If the Road Manager is not named in the Contract, then the Contractor shall appoint the Road Manager before the Start Date and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within fourteen (14) days, the Road Manager shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days giving the reason therefore, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, and the foregoing provisions of this GC Sub-Clause 16.2.1 shall apply thereto.

16.2.2 The Road Manager shall represent and act for the Contractor at all times during the period of the Contract and shall give to the Project Manager all the Contractor's notices, instructions, information and all other communications under the Contract. The Road Manager shall be in charge of the day-to-day management of the works and services to be provided under the contract on behalf of the Contractor, and shall have legal and all other faculties to take all necessary decisions related to the execution of the contract.

All notices, instructions, information and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Road Manager or, in its absence, its deputy, except as herein otherwise provided.

The Contractor shall not revoke the appointment of the Road Manager without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Road Manager, pursuant to the procedure set out in GC Sub-Clause 16.2.1.

16.2.3 The Road Manager may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and

authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice to the Project Manager signed by the Road Manager, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Project Manager.

Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GC Sub-Clause 16.2.3 shall be deemed to be an act or exercise by the Road Manager.

16.2.4 From the Start Date until Completion, the Road Manager shall supervise all work and services done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper performance of the Contract. Whenever the Road Manager is absent from the Site, a suitable person shall be appointed to act as his or her deputy.

16.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under the Specifications. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Site.

16.2.6 If any representative or person employed by the Contractor is removed in accordance with GC Sub-Clause 16.2.5, the Contractor shall, where required, promptly appoint a replacement.

17. Work Program 17.1 Contractor's Organization

The Contractor shall supply to the Project Manager a chart showing the proposed organization to be established by the Contractor for carrying out the Works and Services. The chart shall include the identities of the key personnel together with the curricula vitae of such key personnel to be employed as included in the Contractor's Bid. The Contractor shall promptly inform the Project Manager in writing of any revision or alteration of such an organization chart.

17.2 Program of Performance

Not later than the Start Date, the Contractor shall prepare and supply to the Project Manager a program of performance of the Contract, made in the form specified in the Specifications and showing the sequence in which it proposes to design and carry out

the Works and Services, as well as the date by which the Contractor reasonably requires that the Employer shall have fulfilled its obligations under the Contract so as to enable the Contractor to execute the Contract in accordance with the program and to achieve Completion in accordance with the Contract. The Contractor shall update and revise the program as and when appropriate, but without modification in the Times for Completion given in the PC and any extension granted in accordance with GC Clause 64, and shall supply all such revisions to the Project Manager.

17.3 Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GC Sub-Clause 17.2 above, and supply a progress report to the Project Manager every month together with his Monthly Statement. The progress report shall be in a form acceptable to the Project Manager in accordance with the Specifications.

17.4 Progress of Execution

If at any time the Contractor's actual progress falls behind the program referred to in GC Sub-Clause 17.2, or it becomes apparent that it will so fall behind, the Contractor shall prepare and supply to the Project Manager a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Works and Execution of Services activities within the Time for Completion under GC Sub-Clause 10.2, any extension thereof entitled under GC Sub-Clause 64, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

17.5 Work Procedures

The Contract shall be executed in accordance with the Contract Documents and the procedures given in the Specifications.

18. Execution of Works

18.1 Setting Out/Supervision/Labor

18.1.1 *Bench Mark.* The Contractor shall be responsible for the true and proper setting-out of the Works in relation to bench marks, reference marks and lines provided to it in writing by or on behalf of the Employer.

If, at any time during the progress of execution of the Works, any error shall appear in the position, level or alignment of the Works, the Contractor shall forthwith notify the Project Manager of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Project Manager. If such error is based on incorrect data provided in

writing by or on behalf of the Employer, the expense of rectifying the same shall be borne by the Employer.

18.1.2 *Contractor's Supervision.* The Contractor shall give or provide all necessary supervision during the execution of the Works, and the Road Manager or its deputy shall be on the Site to provide full-time supervision of the execution. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

18.2 Contractor's Equipment

18.2.1 All Contractor's Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without informing the Project Manager.

18.2.2 Unless otherwise specified in the Contract, upon completion of the Works and Services, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site and any surplus materials remaining thereon.

18.2.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's Equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract.

18.3 Site Regulations and Safety

The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Project Manager, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld.

Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety, traffic control, accident response, gate control, sanitation, medical care, and fire prevention.

18.4 Access to site for Other Contractors

18.4.1 The Contractor shall, upon written request from the Employer or the Project Manager, give site access to other contractors employed by the Employer on or near the site.

18.5 Site Clearance

18.5.1 *Site Clearance in Course of Execution*: In the course of carrying out the Contract, the Contractor shallkeep theSite reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract.

18.5.2 *Clearance of Site after Completion*: After Completion of all parts of the Works and Services, the Contractor shall clear away and remove all wreckage, rubbish and debris of any kind from the Site, and shall leave the Site and the Road clean and safe.

18.6 Watching and Lighting

The Contractor shall provide and maintain at its own expense alllighting, fencing, and watching when and where necessary for the proper execution and the protection of the Works and Services, for the protection of his own installations and his equipment, for the safety of the owners and occupiers of adjacent property and for the safety of the public.

18.7 Access to the Site

The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

18.8 Management Meetings

18.8.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised by either the Contractor or the Employer.

18.8.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either during or after the management meeting and stated in writing to all who attended the meeting.

19. Staff and Labor

19.1 The Contractor shall employ the key personnel named in the Contractor's Bid, to carry out the functions stated in the Specifications or other personnel approved by the Project Manager. The Project Manager will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are

substantially equal to or better than those of the personnel listed in the Contractor's Bid.

19.2 Labor

(a) The Contractor shall provide and employ on the Site for the execution of the Works and Services such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

(b) Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation and catering of all labor, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

(c) The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the entry of all labor and personnel to be employed on the Site into the country where the Site is located.

(d) The Contractor shall at its own expense provide the means of repatriation to all of its and its Subcontractor's personnel employed on the Contract at the Site to their various home countries. It shall also provide suitable temporary maintenance of all such persons from the cessation of their employment on the Contract to the date programmed for their departure. In the event that the Contractor defaults in providing such means of transportation and temporary maintenance, the Employer may provide the same to such personnel and recover the cost of doing so from the Contractor.

(e) The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.

(f) The Contractor shall provide lodging, medical assistance, alimentation and sanitary installations for the employees living in the contractor's base camps to comply with the Social, Sanitary and Health Conditions of Labor requirements established in the Specifications.

(g) The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.

(h) HIV-AIDS Prevention. If so indicated in the PC, the Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider or specialized NGO, and shall undertake such other measures as are specified in this Contract to reduce the risk of the Take-Over of the HIV virus between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals. The Contractor shall throughout the contract: (i) conduct Information, Education and Consultation Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labor (including all the Contractor's employees, all Sub-Contractors and Consultants' employees working on the Site, and truck drivers and crew making deliveries to the Site for Works and Services executed under the contract, and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behavior with respect to of Sexually Transmitted Diseases (STD)—or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labor as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counseling and referral to a dedicated national STI and HIV/AIDS program, (unless otherwise agreed) of all Site staff and labor.

(i) If so indicated in the PC, the Contractor shall include in the program to be submitted for the execution of the Works and Services under Sub-Clause 17 a program for Site staff and labour and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation program shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the program shall detail the resources to be provided or utilized and any related sub-contracting proposed. The program shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for preparation and implementation this program shall not exceed the Provisional Sum dedicated for this purpose.

19.3 Removal of staff

If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

19.4 Work at Night and on Holidays

19.4.1 Unless otherwise provided in the Contract, if and when the Contractor considers it necessary to carry out work at night

or on public holidays so as to meet the Service Levels and the Time for Completion, and requests the Employer's consent thereto (if such consent is needed), the Employer shall not unreasonably withhold such consent.

20. Test and Inspection

20.1 The Contractor shall at its own expense carry out on the Site all such tests and/or inspections as are specified in the Specifications, and in accordance with the procedures described in the Specifications.

20.2 The Employer and the Project Manager or their designated representatives shall be entitled to attend the aforesaid test and/or inspection.

20.3 For tests to be carried out on the initiative of the Contractor, whenever the Contractor is ready to carry out any such test and/or inspection, he shall give a reasonable advance notice of such test and/or inspection and of the place and time thereof to the Project Manager. The Contractor shall provide the Project Manager with a signed report of the results of any such test and/or inspection.

20.4 If the Employer or Project Manager (or their designated representatives) fails to attend a scheduled test and/or inspection, or if it is agreed between the parties that such persons shall not attend, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a signed report of the results thereof.

20.5 The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of the works and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

20.6 If Rehabilitation Works, Improvement Works or Emergency Works fail to pass any test and/or inspection, the Contractor shall either rectify or replace such works and shall repeat the test and/or inspection upon giving a notice under GC Sub-Clause 20.3.

20.7 If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Works and Services, or part of them, that cannot be settled between the parties within a reasonable period of time, it may be referred to the RDB (or DRE) for determination in accordance with GC Sub-Clause 6.1.

20.8 The Contractor agrees that neither the execution of a test and/or inspection of the Works and Services or any part of them, nor the attendance by the Employer or the Project Manager, nor the issue

of any test certificate pursuant to GC Sub-Clause 20.4, shall release the Contractor from any other responsibilities under the Contract.

20.9 No part or foundations shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the Project Manager whenever any such part or foundations are ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

20.10 The Contractor shall uncover any part of the Works or foundations, or shall make openings in or through the same as the Project Manager may from time to time require at the Site, and shall reinstate and make good such part or parts.

If any parts of the Works or foundations have been covered up at the Site after compliance with the requirement of GC Sub-Clause 20.9 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.

21. Rehabilitation Works

21.1 If so indicated in the PC, specific Rehabilitation Works shall be carried out explicitly in accordance with the Specifications and as specified in the bidding documents and in the Contractor's Bid. Input quantities for Rehabilitation Works were estimated by the Contractor to achieve the performance criteria for Rehabilitation Works given in the Specifications. The specific Rehabilitation Works were offered by the Contractor at a Lump-Sum price.

22. Improvement Works

22.1 If so indicated in the PC, Improvement Works are required and will consist of a set of interventions that add new characteristics to the roads in response to new traffic and safety or other conditions. Improvement Works quantities were offered at unit prices included in the Bill of Quantities.

22.2 The execution of Improvement Works shall be requested by the Project Manager, who will issue a Work Order defining the requested works to be carried out by the Contractor, based on the activities priced in the Bill of Quantities. The Work order shall specify the activities to be carried out and the corresponding price. The Road Manager shall confirm his acceptance by signing the Work Order.

23. Maintenance Services

23.1 Maintenance Services are those activities necessary for keeping the Road in compliance with the Performance Standards pursuant to GC Clause 24. Maintenance Services shall include all activities required to achieve and keep the Road Performance Standards and Service

Levels. These Services will be remunerated by Lump-Sum amount for the period of the contract paid in fixed monthly payments during the entire Contract period.

24. Performance Standards

24.1 The Contractor shall carry out the Maintenance Services to achieve and keep the Road complying with the Service Levels defined in the Specifications. He will carry out all Works in accordance with the performance standards indicated in the Specifications.

25. Contractor's Self-Control of Quality and Safety

25.1The Contractor shall, throughout the execution and completion of the Works and Services, maintain a System which shall ensure that the work methods and procedures are adequate and safe at all times and do not pose any avoidable risks and dangers to the health, safety and property of the workers and agents employed by him or any of his subcontractors, of road users, of persons living in the vicinity of the roads under contract, and any other person who happens to be on or along the roads under contract.

25.2 Unless specified otherwise in the PC, the Contractor shall establish, within his own organizational structure, a specific Unit staffed with qualified personnel, whose task is to verify continuously the degree of compliance by the Contractor with the required Service Levels. That Unit will also be responsible for the generation and presentation of the information needed by the contractor for the documentation required as defined in the Specifications. The Unit will be responsible for maintaining a detailed and complete knowledge of the condition of the Road and to provide to the Road Manager all the information needed in order to efficiently manage and maintain the Road. The Unit shall also carry out, in close collaboration with the Project Manager, the verifications on the Service Levels.

25.3 The Contractor's Self-Control Unit mentioned in GC Sub-Clause 25.2 shall report the level of compliance with the required Service Levels in the standard format presented in the Specifications.

26. Environmental and Safety Requirements

26.1 The Contractor shall, throughout the design, execution and completion of the Works and Services, and the remedying of any defects therein:

(a) have full regard for the safety of all persons employed by him and his subcontractors and keep the Site (so far as the same is under his control) in an orderly state appropriate to the avoidance of danger to such persons;

(b) provide and maintain at his own cost all guardrails, fencing, warning signs and watching, when and where necessary or required by Sub-Clause 18.3 of the Contract or by any duly constituted authority, for the protection of the Works and Services or for the safety and convenience of his workers and road users, the public or others; and

(c) take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.

27. Work Orders for Improvement Works and Emergency Works

27.1 Improvement Works and Emergency Works shall be executed by the Contractor on the basis of Work Orders issued by the Project Manager.

27.2 Work Orders shall be issued in writing and shall include the date on which the Work Order was issued and the signature of the Project Manager. Two copies of the Work Order shall be transmitted by the Project Manager to the Contractor, who shall immediately countersign one copy, including the date of acceptance, and return it to the Project Manager.

27.3 If the Contractor has any objection to a Work Order, the Road Manager shall notify the Project Manager of his reasons for such objection within ten (10) days) of the date of issuing the Work Order. Within five (5) days of the Road Manager's objection, the Project Manager shall cancel, modify or confirm the Work Order in writing.

28. Taking Over Procedures

28.1 When the whole of the Works and Services have been substantially completed and have satisfactorily passed any Tests on Completion prescribed by the Contract, the Contractor may give a notice to that effect to the Project Manager, accompanied by a written undertaking to finish with due expedition any outstanding work during the Defects Liability Period. Such notice and undertaking shall be deemed to be a request by the Contractor for the Project Manager to issue a Taking-Over Certificate in respect of the Works and Services. The Project Manager shall, within twenty-one (21) days of the date of delivery of such notice, either issue to the Contractor a Taking-Over Certificate, stating the date on which the Works and Services were substantially completed in accordance with the Contract, or give instructions in writing to the Contractor specifying all the conditions to be complied with and all the work which is required to be done by the Contractor before the issue of such Certificate. The Project Manager shall also notify the Contractor of any defects in the Works and Services affecting substantial completion that may appear after such instructions and before completion of Taking-Over Certificate within twenty-one (21) days of completion, to the satisfaction of the Project Manager, of the Works and Services so specified and remedying any defects so notified.

28.2 Similarly, in accordance with the procedure set out in Sub-Clause 28.1, the Contractor may request and the Project Manager shall issue a Taking-Over Certificate in respect of:

(a) any Section in respect of which a separate Time for Completion is provided in the contract,

(b) any substantial part of the Works and Services which has been both completed to the satisfaction of the Project Manager and, otherwise than as provided for in the Contract, occupied or used by the Employer, or

(c) any part of the Works and Services which the Employer has elected to occupy or use prior to completion (where such prior occupation or use is not provided for in the Contract or has not been agreed by the Contractor as a temporary measure).

29. Emergency Works

29.1 The need for execution of Emergency Works is jointly identified by the Employer and the Contractor and the starting of the execution of Emergency Works shall always require a Work Order issued by the Project Manager.

29.2 The execution of Emergency Works shall be requested by the Contractor based on losses or damages occurred as a result of natural phenomena (such as strong storms, flooding or earthquakes) with imponderable consequences, or on the possibility of damages or losses occurring, or the safety of individuals, works, services or equipment being at risk as result of the natural phenomena. In order to characterize the Emergency Works, the Contractor shall forward a Technical Report to the Project Manager requesting the execution of Emergency Works and characterizing the situation. On the basis of the said report, and of his own judgment of the situation, the Project Manager may issue a Work Order to the Contractor.

29.3 The Employer or even Government authorities may declare an Emergency Situation on the basis of local legislation. In those cases, the Project Manager may issue a Work Order for Emergency Works to the Contractor even without a request by the Contractor.

29.4 If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine necessary in order to prevent damage to the Road. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefore. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. Otherwise, the cost of such remedial work shall be borne by the Employer.

30. Quality of materials used by Contractor

30.1 The quality of materials used by the Contractor for the execution of the Contract shall be in compliance with the requirements of the Specifications. If the Contractor is of the opinion that materials of higher quality than those stated in the Specifications need to be used in order to ensure compliance with the Contract, he shall use

such better materials, without being entitled to higher prices or remunerations.

30.2 Under no circumstances may the Contractor make any claim based on the insufficient quality of materials used by him, even if the material used was authorized by the Project Manager.

30.3 The Contractor shall carry out at his own cost the laboratory and other tests that he needs to verify if materials to be used comply with the Specifications, and shall keep records of such tests. If requested by the Project Manager, the Contractor shall hand over the results of the tests.

31. Signalling and demarcation of work zones and bypasses

31.1 To ensure the safety of road users, including non-motorized road users and pedestrians, the Contractor is responsible to install and maintain at his cost the adequate signalling and demarcation of work sites, which in addition must comply with the applicable legislation.

31.2 If the execution of services and works under the contract is likely to interfere with traffic, the Contractor shall take at his cost the measures necessary to limit such interference to the strict minimum, or any danger to the workers or others. For that purpose, he is entitled to install, within the right-of-way of the road, temporary bypasses, structures or other modifications to be used by traffic during the execution of works and services. The Contractor shall notify the Project Manager of any such temporary installations.

31.3 If the execution of Works and Services by the Contractor makes it necessary to temporarily close a road section, and a traffic detour has to be implemented over other public roads or streets, the Contractor shall be responsible for the adequate signalling of the detour, under the same conditions as stated in GC Sub-Clause 31.1.

31.4 The Contractor shall inform the local authorities and the local police about such activities to be carried out by him which may cause any significant interruptions or changes to the normal traffic patterns. Such information shall be made in writing and at least seven (7) days before the beginning of such activities. Upon request from the Contractor, the Employer shall assist the Contractor in the coordination with the local authorities and the local police.

D. ALLOCATION OF RISKS

32. Employer's Risks

32.1 From the Start Date until the Defects Correction Certificate has been issued, the following are Employer's risks insofar as they directly affect the execution of the Works and Services included in this Contract:

(a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies;

(b) rebellion, revolution, insurrection, military or usurped power, or civil war;

(c) ionising radiations, contamination by radioactivity from any nuclear fuel, or any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof;

(d) riot, commotion or disorder, unless solely restricted to employees of the Contractor or of his Subcontractors and arising from the conduct of the Works and Services;

(e) loss or damage due to the use or occupation by the Employer of any unfinished Section or part of the Works, except as may be provided for in the Contract;

(f) any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions.

33. Contractor's Risks

33.1 The Employer carries the risks which this Contract states are Employer's risks, and the remaining risks are the Contractor's risks.

34. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification

34.1 Subject to GC Sub-Clause 34.3, the Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property arising in connection with the execution and by reason of the negligence of the Contractor or its Subcontractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Employer, its contractors, employees, officers or agents.

34.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GC Sub-Clause 34.1, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the twenty-eight (28) day period, the Employer

shall make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

34.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Subcontractors from any liability for loss of or damage to property of the Employer, other than the Works not yet taken over, that is caused by fire, explosion or any other perils, in excess of the amount recoverable from insurances procured under GC Clause 35, provided that such fire, explosion or other perils were not caused by any act or failure of the Contractor.

34.4 The party entitled to the benefit of an indemnity under this GC Clause 34 shall take all reasonable measures to mitigate any loss or damage which has occurred. If the party fails to take such measures, the other party's liabilities shall be correspondingly reduced.

35. Insurance

35.1 To the extent specified in the PC, the Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions specified in the said PC. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval.

(a) *Loss of or damage to the Plant and Materials*

Covering loss or damage occurring prior to Completion.

(b) *Third Party Liability Insurance*

Covering bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property occurring in connection with Works and Services.

(c) *Automobile Liability Insurance*

Covering use of all vehicles used by the Contractor or its Subcontractors (whether or not owned by them) in connection with the execution of the Contract.

(d) *Workers' Compensation*

In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

(e) *Employer's Liability*

In accordance with the statutory requirements applicable in any country where the Contract or any part thereof is executed.

(f) *Other Insurances*

Such other insurances as may be specifically agreed upon by the parties.

35.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 35.1, except for the Third Party Liability, Workers' Compensation and Employer's Liability Insurances, and the Contractor's Subcontractors shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GC Sub-Clause 35.1 except for the Cargo Insurance During Transport, Workers' Compensation and Employer's Liability Insurances. All insurer's rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.

35.3 The Contractor shall deliver to the Employer certificates of insurance (or copies of the insurance policies) as evidence that the required policies are in full force and effect. The certificates shall provide that no less than twenty-one (21) days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.

35.4 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Contractor.

35.5 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GC Sub-Clause 35.1, the Employer may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Contractor under the Contract any premium that the Employer shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Contractor.

35.6 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GC Clause 35, and all monies payable by any insurers shall be paid to the Contractor. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.

36. Unforeseen Conditions

36.1 If, during the execution of the Contract, the Contractor shall encounter on the Site any physical conditions (other than climatic conditions) or artificial obstructions that could not have been reasonably foreseen prior to the date of the Contract Agreement by an experienced contractor on the basis of reasonable examination of the data relating

to the Road (including any data and tests provided by the Employer), and on the basis of information that it could have obtained from a visual inspection of the Site or other data readily available to it relating to the Road, and if the Contractor determines that it will in consequence of such conditions or obstructions incur additional cost and expense or require additional time to perform its obligations under the Contract that would not have been required if such physical conditions or artificial obstructions had not been encountered, the Contractor shall promptly, and before performing additional work or using additional Plant and Equipment or Contractor's Equipment, notify the Project Manager in writing of

(a) the physical conditions or artificial obstructions on the Site that could not have been reasonably foreseen;

(b) the additional work and/or Plant and Equipment and/or Contractor's Equipment required, including the steps which the Contractor will or proposes to take to overcome such conditions or obstructions;

(c) the extent of the anticipated delay;

(d) the additional cost and expense that the Contractor is likely to incur.

On receiving any notice from the Contractor under this GC Sub-Clause 36.1, the Project Manager decides upon the actions to be taken to overcome the physical conditions or artificial obstructions encountered. Following such consultations, the Project Manager shall instruct the Contractor, with a copy to the Employer, of the actions to be taken.

36.2 Any reasonable additional cost and expense incurred by the Contractor in following the instructions from the Project Manager to overcome such physical conditions or artificial obstructions referred to in GC Sub-Clause 36.1 shall be paid by the Employer to the Contractor as an addition to the Contract Price.

36.3 If the Contractor is delayed or impeded in the performance of the Contract because of any such physical conditions or artificial obstructions referred to in GC Sub-Clause 36.1, the Time for Completion shall be extended in accordance with GC Clause 64.

37. Change in Laws and Regulations

37.1 If, after the date twenty-eight (28) days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the

extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable, in accordance with the PC.

38. Force Majeure

38.1 "Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, insofar as they directly affect the execution of the Services and Works included in this Contract and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following:

(a) war, hostilities or warlike operations (whether a state of war be declared or not), invasion, act of foreign enemy and civil war;

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts;

(c) confiscation, nationalization, mobilization, commandeering, requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority;

(d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague;

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster;

(f) shortage of labor, materials or utilities where caused by circumstances that are themselves Force Majeure.

38.2 If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.

38.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GC Clause 64.

38.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either party's right to terminate the Contract under GC Sub-Clause 38.6.

38.5 No delay or non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall

(a) constitute a default or breach of the Contract;

(b) give rise to any claim for damages or additional cost or expense occasioned thereby;

if and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.

38.6 If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the currency of the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which either party may terminate the Contract by giving a notice to the other, but without prejudice to either party's right to terminate the Contract under GC Clause 59.

38.7 In the event of termination pursuant to GC Sub-Clause 38.6, the rights and obligations of the Employer and the Contractor shall be as specified in GC Sub-Clauses 59.1.2 and 59.1.3.

38.8 Notwithstanding GC Sub-Clause 38.5, Force Majeure shall not apply to any obligation of the Employer to make payments to the Contractor herein.

E. GUARANTEES AND LIABILITIES

39. Completion Time Guarantee and Liability

39.1 The Contractor guarantees that it shall attain specified Service Levels and the Completion of Rehabilitation and Improvement Works (or a part for which a separate time for completion is specified in the PC) within the time schedules specified in the PC and the Specifications, pursuant to GC Sub-Clause 10.2, or within such extended time to which the Contractor shall be entitled under GC Clause 64 hereof.

39.2 If the Contractor fails to attain specified Service Levels within the contractually agreed time schedules as given in the Specifications, the contractor shall receive reduced payments for Maintenance Services, for such default and not as a penalty, in accordance with the Specifications.

39.3 If the Contractor fails to attain the Completion of Rehabilitation and Improvement Works (or a part for which a separate time for completion is specified in the PC clause 39.1) within the contractually required time schedules, the contractor shall shall pay to the Employer liquidated damages for such default and not as a penalty, in accordance with the PC and the Specifications.

39.4 The payment reductions and liquidated damages indicated in GC 39.2 and 39.3 shall be the only monies due from the Contractor for such defaults, and they will be applied for every day of delay, in accordance with the PC and the Specifications. The aggregate amount of such liquidated damages and payment reductions shall in no event exceed the "aggregate liability" in accordance with GC Clause 42. The payment or deduction of such sums shall not relieve the Contractor from his obligation to complete the Works and Services, or from any other of his obligations and liabilities under the Contract.

40. Performance Guarantee and Liability

40.1 The Contractor guarantees that during the Performance Tests or Inspections for Rehabilitation and Improvement Works, and for Emergency Works, the Road and all parts thereof shall attain the Performance Standards specified in the corresponding Specifications.

40.2 If, for reasons attributable to the Contractor, the minimum level of the Performance Standards specified in the corresponding Specifications are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the Road or any part thereof as may be necessary to meet at least the minimum level of such Standards. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall request the Employer to repeat the Test or Inspection until the minimum level of the Standards has been met. If the Contractor eventually fails to meet the minimum level of Performance Standard, the Employer may consider termination of the Contract, pursuant to GC Sub-Clause 59.2.2.

40.3 If, for reasons attributable to the Contractor, the Performance Standards relating to Rehabilitation and Improvement Works specified in the corresponding Specifications are not attained either in whole or in part, the Contractor shall, at the Contractor's choice, either

(a) make such changes, modifications and/or additions to the Works and Services or any part thereof that are necessary to attain the Performance Standards at its cost and expense, and shall request the Employer to repeat the Test, or

(b) pay liquidated damages to the Employer in respect of the Works and Services which fail to meet the Performance Standards in accordance with the provisions in the corresponding Specifications.

40.4 The payment of liquidated damages under GC Sub-Clause 40.3, up to the limitation of liability specified in the PC, shall completely satisfy the Contractor's guarantees under GC Sub-Clause 40.1, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof. Upon the payment of such liquidated damages by the Contractor, the Project Manager shall issue the Certificate of Completion for the Works or any part thereof in respect of which the liquidated damages have been so paid.

41. Defect Liability

41.1 The Contractor warrants that the Works and Services or any part thereof shall be free from defects in the design, engineering, materials and workmanship of the Works and Services executed.

41.2 The Defect Liability Period shall be twelve (12) months from the date of Completion of the Contract, or eighteen (18) months from the date of Certificate of Completion of the Works (or any part thereof), whichever occurs first, unless specified otherwise in the PC.

If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Works and Services executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Road caused by such defect. The Contractor shall not be responsible for the repair, replacement or making good of any defect or of any damage to the Road arising out of or resulting from improper operation or maintenance of the Road by the Employer after taking over.

41.3 The Contractor's obligations under this GC Clause 41 shall not apply to

(a) any works or materials that have a normal life shorter than the Defect Liability Period stated herein;

(b) any designs, specifications or other data designed, supplied or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility herein;

(c) any other materials supplied or any other work executed by or on behalf of the Employer, except for the work executed by the Employer under GC Sub-Clause 41.6.

41.4 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.

41.5 The Employer shall afford the Contractor all necessary access to the Site to enable the Contractor to perform its obligations under this GC Clause 41. The Contractor may remove from the Site any Plant and Equipment that are defective if the nature of the defect is such that repairs cannot be expeditiously carried out at the Site.

41.6 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Road caused by such defect within a reasonable time (which shall in no event be considered to be less than fifteen (15) days), the Employer may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer

from any monies due the Contractor or claimed under the Performance Security.

41.7 If the Road or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Road or such part, as the case may be, shall be extended by a period equal to the period during which the Road or such part cannot be used because of any of the aforesaid reasons.

41.8 Except as provided in GC Clauses 40 and 41, the Contractor shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Road or any part thereof, the Plant and Equipment, design or engineering or work executed that appear after Completion of the Works and Services, except where such defects are the result of the gross negligence, fraud, criminal or willful action of the Contractor.

42. Limitation of Liability

42.1 Except in cases of criminal negligence or willful misconduct,

(a) the Contractor shall not be liable to the Employer, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Employer and

(b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the limit specified in the PC.

43. Liability for Damages through Traffic Accidents and Traffic Interruptions

43.1 The Contractor cannot be held liable for losses or damages of any kind arising out of traffic accidents on the roads included in the Contract, unless those traffic accidents have been caused directly by potholes or other major defects of the Road covered by the Contract he failed to repair in a timely manner, criminal acts, wilful misconduct or gross negligence of the Contractor.

43.2 Under no circumstances can the Contractor be held liable for losses or damages of any kind and to anyone arising out of interruptions of traffic or traffic delays on the road included in the Contract, including any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs.

F. PAYMENT

44. Contract Price

44.1 The Contract Price shall be as specified in the Form of Contract Agreement to be paid in the currencies indicated in the PC.

44.2 Unless indicated otherwise in the PC, and except in the event of a Change as provided for in the Contract, the Contract Price shall be:

(a) For Rehabilitation Works, a firm lump sum not subject to any alteration, to be paid according to work progress;

(b) For Maintenance Services, a firm lump sum to be paid in monthly installments;

(c) For Improvement Works, the total price stated in the Bill of Quantities for this item;

(d) For Emergency Works, the Provisional Sum reserved for this purpose.

44.3 The Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

45. Advance Payment

45.1 The Employer shall make advance payment to the Contractor of the amounts and by the date stated in the PC, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payment.

45.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for the execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.

45.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works and Services on a payment basis as indicated in the PC.

46. Bill of Quantities

46.1 The Bill of Quantities shall contain items for Groups of Activities which include the provision of Services (measured by performance standards) and Works(measured by unit of outputs or of products). The Bill of Quantities for Works shall include, where applicable, the lump-sum and unit price for Rehabilitation Works, and unit rates for Improvement Works and for Emergency Works.

46.2 Maintenance Services shall be measured and billed separately and will be remunerated by lump-sum amount for the period of the contract, and paid in fixed monthly payments during the entire Contract period. The values for remuneration of the Maintenance Services are those stated in the Bill of Quantities.

46.3 Rehabilitation Works will be remunerated by Lump-Sum amount for the period of the contract, however, indicating the quantities of

measurable outputs to be executed in order that the Road achieves the performance standards specified in the bidding documents. Payments will be made in accordance with the execution of those measured outputs paid by executed works output. The prices shall be those stated in the Bill of Quantities.

46.4 Improvement Works will be remunerated after acceptance by the Employer and shall be paid according to the product unit price using the prices included in the Bill of Quantities.

46.5 Each Emergency Work Order issued by the Project Manager will include a lump-sum price for the works to be performed. The Lump-Sum price for the Emergency Works will be submitted by the Contractor to the Project Manager in each emergency pursuant to GC Clauses 29 and 61 and will be prepared based on the Specifications and on the unit prices included in the Bill of Quantities for Emergency Works, and will remunerate all Emergency Activities. The prices include compliance with all Performance Indices described in the Specifications. Once approved, Emergency Works will be paid as lump sum in accordance with the schedule of payment proposed by the Contractor for the specific Emergency and approved by the Employer.

46.6 The Bill of Quantities is used to calculate the Contract Price. The amounts for Maintenance Services and Rehabilitation Works are the Lump-Sum prices offered in the Contractor's Bid. The Improvement Works amount included in the Contract is an estimate on the basis of the unit prices included in the Contractor's Bid. The Provisional Sum included in the Contract Price is an estimate for use when authorized by the Employer for Emergency Works and contingencies.

47. Measurement

47.1 Maintenance Services will not be measured in volume; however its payment will be affected by compliance with the Performance Standards pursuant to GC Clause 24. Maintenance Services shall be billed in fixed monthly amounts as per the Bill of Quantities Lump-Sum amount for Maintenance Services, beginning from the Start Date. Payments will be made with Reductions if the Performance Standards are not achieved, as defined in the Specifications. The Reductions for non-compliance with the Performance Standards will be applied on a daily basis for the period under which the Road does not achieve the Performance Standards, in accordance with the methodology specified in the Specifications.

47.2 Rehabilitation Works will be measured on the basis indicated in the PC, based on the quantity of actual work outputs as defined in the Specifications, concluded by the Contractor and approved by the Project Manager. 47.3 Improvement Works will be measured on the basis indicated in the PC and in accordance with the unit of measurement used for product unit price included in the Bill of Quantities. The prices shall be those stated in the Bill of Quantities.

47.4 Emergency Works will not be measured and shall be billed in accordance with the Schedule of Payments agreed for each specific Emergency Work as approved by the Employer.

48. Price Adjustments

48.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the PC. If so provided, the amounts certified in each payment certificate, after deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type indicated below applies to each Contract currency:

$$\mathbf{P_c = A_c + B_c Imc/Ioc}$$

where:

P_c is the adjustment factor for the portion of the Contract Price payable in a specific currency "c"

A_c and B_c are coefficients[1] specified in the PC, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific currency "c", and

Imc is the index prevailing at the end of the month being invoiced and Ioc is the index prevailing twenty-eight (28) days before Bid opening for inputs payable; both in the specific currency "c".

48.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

49. Monthly Statements and Payments

49.1 The Contractor shall submit to the Project Manager monthly statements in the format indicated in the Specifications, of the estimated value of Maintenance Services, Rehabilitation Works, Improvement Works, and Emergency Works in separated items covering the Works and Services for the corresponding month.

49.2 The Project Manager shall check the Contractor's monthly statement and certify within fourteen (14) days the amount to be paid to the Contractor.

49.3 The value of Services executed shall be certified by the Project Manager taking into account the monthly amount included in the Bill of Quantities for Maintenance Services and the achievement of the Performance Standards for the Maintenance Services adjusted for any payment reductions in accordance with GC Sub-Clause 47.1.

[1] The sum of the two coefficients A_c and B_c should be 1 (one) in the formula for each currency. Normally, both coefficients will be the same in the formulae for all currencies, since coefficient A, for the nonadjustable portion of the payments, is a very approximate figure (usually 0.15) to take account of fixed cost elements or other nonadjustable components. The sum of the adjustments for each currency is added to the Contract Price.

49.4 The value of Works executed shall be certified by the Project Manager taking into account the value of the quantities of products executed and the prices in the Bill of Quantities.

49.5 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

50. Payments

50.1 Payments shall be adjusted for deductions for advance payments, retention, and reductions for not achieving Performance Standards for Maintenance Services. The Employer shall pay the Contractor the amounts certified by the Project Manager in accordance with GC Clause 49, within twenty-eight (28) days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing for each of the currencies in which payments are made.

50.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute. The interest rate shall be determined as per Sub-Clause 50.1.

50.3 Unless otherwise stated, all payments and deductions will be paid or charged in the proportions of currencies comprising the Contract Price.

50.4 Items of the Works for which no rate or price has been entered in the Bill of Quantities will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

51. Retention and Reductions

51.1 The Employer shall retain the percentage indicated in the PC from each payment due to the Contractor for Rehabilitation Works and Improvement Works, except for the types of works specified in the PC. The regular monthly lump-sum payments for performance-based Maintenance Services will not be subject to retentions, unless indicated in the PC.

51.2 On completion of the Rehabilitation and Improvement Works, half the total amount retained shall be repaid to the Contractor and the other half after twelve (12) months have passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor have been corrected before the end of this period.

51.3 On completion of the whole Works and Services, the Contractor may substitute retention money with an “on demand” Bank guarantee.

51.4 Reduction of monthly payments for Maintenance Services due to non compliance with the Service Levels will be made as indicated in GC Sub-Clause 47.1. The amount of Reduction for the days in which the Road was not complying with the Performance Standards will not be paid or repaid, even after the Contractor re-establishes the quality levels to the standards required by the contract.

52. Taxes and Duties

52.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies and charges assessed on the Contractor, its Subcontractors or their employees by all municipal, state or national government authorities in connection with the Works and Services in and outside of the country where the Site is located.

52.2 If any tax exemptions, reductions, allowances or privileges may be available to the Contractor in the country where the Site is located, the Employer shall use its best endeavors to enable the Contractor to benefit from any such tax savings to the maximum allowable extent.

52.3 For the purpose of the Contract, it is agreed that the Contract Price specified in the Form of Contract Agreement is based on the taxes, duties, levies and charges prevailing at the date twenty-eight (28) days prior to the date of bid submission in the country where the Site is located (hereinafter called "Tax"). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of the Contract, which was or will be assessed on the Contractor, Subcontractors or their employees in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction therefrom, as the case may be, in accordance with GC Clause 37 hereof.

53. Securities

53.1 Issuance of Securities

The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner and form specified below.

53.2 Advance Payment Security

53.2.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security in an amount equal to the advance payment calculated in accordance with the corresponding PC to the Contract Agreement, and in the same currency or currencies.

53.2.2 The security shall be in the form provided in the bidding documents or in another form acceptable to the Employer. The amount of the security shall be reduced in proportion to the value of the Works and Services executed by and paid to the Contractor from time to time, and shall automatically become

null and void when the full amount of the advance payment has been recovered by the Employer. The security shall be returned to the Contractor immediately after its expiration.

53.3 Performance Security

53.3.1 The Contractor shall, within twenty-eight (28) days of the notification of contract award, provide a security for the due performance of the Contract in the amount specified in the PC.

53.3.2 The security shall be denominated in the currency or currencies of the Contract, or in a freely convertible currency acceptable to the Employer, and shall be in one of the forms of guarantees provided in the bidding documents, as stipulated by the Employer in the PC, or in another form acceptable to the Employer.

53.3.3 The security shall automatically become null and void, twelve (12) months after Completion of all Works and Services under the Contract, provided however, that if the Defects Liability Period has been extended on any part of the Works pursuant to GC Sub-Clause 41.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration.

54. Certificate of Completion

54.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Rehabilitation Works, Improvement Works and Emergency Works, or parts thereof, as applicable, and the Project Manager will do so upon deciding that the work is completed.

55. Final Statement

55.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within fifty-six (56) days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within fifty-six (56) days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.

56. Discharge

56.1 Upon submission of the Final Statement, the Contractor shall give to the Project Manager, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued pursuant to Sub-Clause 55 has been made and the performance security referred to in Sub-Clause 53.3, if any, has been returned to the Contractor.

57. As Built Drawings and Manuals

57.1 If "as built" Drawings and/or manuals are required, the Contractor shall supply them by the dates stated in the PC.

57.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the PC, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the PC from payments due to the Contractor.

G. REMEDIES

58. Suspension

58.1 The Employer may request the Project Manager, by notice to the Contractor, to order the Contractor to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefore. The Contractor shall thereupon suspend performance of such obligation (except those obligations necessary for the care or preservation of the Site and Works) until ordered in writing to resume such performance by the Project Manager.

If, by virtue of a suspension order given by the Project Manager, other than by reason of the Contractor's default or breach of the Contract, the Contractor's performance of any of its obligations is suspended for an aggregate period of more than ninety (90) days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the Project Manager requiring that the Employer shall, within twenty-eight (28) days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GC Sub-Clause 63.1, excluding the performance of the suspended obligations from the Contract.

If the Employer fails to do so within such period, the Contractor may, by a further notice to the Project Manager, elect to treat the suspension as termination of the Contract under GC Sub-Clause 59.1.

58.2 If

(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to the Contract, or commits a substantial breach of the Contract, the Contractor may give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GC Sub-Clause 50.1, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, or fails to

remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice; or

(b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site, or failure to obtain any governmental permit under the Employer's responsibility and necessary for the execution and/or completion of the Works and Services,

then the Contractor may by fourteen (14) days' notice to the Employer suspend performance of all or any of its obligations under the Contract, or reduce the rate of progress.

58.3 If the Contractor's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GC Clause 58, then the Time for Completion shall be extended in accordance with GC Sub-Clause 64, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default or breach of the Contract.

58.4 During the period of suspension, the Contractor shall not remove from the Site any Plant and Equipment or any Contractor's Equipment, without the prior written consent of the Employer.

59. Termination 59.1 Termination for Employer's Convenience

59.1.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GC Sub-Clause 59.1.

59.1.2 Upon receipt of the notice of termination under GC Sub-Clause 59.1.1, the Contractor shall either immediately or upon the date specified in the notice of termination

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Works and Services already executed, or any work required to leave the Site in a clean and safe condition,

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii) below,

(c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition.

(d) In addition, the Contractor, subject to the payment specified in GC Sub-Clause 59.1.3, shall

(i) deliver to the Employer the parts of the Works executed by the Contractor up to the date of termination,

(ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Works and Services and to the Plant and Equipment as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors

(iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of termination in connection with the Works.

59.1.3 In the event of termination of the Contract under GC Sub-Clause 59.1.1, the Employer shall pay to the Contractor the following amounts:

(a) the Contract Price, properly attributable to the parts of the works and services executed by the Contractor as of the date of termination,

(b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel,

(c) any amounts to be paid by the Contractor to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges,

(d) the costs incurred by the Contractor in protecting and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GC Sub-Clause 59.1.2,

(e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third parties in connection with the Contract and that are not covered by paragraphs (a) through (d) above.

59.2 Termination for Contractor's Default

59.2.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefor to the Contractor, referring to this GC Sub-Clause 59.2:

(a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt;

(b) if the Contractor assigns or Take-Over s the Contract or any right or interest therein in violation of the provision of GC Clause 13;

(c) if the Contractor, in the judgment of the Employer has engaged in corrupt, fraudulent, collusive or coercive practices in competing for or in executing the Contract.

For the purpose of this Sub-Clause:

(i) "corrupt practice"[2] is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

[2] "Another party" refers to a public official acting in relation to the procurement process or contract execution]. In this context, "public official" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

(ii) "fraudulent practice"[3] is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "collusive practice"[4] is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice"[5] is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice"is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 1.15 [Inspections and Audits by the Bank].

59.2.2 If the Contractor

(a) has abandoned or repudiated the Contract

(b) has without valid reason failed to commence work on the Road promptly or has suspended (other than pursuant to GC Sub-Clause 58.2) the progress of Contract performance for more than twenty-eight (28) days after receiving a written instruction from the Employer to proceed,

(c) persistently fails to execute the Contract in accordance with the Contract, such failure being defined in the PC, or persistently neglects otherwise to carry out its obligations under the Contract without just cause,

(d) refuses or is unable to provide sufficient materials, services or labor to execute and complete the Works and

[3] A "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

[4] "Parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

[5] A "party" refers to a participant in the procurement process or contract execution.

Services in the manner specified in the program furnished under GC Clause 17 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain completion of the works and services by the Time for Completion as extended,

then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GC Sub-Clause 59.2.

59.2.3 Upon receipt of the notice of termination under GC Sub-Clauses 59.2.1 or 59.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Works and Services already executed, or any work required to leave the Site in a clean and safe condition

(b) terminate all subcontracts, except those to be assigned to the Employer based on the Employer's written request,

(c) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Works and Services.

59.2.4 The Contractor shall be entitled to be paid the Contract Price attributable to the Works and Services executed as of the date of termination, and the costs, if any, incurred in protecting and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GC Sub-Clause 59.2.3. Any sums due the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

59.3 Termination by Contractor

59.3.1 If

(a) the Employer has failed to pay the Contractor any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause pursuant to GC Clause 50, or commits a substantial breach of the Contract, the Contractor may

give a notice to the Employer that requires payment of such sum, with interest thereon as stipulated in GC Sub-Clause 50.2, requires approval of such invoice or supporting documents, or specifies the breach and requires the Employer to remedy the same, as the case may be. If the Employer fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Contractor's notice, or

(b) the Contractor is unable to carry out any of its obligations under the Contract for any reason attributable to the Employer, including but not limited to the Employer's failure to provide possession of or access to the Site or other areas or failure to obtain any governmental permit under the Employer's responsibility and necessary for the execution and/or completion of the Works and Services,

then the Contractor may give a notice to the Employer thereof, and if the Employer has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within twenty-eight (28) days of such notice, or if the Contractor is still unable to carry out any of its obligations under the Contract for any reason attributable to the Employer within twenty-eight (28) days of the said notice, the Contractor may by a further notice to the Employer referring to this GC Sub-Clause 59.3.1, forthwith terminate the Contract.

59.3.2 The Contractor may terminate the Contract forthwith by giving a notice to the Employer to that effect, referring to this GC Sub-Clause 59.3.2, if the Employer becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Employer takes or suffers any other analogous action in consequence of debt.

59.3.3 If the Contract is terminated under GC Sub-Clauses 59.3.1 or 59.3.2, then the Contractor shall immediately

(a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the Road already executed, or any work required to leave the Site in a clean and safe condition,

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii),

(c) remove all Contractor's Equipment from the Site and repatriate the Contractor's and its Subcontractors' personnel from the Site.

(d) In addition, the Contractor, subject to the payment specified in GC Sub-Clause 59.3.4, shall

(i) deliver to the Employer the parts of the Road executed by the Contractor up to the date of termination,

(ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Road and to the Plant and Equipment as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors,

(iii) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Works and Services.

59.3.4 If the Contract is terminated under GC Sub-Clauses 59.3.1 or 59.3.2, the Employer shall pay to the Contractor all payments specified in GC Sub-Clause 59.1.3, and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Contractor arising out of, in connection with or in consequence of such termination.

59.3.5 Termination by the Contractor pursuant to this GC Sub-Clause 59.3 is without prejudice to any other rights or remedies of the Contractor that may be exercised in lieu of or in addition to rights conferred by GC Sub-Clause 59.3.

59.4 In this GC Clause 59, in calculating any monies due from the Employer to the Contractor, account shall be taken of any sum previously paid by the Employer to the Contractor under the Contract, including any advance payment paid pursuant to the Contract.

H. PROVISIONAL SUM

60. Provisional Sum

60.1 "Provisional Sum" means a sum included in the Contract for use when authorized by the Employer for Emergency Works and for contingencies, which sum may be used, in whole or in part, or not at all, on the instructions of the Employer. The Contractor shall be entitled to only such amounts in respect of the work, supply or

contingencies to which such Provisional Sums relate as the Project Manager shall determine in accordance with this Clause.

61. Use of Provisional Sum for Emergency Works

61.1 After detecting a situation which in the opinion of the Contractor justifies the execution of Emergency Works or otherwise as defined in GC Clause 29, the Contractor shall submit a Technical Report to the Project Manager characterizing the situation, and state estimated works quantities to correct the emergency situation, and a Lump Sum price quotation for the Emergency Works to be carried out. The price quotation should be based on the Specifications stated in Section VII using the unit prices included in the Bill of Quantities.

61.2 If the execution of the Emergency Works require any activity not priced in the Bill of Quantities, the Contractor will use the price breakdowns included in the Contractor's Bid in order to form the unit prices of the unpriced items to be included in the Price Quotation of the Emergency Works, all in accordance with agreed methodology for approving new prices.

61.3 Upon receiving the request for Emergency Works including a Price Quotation, the Project Manager may issue a Work Order in accordance with GC Sub-Clause 29.2 for execution of the Emergency Works for a Lump-Sum amount with a payment Schedule agreed with the Contractor. The cost of these Works will be covered by the amounts included in the Provisional Sum.

62. Use of Provisional Sum for Contingencies

62.1 The use of the Provisional Sum to cover for Contingencies will be done under the control and initiative of the Project Manager in accordance with the conditions of the Contract.

I. CHANGE IN CONTRACT ELEMENTS

63. Change in Assignments to Contractor

63.1 Introducing a Change

63.1.1 If so indicated in the PC, the Employer shall have the right to propose, and subsequently require, that the Project Manager order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the Assignments to the Contractor (hereinafter called "Change"), provided that such Change falls within the general scope of the Assignment and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Works and Services and the technical compatibility of the Change envisaged with the nature of the Works and Services as specified in the Contract.

63.1.2 If so indicated in the PC, the Contractor may from time to time during its performance of the Contract propose to the

Employer (with a copy to the Project Manager) any Change that the Contractor considers necessary or desirable to improve the quality, efficiency or safety of the Works and Services. The Employer may at its discretion approve or reject any Change proposed by the Contractor.

63.1.3 Notwithstanding GC Sub-Clauses 63.1.1 and 63.1.2, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

63.1.4 The procedure on how to proceed with and execute Changes is specified in GC Sub-Clauses 63.2 and 63.3, further details and sample forms are provided in the Sample Forms and Procedures section in the bidding documents.

63.2 Changes Originating from Employer

63.2.1 If the Employer proposes a Change pursuant to GC Sub-Clause 63.1.1, it shall send to the Contractor a "Request for Change Proposal," requiring the Contractor to prepare and furnish to the Project Manager, as soon as reasonably practicable, a "Change Proposal," which shall include the following:

(a) brief description of the Change

(b) effect on the Time for Completion

(c) estimated cost of the Change

(d) effect on Functional Guarantees (if any)

(e) effect on any other provisions of the Contract

63.2.2 Prior to preparing and submitting the "Change Proposal," the Contractor shall submit to the Project Manager an "Estimate for Change Proposal," which shall be an estimate of the cost of preparing and submitting the Change Proposal.

Upon receipt of the Contractor's Estimate for Change Proposal, the Employer shall do one of the following:

(a) accept the Contractor's estimate with instructions to the Contractor to proceed with the preparation of the Change Proposal,

(b) advise the Contractor of any part of its Estimate for Change Proposal that is unacceptable and request the Contractor to review its estimate,

(c) advise the Contractor that the Employer does not intend to proceed with the Change.

63.2.3 Upon receipt of the Employer's instruction to proceed under GC Sub-Clause 63.2.2 (a), the Contractor shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GC Sub-Clause 63.2.1.

63.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If such rates and prices are inequitable, the parties thereto shall agree on specific rates for the valuation of the Change.

63.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance therewith, and with all other Change Orders that have already become binding upon the Contractor under this GC Clause 63, would be to increase or decrease the Contract Price as originally set forth in the Contract Agreement by more than fifteen percent (15%), the Contractor may give a written notice of objection thereto prior to furnishing the Change Proposal as aforesaid. If the Employer accepts the Contractor's objection, the Employer shall withdraw the proposed Change and shall notify the Contractor in writing thereof.

The Contractor's failure to so object shall neither affect its right to object to any subsequent requested Changes or Change Orders herein, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Contractor represents.

63.2.6 Upon receipt of the Change Proposal, the Employer and the Contractor shall mutually agree upon all matters therein contained. Within fourteen (14) days after such agreement, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order.

If the Employer is unable to reach a decision within fourteen (14) days, it shall notify the Contractor with details of when the Contractor can expect a decision.

If the Employer decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Contractor accordingly. Under such circumstances, the Contractor shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Contractor in its Estimate for Change Proposal submitted in accordance with GC Sub-Clause 63.2.2.

63.2.7 If the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time

for Completion, or any other matters identified in the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order."

Upon receipt of a Pending Agreement Change Order, the Contractor shall immediately proceed with effecting the Changes covered by such Order. The parties shall thereafter attempt to reach agreement on the outstanding issues under the Change Proposal.

If the parties cannot reach agreement within sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Dispute Review Expert in accordance with the provisions of GC Sub-Clause 6.1.

63.3 Changes Originating from Contractor

63.3.1 If the Contractor proposes a Change pursuant to GC Sub-Clause 63.1.2, the Contractor shall submit to the Project Manager a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GC Sub-Clause 63.2.1.

Upon receipt of the Application for Change Proposal, the parties shall follow the procedures outlined in GC Sub-Clauses 63.2.6 and 63.2.7. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Application for Change Proposal.

64. Extension Time for Completion

64.1 The Time(s) for Completion specified in the PC shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) any Change in the Works and Services as provided in GC Clause 63,

(b) any occurrence of Force Majeure as provided in GC Clause 38 and unforeseen conditions as provided in GC Clause 36,

(c) any suspension order given by the Employer under GC Clause 58,

(d) any changes in laws and regulations as provided in GC Clause 37, or

(e) any default or breach of the Contract by the Employer, or any activity, act or omission of any other contractors employed by the Employer, or

(f) any other matter specifically mentioned in the Contract

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

64.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Project Manager a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to anDispute Review Expert, pursuant to GC Sub-Clause 6.1.

64.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

65. Release from Performance

65.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

Section VIII. Specifications

Part A: Performance Specifications

DEFINITIONS

Alternatives (of design): Differing paving or rehabilitation courses of action that will satisfy pavement design and management objectives.

Analysis period: The time period used for comparing design alternatives. An analysis period may contain several maintenance and rehabilitation activities during the life cycle of the pavement being evaluated.

Annual Average daily traffic (AADT): The estimate of typical traffic on a road segment for all days of the week over the period of a year.

Asphalt Concrete (AC): A controlled mixture of asphalt cements and graded aggregate compacted to a dense mass. Also, hot-mixed asphalt (HMa), hot mixed asphalt concrete (HMAC), bituminous concrete (BC), plant mix (PM).

Asphalt Concrete surface: Asphalt concrete used as a surface course. Also, dense-graded asphalt concrete, asphalt surface, asphalt carpet.

Axle load: The sum of all tire loads on an axle

Base: layer of specified or select material of designed thickness placed on a subbase or subgrade to support a surface course or binder.

Backcalculation: A mathematical methodology for estimating mechanical properties of pavement materials and layers from the results of pavement deflection tests.

Bill of Quantities means the priced and completed Bill of Quantities forming part of the Contractor's Bid.

CBR: California Bearing Ratio. Bearing capacity of one material compared with a standard well-graded crush stone.

Contracting Entity; (CE); The Contractor: Any combination of companies that has inter-alia Construction capabilities, Design capabilities., It is emphasized that the Design capabilities shall be provided by an experienced, Consultancy firm, which is one of the companies which form the CE, and **not** by a Design Unit that is an integral part of any of the companies forming the CE.

Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.

Contract Price is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

Days are calendar days; **months** are calendar months.

Deflection: Vertical deformation of a pavement under an applied load.

Design life of pavement: The length of time for which a pavement structure is being designed.

Drawings include calculations and other information provided by the Contractor for the execution of the Contract.

Engineering, Procurement and Construction (EPC): It is a common form of contracting arrangement within the construction industry. Under an EPC contract, the contractor will design the installation, procure the necessary materials and construct it.

Employer is the party who employs the Contractor to carry out the Works and Services.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works and to carry out the Services.

Equivalent Single Axle Load (ESAL): A numerical factor that expresses the relationship of a given axle load to another axle load in terms of the relative effects of the two loads on the serviceability of a pavement structure. Often expressed in terms of 18 kips (8.2 tons) single axle loads.

Falling Weight Deflectometer (FWD): Non destructive equipment used to measure the deflection bowl or basin of a given pavement structure. Indicator of the structural condition of the road.

GDP: Gross Domestic Product - a basic measure of an economy's economic performance, is the market value of all final goods and services made within the borders of a nation in a year

International Roughness Index (IRI): A pavement roughness index computed from a longitudinal profile measurement.

Intervention (type): The type of intervention to be carried out on a road section, based on the current condition (structural and functional).

Lane distribution factor: A factor describing the percentage (of traffic in one direction) of a given vehicle class using a given lane.

Lifespan: Period of time during which something is functional, referred as the period of the project.

Milestone: is the end of a stage that marks the completion of a work package or phase

Net Present Value (NPV): indicator that compares the value of Employer's payments undertaken at different schedules for different business models.

Overlay: a layer placed on top of an existing pavement structure to improve their performance and strength.

Pavement condition: A quantitative representation of pavement distress at a given point in time.

Pavement performance: Measure of accumulated service provided by a pavement. Often referred to the record of pavement condition or serviceability over time or with accumulated traffic.

Pavement rehabilitation: Works undertaken to extend the service life of an existing facility. This includes placement of additional surfacing material and/or other work necessary to return an existing roadway, including shoulders, to a condition of structural or functional adequacy. This could include the complete removal and replacement of a portion of the pavement structure.

Pavement structure: A combination of subbase, base course, and surface course placed on a subgrade to support the traffic load and distribute it to the roadbed.

Performance Period: Period of time that an initial pavement structure will last before it needs rehabilitation.

Periodic Payment Report: The report prepared by Contracting Entity specifying their entitlements and substantiated payments

Project Internal Rate of Return (PIRR): Represents the yield of the project regardless of the financing structure.

Present serviceability Index (PSI): An index derived by formula for estimating the serviceability rating from measurements of physical features of the pavement.

Project Manager is the person named in the PC who is responsible for the overall administration of the Contract on behalf of the Employer, and the supervision of works and services to be performed there under. The Project Manager may delegate through a written instrument some of his functions to any other competent person, retaining however the overall responsibility for the actions of that person. The Project Manager may not delegate the overall administrative control of the Contract.

Reliability: The probability that serviceability will be maintained at adequate levels from a user's point of view, throughout the design life of the road. Probability that a pavement section designed using the process will perform satisfactorily over the traffic and environmental conditions for the performance period.

Rehabilitation: The act of restoring a pavement to a former condition.

Rehabilitation Works are specific and clearly defined civil works the Contractor is required to carry out under the conditions of the Contract, as defined in the Specifications.

Resilient Modulus: Modulus of Elasticity that represents the resistance of one material to deformation under load.

Right of Way: Land authorized to be used or occupied for the construction, operations, maintenance, and termination of a project or facility passing over, under, or through such land.

Roadbed: The graded portion of a highway between top and side slopes, prepared as a foundation for the pavement structure and shoulder.

Road means the road or network of roads for which the Works and Services are contracted under the Contract

Road Management Office is the location indicated by the Contractor from which the Road Manager operates, and where the Contractor shall receive notifications.

Road Manager is a person appointed by the Contractor who is in charge of managing all activities of the Contractor under the Contract. He is also the Contractor's Representative for the purposes of this contract.

Road Section: Minimum portion of the total length of the road to measure level of service for approval and payments purposes.

Road Surface Profiler (RSP): Equipment Class 1 measuring the IRI.

Service Levels are the minimum performance standards for the level of quality of conditions of the Road defined in the Specifications which the Contractor shall comply with.

Serviceability: It is the ability of the pavement to serve the type of traffic which uses the facility during the performance period.

Structural number: represents the strength of a pavement structure or a layer.

Specifications means the Specifications of the Works and Services included in the Contract and any modification or addition made or approved by the Project Manager.

Subbase: The layer or layers of specified or selected materials of designed thickness placed on a subgrade to support a base course.

Subcontractor is a person or corporate body who has a contractual agreement with the Contractor to carry out certain activities related to the services to be provided under the contract, which may include work on the Site.

Subgrade: the top surface of a roadbed upon which the pavement structure and shoulders are constructed.

Traffic growth factor: A factor used to describe the annual growth rate of traffic volume on a roadway.

World Bank: Referred to the World Bank Group. International financial institution that provides credits, loans and grants.

PART A1: BASIC CONCEPT OF OUTPUT AND PERFORMANCE BASED ROAD CONTRACTS.

INTRODUCTION PREFACE: Output- and Performance Based Contracting for Roads:

This introductory preface summarizes the concept of **Performance Based Contracts (PBC)**. For legal and contractual purposes the text of the main body of this Specification (the General Specification and the Particular Specification which follow) is binding and takes precedence over this preface in the event of any discrepancy between the two.

Output- and Performance-based contracting for Roads is designed to increase the efficiency and effectiveness of road asset management and maintenance. It should ensure that the physical condition of the roads under contract is adequate for the needs of road users, over the entire period of the contract which is normally several years. This type of contract significantly expands the role of the private sector, from the simple execution of works to the management and conservation of road assets.

In traditional road construction and maintenance contracts, the Contractor is responsible for the execution of works which are normally defined by the Road Administration or the Employer, and the Contractor is paid on the basis of unit prices for different work items, i.e. a contract based on "inputs" to the works. The results of traditional road contracts are in many cases less-than-optimal. The problem is that the Contractor has the wrong incentive, which is to carry out the maximum amount of works, in order to maximize his turnover and profits. Even if the work is carried out according to plan and considerable amount of money is spent, the overall service quality for the road user depends on the quality of the design given to the Contractor who is not accountable for it. In many cases the roads do not last as long as they should because of deficiencies in the original design, aggravated by inadequate maintenance.

The OPRC as a model for road asset management is similar to Design, Build, Maintain, Operate and Take-Over (DBMOT) model of contracts which addresses the issue of inadequate incentives. During the bidding process, contractors compete among each other by essentially proposing fixed lump-sum prices for bringing the road to a certain service level and then maintaining it at that level for a relatively long period. It is important to understand that contractors are not paid directly for "inputs" or physical works (which they will undoubtedly have to carry out), but for achieving specified Service Levels, i.e., the Rehabilitation of the road to pre-defined standards, the maintenance service of ensuring certain Service Levels on the roads under contract, and specific improvements, all represented in outputs or outcomes, expressed in Service-Levels criteria. A lump-sum periodic remuneration paid to the Contractor will cover all physical and non-physical services provided by the Contractor, except for unforeseen emergency works which are remunerated separately. In order to be entitled to these periodic payments, the Contractor must ensure that the roads under contract comply with the Service Levels which have been specified in the bidding document. It is possible that during some months he will have to carry out a rather large amount of physical works in order to comply with the required Service Levels and very little work during other months. However, his periodic payment remains the same as long as the required Service Levels are complied with.

A fundamental feature of the OPRC is that the "Contractor" must not necessarily be a traditional works contractor, but can be any type of firm or business venture "Contractor" having the necessary technical, managerial and financial capacity to fulfil the contract. In any case, the

contractor is responsible for designing and carrying out the works, services and actions he believes are necessary in order to achieve and maintain the Service Levels stated in the contract. The Service Levels are defined from a road user's perspective and from a "strength of the pavement" point of view and may include factors such as riding comfort, safety features, residual strength of pavement, etc. If the Service Level is not achieved in any given month, the payment for that month may be reduced or even suspended.

Under the OPRC, the Contractor has a strong financial incentive to be both efficient and effective whenever he undertakes work. In order to maximize profits, he must reduce his activities to the smallest possible volume of well-designed interventions, which nevertheless ensure that pre-defined indicators of Service Level are achieved and maintained over time. This type of contract makes it necessary for the Contractor to have a good management capacity. Here, "management" means the capability to define, optimize and carry out on a timely basis the physical interventions which are needed in the short, medium and long term, in order to guarantee that the roads remain above the agreed Service Levels. In other words, within the contract limitations and those required to comply with local legislation, technical and performance specifications and environmental and social regulations, the Contractor is entitled to independently define (within the limits indicated in the schedule of payment): (i) what to do, (ii) where to do it, (iii) how to do it, and (iv) when to do it. The role of the Road Administration and of the Employer is to enforce the contract by verifying compliance with the agreed Service Levels and with all applicable legislation and regulations. The Contractor will be responsible for the detailed design of the rehabilitation and other consequent phases included in the life-span of the project (the Contractor is not entitled to any payment for the design). The Design Standards and specifications shall be recommended by the Project Manager and the Contractor's design shall meet at least the minimum specified design standards The bidder can propose higher standards if it better serves his optimal Programming for the project period and the need to meet specified handover standards at the end of the project.

The project management triangle is composed of the Employer, Contractor and the Project Manager from the Monitoring Consultant. In order to guarantee the success of the OPRC project the Employer will select a qualified and experienced Monitoring Consultant to monitor/supervise the project as a Project Managing entity.

In the specific case of this Contract the maintenance aspect of a typical OPRC Contract is not included.

Road conditions and Service Levels are defined through output and performance measures, and these are used under the OPRC to define and measure the desired performance of the Contractor. In the OPRC, the defined performance measures are thus the accepted thresholds for the quality levels of the roads for which the Contractor is responsible.

The performance criteria should cover all aspects of the contract, and be clearly defined and objectively measurable. Criteria can be as as outlined below:

Road Service Level measures, which can be expressed in terms such as:

- Road Roughness
- Road and lane width
- Longitudinal and cross profiles
- Pavement strength
- Rutting

- Skid resistance
- Vegetation control
- Visibility of road signs and markings
- Availability of each lane-km for use by traffic
- Drainage systems

Some emergency works arealso foreseen under this contract, which mean to remedy unexpected damage which occurs as a result of extraordinary natural phenomena, and which affect the normal use of the road network, or the safety and security of the users. For emergency works, the contract limits the responsibility of the Contractor, establishing that the Employer will approve execution of services and separate remuneration based on specific work order issued by a Project Manager for each case, on the basis of volume of works estimated at each time and on unit prices included in the bid and in the contract.

The key stakeholders in the OPRC Contract are the Employer, the Contractor and the Project Manager. Their essential roles and responsibilities and the basic requirements for communication among them are presented below. In addition to these three key stakeholders in the contract there are other important stakeholders in the project as a whole; principally the general public but also those concerned with environmental and social issues arising from the project and from the works.

The general major roles and responsibilities of the Key Stakeholders are listed below. However, the actual performance and duties of these entities in any specific case is governed by the terms and conditions of the contract.

The Employer shall:

ii) Provide a governance role in setting standards and procedures that will protect the long term integrity of the network and the Road Reserve (also known as Right of Way)

iii) Confirm the name of the Project Manager

iv) Notify the extent to which the Project Manager is empowered to act for the Employer

v) Administer the contract including the issuance of necessary instructions and certificates in an efficient and timely manner including the confirmation of any time extensions granted.

vi) Make payment to the Contractor on all certified payment requests within the required time frames

vii) Minimize barriers to effective communication with the Contractor

viii) Communicate all contractual matters and decisions to the Contractor in writing as quickly and efficiently as possible.

ix) Support the Contractor in fulfilling the objectives of the OPRC model and encourage his development and experience with performance based road contract

x) Facilitate a cooperative and trusting contractual environment with the Contractor and facilitate the Contractor’s interaction and liaison with other line departments of the Government of Georgia and the Roads Department.

xi) Confirm the evaluation of the Contractor’s performance at the required frequencies.

The Contractor shall:

i) Perform all necessary engineering surveys and investigations necessary to deliver the contract works.

ii) Prepare all required detailed engineering designs and working drawings for all of the improvement/rehabilittion components of the contract including associated Environment, Health, Safety and Social Management Plans and drainage studies as necessary.

iii) Execute all the Works necessary to bring the roads to the required service levelsrespecting the relevant plans, procedures, specifications, drawings, codes and any other documents as specified in the Specifications.

iv) Develop, implement, and manage systems and procedures that:

- Ensure all performance criteria are met.
- Demonstrate physical works conformance including the achievement of minimum design standards post construction and the implementation of appropriate corrective actions.

v) Complete all work, including the rework of any defects or failures resulting from material, construction, workmanship or quality issues under the control of the Contractor, required to maintain the condition of the Contracts assets within the lump sum price for the duration of this contract.

The Monitoring Consultant shall act as the Project Manager as defined in and required by this Contract. The Project Manager, in accordance with the devolvement of powers agreed with the Employer, and communicated to the Contractor, shall:

i) In general, be responsible, on the Employer's behalf, for

- Reviewing and commenting/approving the Contractor's designs for the improvement/construction works
- Monitoring the Contractor's execution of the works, ensuring, through observation and testing that the works conform to the specified requirements
    - Review and comment/approve the Contractor's Programs and required Plans, including those dealing with Quality Control, Traffic Management, Health and Safety, and Data Acquisition and management

ii) Check presence of the required licenses and permits in the possession of Contractor.

iii) Audit the systems, procedures and records of the Contractor to ensure sufficient inspections, tests, etc. are being completed to enable the achievement of the Performance Requirements.

iv) Certify the Completion of discrete lengths of improved/constructed road and certify relevant payment.

v) Where appropriate issue instructions to the Contractor on behalf of the Employer.

vi) Monitor and value any required Emergency Works

vii) Supervise the Contractor's execution of longer term test programmes including FWD and roughness.

viii) Supervise the Contractor's compilation of road data for submission to RD

PART A2: DESCRIPTION OF SERVICES TO BE PROVIDED

1. SCOPE OF SERVICES TO BE PROVIDED

Notwithstanding the provisions of Clause 7 of the contract, the services to be provided by the Contractor include all activities, physical or others, which the Contractor needs to, carry out, in order to comply with the Service Levels and other output and performance criteria indicated under the contract, or with any other requirements of the contract. In particular, they include management tasks and physical works associated with the following road-related assets and items:

- Pavements (paved roads)
- Shoulders
- Signaling and road safety furniture
- Bridges
- Drainage structures
- Vegetation control
- Slopes (cuts and embankments)
- Retaining structures
- Rock Fall Protection
- Traffic Management

2. DESCRIPTION OF THE PROJECT AREA

Background
Improvement of the secondary and local road networks is important for regional integration and poverty reduction. Roads are the lifeline of the economic activities of most Georgians and a reliable transport network is needed to stimulate both the industry and tourism, and to reduce poverty in the rural area.

Geographical location
Georgia is located in the south of the Caucasus region and borders with Russia in the north, Azerbaijan in the south-east, Armenia in the south, Turkey in the south-west and the Back Sea in the west. Georgia has an area of 69,700 square kilometers. Two thirds of Georgian territory is occupied by mountains. The rugged Caucasus Mountains stretch across the northern third, while central and south, the Lesser Caucasus Mountains dominate the landscape.

The Khidistavi-Ateni-Boshuri road section from km 12.4 to km 22.5 is located within Gori Municipality of ShidaKartli Region,Eastern Georgia, on the right bank of river Tana, at the northern slope of the Trialeti Range.

The Khidistavi – Ateni-Boshuri road connects the densely populated villages with the central highway and the regional center. There are several historic monuments on this section of the road, including the Sioni Cathedral of Ateni, one of the important places of visit by many pilgrims.

Climate
Georgian's climate is affected by subtropical influences from the west and Mediterranean influences from the east. The Greater Caucasus Range moderates local climate by serving as a barrier against cold air from the north. Georgia covers different climatic zones, which are determined by distance from the Black Sea and by altitude. The climatic zones are ranging from

humid subtropical to the eternal snow and glaciers. The country experiences severe winters from November to April at higher altitudes and December to March at lower altitudes.

Information of climate condition is based on meteorological station data of Gpro. The data are obtained by construction climatologically standard (pn 01.05-08).

According to climate regionalization map of Georgia the region belongs to II climatic and II-b sub-region. Average temperature in January is from -5^0 to -2^0 but average temperature in July ranges between $+21^0$C and $+25^0$C.

In the following tables the average temperatures during the year for each month are shown as well as maximum and minimum values for the hottest and coldest periods.

Table1, Average monthly temperatures

Month												Year Average
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
-1.2	0.2	4.8	10.3	15.7	19.1	22.2	22.3	18.0	12.3	6.0	0.9	10.9

Table 2, Minimum and maximum Temperatures

Absolute Minimum	Absolute Maximum	Average Maximum of the Hottest Month	Average of the Coldest 5-Day Period	Average of the Coldest Day	Average of the Coldest Period	Average Temperature at 1 p.m	
						The Coldest Month	The Hottest Month
-28	40	28.7	-12	-16	-1.3	1.6	27.2

Other key climateindicators are as follows:

- Quantity of atmosphere precipitation average per year:518 mm;
- Maximum amount of Precipitation a day: 71 mm;
- Number of days with snow cover: 34.
- Wind pressure normative value w0 once in 5 years is 0.30kpa;
- Wind pressure normative value w0 once in 15 years is 0.25kpa.
- Wind with 19m/sec velocity :once a year;
- Wind with 23m/sec velocity :once in 5 years;
- Wind with 24m/sec velocity :once in 10 years;
- Wind with 25m/sec velocity :once in 15 years;
- Wind with 25m/sec velocity :once in 20 years.

Geological Overview of the Project Area

Along the study road area the engineering-geological conditions are almost homogeneous and the relief surface is wavy-steppy.

At the village Khidistavi, along the left bank of the river Tana, the road turns to the south. Initially the road passes a wider part of the ravine, built mostly by alluvial formations; Middle and Upper Oligocene brown Maykop-type clay outcrop on both sides of the road. Lower Oligocene brownish-grey clay and sandstone, rarely micro-conglomerate, outcrop at the village Jebiri.

The psammitic fraction increases at the top, the upper part of the cross-section is built by 60m of grey-yellowish, middle and thick-bedded various grain size, carbonic and poorly carbonic quartz feldspatic, hard sandstone (Jebiri construction sandstone), rich in plant remnant. These rocks create an asymmetric hillock of sublatitudinal direction perpendicular to the gorge. Total thickness of the lower Oligocene is 150m. The borderline is between the Oligocene and Upper Eocene is visible to the south, at the village Gardatena, but cannot be seen from the road.

The Upper Eocene outcrops are on both sides of the gorge, where they make at some places quite high cornices. At the village PataraAteni, the upper part of the section is characterized by interbedding of grey-brown, sometimes gypsum-bearing carbonic clay and arkose and quartz feldspatic sandstone to the west from the village PataraAteni (left side of gorge).

The Middle Eocene outcrops exist on both sides of the gorge. The middle Eocene is characterized by bedded volcanic-sedimentary formation: crystallo-clastic, litho-clastic and vitrophyric tuff of andesite-basalt content, tuffaceousbreccias, tuffaceous sandstone and tuffaceous mudstone, which are intensely zeolitized and chloritised and fractured.

According to seismic regionalization scheme of Georgia the investigated area (3684) is located in 8 scale (MSK64) seismic region, un-dimensioned coefficient of seismicity A is 0.20 (Construction Norms and Rules "Seismic Resistance Construction" – pn 01.01-09).

Hydrology

The project road section runs through the river Tana gorge in Gori municipality, Shida Kartli. The project road section is crossed by 44 watercourses and one local (small) irrigation channel. Out of the rivers and gorges crossing the rehabilitation road, the river Tana is the biggest one. The brief hydrographic description of the river Tana is given below.

The river Tana heads at 2075 m altitude, 3 km north-east of mountain Murknevi (2340), on the northern slope of Trialeti Ridge and flows into the river Mtkvari from its right side, at village Khidistavi, at the altitude of 570 m. The total length of the river is 39 km, its total fall is 1505 m, its mean slope is 38,6‰; the area of its catch basin is 382 km^2 and the average altitude of the basin is 1400 m. The river is flown by 68 tributaries of different ranges with the total length of 205 km. Its largest tributaries are the Tusrebi (with the length of 7 km), the Balavnistskali (with the length of 11 km), the Tkhinala (with the length of 10 km), the Vera (with the length of 13 km), and a nameless tributary (with the length of 20 km). Other tributaries are insignificant.

The asymmetrical basin of the river is situated on the northern slopes of Trialeti ridge and is intensely dissected with deeply cut gorges of the river tributaries. The levels of the basin watersheds in the upper zone vary from 1500 to 2200 m altitude and elevate to 500-800 m from the bottom of the gorge. Past village Ateni, the relief of the basin is hilly and has relatively smoother contours. Nearly 13% of the basin is located in the high-mountainous area, 82% of it is located in the piedmont zone and only 5% of the basin is located at the elevations less than 800 m.

3. DESCRIPTION OF THE PROJECT ROAD

The Khidistavi-Ateni-Boshuri road section from km 12.4 to km 22.5 (project chainage 0+000 – 10+010) is located within Gori Municipality of ShidaKartli Region,Eastern Georgia, on the right bank of river Tana, at the northern slope of the Trialeti Range. The Khidistavi-Ateni-Boshuri road section is a two lane, one carriageway road with a deteriorated asphalt-concrete surface in fair to poor condition, locally deteriorated to a gravel surface. The existing pavement width varies between 6.00m and 7.00m.

There are four bridges along the study road section. Existing bridges are one span structures with a maximum span length of 21 m.

At several locations erosion by surface water is continuing and has already damaged the left side of the road. For the reinstatement of the full road width and to prevent further erosion the construction of retaining structures are required. The provision of adequate roadside drains to collect and channel surface water is of great importance.

On the right side of the road, high slopes cut into the hillside consisting of mainly weathered rock like material are posing a permanent danger to the road users due to stone and rock fall. The peak of rock fall is observed following and during heavy rains and snow melt, but rock fall is expected also during dry seasons also less frequent. To avoid danger to the road user protective measures are proposed. The installation of wire netting at selected locations will prevent stones and rock fragments falling onto the road.

Locally at a few places, hill side slopes are formed by conglomerate or soil. The inclination of these slopes is with some exception gentler than the rock slopes and simple cutting back will be the preferred solution as not sliding or other destabilizing factors have been observed or reported.

Along the total length the study road has an asphalt surface with a fair to poor condition, locally deteriorated to a gravel surface. The thickness of the asphalt has been recorded during trial pit excavations to about 100mm. At two locations of the study road section an asphalt layer in greater depth below a granular surface layer has been encountered. It is assumed that this asphalt is the surface layer of the original pavement.

Along the study road section of the road Khidistavi-Ateni-Boshuri no granular material layer, which could be considered as base course, has been found. The asphalt pavement has been constructed direct on the cohesive subgrade material.

The subgrade along this road section consists in for the road construction relevant depth of gravelly sandy clay.

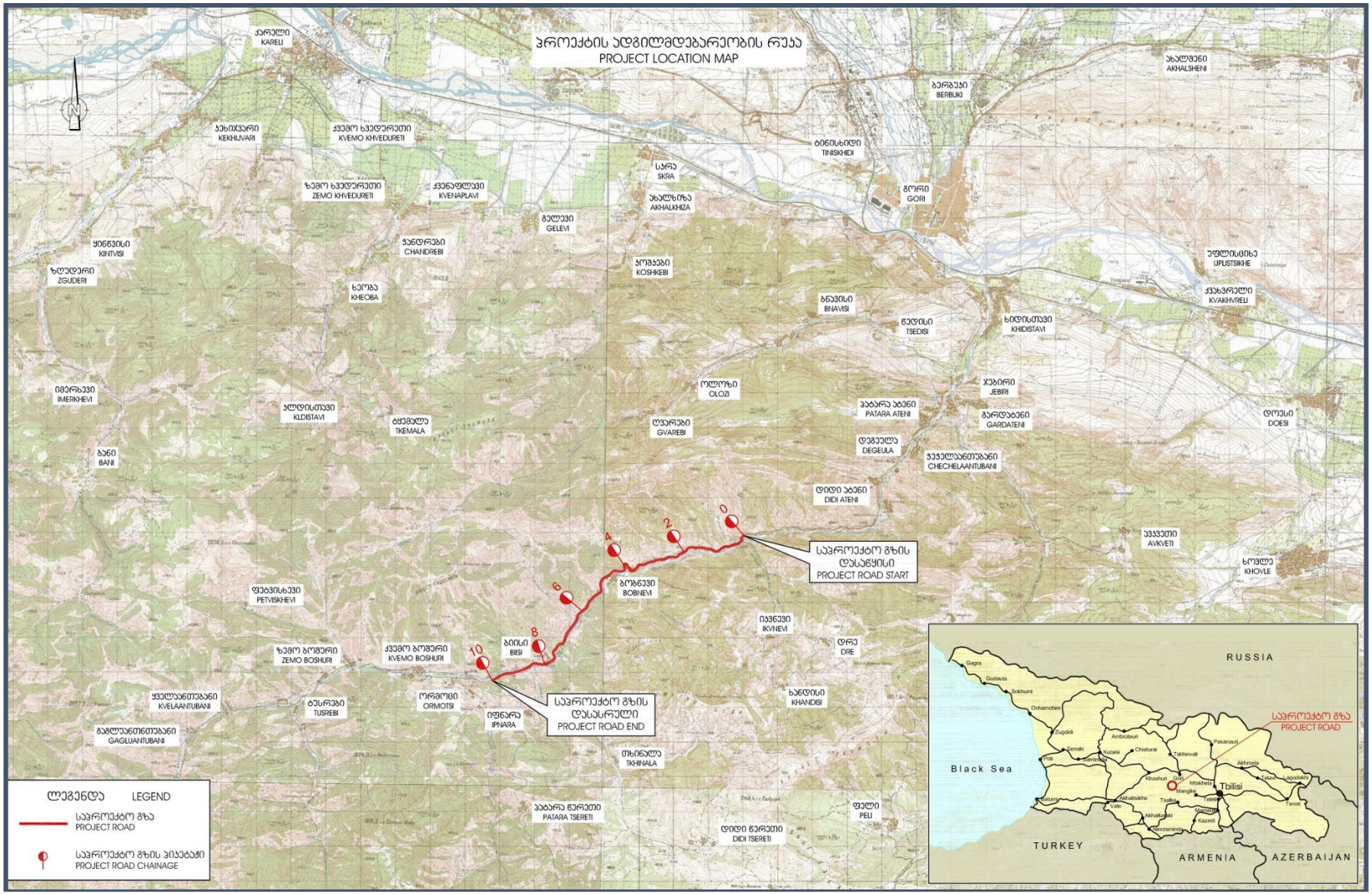


Figure 1, Loction of the Khidistavi – Ateni – Boshuri Road Section from km 12.4 – km 22.5(Project Chainage 0+000 – 10+010) included in this bid

4. CONCEPTUAL DESIGN

The conceptual design of the Khidistavi-Ateni-Boshuri road section from km 12.4 to km 22.5 (project chainage 0+000 – 10+010) is described in the Design Report of the Khidistavi-Ateni-BoshuriRoad Rehabilitation and the corresponding conceptual design drawings are presented in Annex A and B.These documents are only for information purposes and are not part of the bid.

The preliminary road design is carried out considering following design philosophy:

- The porpose of the project is the rehabilitation of the existing carriageway. The alignment therefore follows the existing road.

- The standards to be applied will follow the Georgian geometric design standard for the selected design speed of 40 km/h, with some flexibility in application when the strict application of the standards would result in an excessively costly technical solution.

- In order to avoid environmental problems that arise when land taking is required any road realignments will be limited to what can be achieved within the existing road corridor.

- In general the design follows the existing alignment wherever possible and considers the existing structures. Where the existing alignment does not correspond to the proposed parameters, certain improvements depending on topography, build-up areas and structures are consider.

- The design will result in a cost effective construction, considering the low traffic volumes on the road and the economic viability of the design.

The horizontal alignment follows the existing road with minor alignment improvements within the existing right-of-way.

The vertical design follows the exiting alignment but allows an increase in the road elevation to accommodate additional pavement layers where possible to minimise the quantities for removal of existing embankment material.

Along the project road section minor roads join the main road. These side road connections are, in general, unregulated with no road marking and little signing. This minor junction has to been furnished with adequate marking and traffic signs for safety of the road user.

Road Section Propsed

The recommendation is given taking into account:

- Major rehabilitation works to be executed: The current condition of three roads requires rehabilitation works on all corridors based also in the importance of them.

- Creation of contiguous and consistent road network. All roads require works at different levels but all of them are rehabilitation works.

- Sources available to finance OPRC

- Capacity of the local industry and responsiveness of international contracting industry.

The road sections recommended consists of

Number of lanes:	2
Lane width:	3.00 m
Carriageway width:	6.00 m
Width of shoulder:	1.00 m
Total road width:	**8.00 m**

In areas where a concrete drainage side drain is located directly at the paved carriageway, the shoulder width will be reduced to 0.65 m.

Detailed Design Requirements

Design and construction of the rehabilitated road shall provide for a service life of at least 20 years from completion of the construction works.

The Contractor is solely responsible for completing the detailed design of the required Rehabilitation / Improvement Works in accordance with the intent of the Contract and the scope of the Conceptual Design. This includes, where necessary, the detailed pavement design and the design of all associated embankment, culverts, bridges, intersections, drainage and all ancillary works such as barriers, road signs and pavement markings.

It is Contractor's responsibility to make assessment of existing traffic, including Origin Destination Survey to estimate diverted traffic potential (on current roads which are open for traffic) and provide reasoned forecasts of pavement loadings during service life of project road section. These data will form the basis for Contractor's pavement designs.

The road shall comply with the Geometrical and Structural requirements of the Georgian National Standard for Public Roads and/or any international standards as applicable with some flexibility in application when the strict application of the standards would result in an excessively costly technical solution. Each case of slight deviation from the above standards should be agreed upon in advance with the Project Manager and the Employer on the Detailed Design stage of the Contract.

The Contractor is required to explore and recommend the most appropriate pavement design to provide the required outcome of best advantage to the Employer, the Road User and the Contractor in terms of performance, construction and lifecycle costs and/or environmental considerations. The design shall provide a road cross-section to comply with the outline conceptual design.

5. INDICATIVE QUANTITIES

The bid includes the Bills of Quantities, which specify the payments over the lifespan project for all activities in the Contract

The Bidder should summarize his total costs in the Letter of Bid (including any applicable taxes).

The Bidders should note that below quantities are preliminary estimates and they should only be used as indicative amounts for calculation of the Bid Price. The Bid Price should be presented as described in the Bidding Documents and below qunatities **SHOULD NOT** be priced by the Bidders. The Bidders should make their own estimations about the exact quantities and the whole responsibility for preparation of the Bid Price lies solely with the Bidders.

Item	Work Description	Unit	Quantity
100	**Preparatory Works**		
101	Setting up of road alignment	km	10
102	General clearing of the area along the existing road sections from trees (with trunk diameters of 80mm), scrubs and other waste	Ha	3
103	Cutting trees within Right of Way		
103.1	Cutting of big trees (D>240mm)	Item	2
103.2	Cutting of medium trees (160mm < D ≤ 240mm)	Item	8
103.3	Cutting of small trees (80mm < D ≤ 160 mm	Item	71
104	Dismantling/demolishing of circular and box culverts, including headwalls, wing walls, segments, manholes, etc.		
104.1	Dismantling/demolishing of the existing culvert headwalls	m3	192.455
104.2	Dismantling/demolishing of the existing culvert barrels	m3	78.378
104.3	Removing of the existing gabion walls, and storing of the stone material for subsequent use	m3	66
105	Removing of the existing concrete walls		
105.1	Demolishing/dismantling of the existing r/c walls with total length of L=227m and height of H=3.8m (0+475 - 0+533; 0+925 - 0+966; 1+492 - 1+528; 4+122 - 1+528; 4+122 - 4+144; 4+205 - 4+285; 5+353 - 5+371)	m3	543
200	**Earthworks**		
201	Removing and stockpiling of humus soil layer	m3	1500
202	Open cut excavation in Category III Group 8G soils and moving of the excavated material to the fill zone	m3	2897
203	Open cut excavation in Category III Group 8G soils and moving of the excavated material to the dump site	m3	27371
204	Open cut excavation in Category III Group 28G soils and moving of the excavated material to the dump site	m3	5420
205	Spreading of the stockpiled humus soil over road sides	m3	1500
300	**Pavement**		
301	Milling off the existing damaged asphalt concrete pavement and storing of the removed material	m3	1000
302	Placement of the sand and gravel mixture subbase over the roadbed	m3	1644
303	Placement of the lower base course layer with thickness of 150mm using sand and gravel material	m3	12070
304	Placement of 140mm thick stabilized upper base course layer by mixture composed of about 4% cement, 2% bitumen emulsion, 10,270 m3 of the imported crush stone (0-40 mm) and in-situ milled material (1000 m3)	m3	10518.66667
305	Spraying of the bitumen over base surface	t	47.3

Item	Work Description	Unit	Quantity
306	Placement of 50mm thick wearing course using the mixture of dense rubbly asphalt concrete, Type B, Class II	m2	67511
307	Placement of the soft shoulders using sand and gravel mixture	m3	3070
400	**Drainage**		
	Culverts		
401	Earthworks for culverts		
401.1	Soil excavation for installation of culverts	m3	8356.5
401.1	Backfilling and compacting in layers around culverts	m3	5334.4
402	Placement of sand and gravel bedding under the new pipe and box culverts	m3	448.75
403	Placement and compacting of crush stone base course under headwalls and wing walls of culverts	m3	220.44
404	Supply to site and installation of the precast r/c pipe culverts including ancillary works		
404.1	Single barrel, circular, reinforced concrete culvert pipes with diameters of D=1000mm (Total volume: 132.3 m3)	m	315
404.2	Single barrel, circular, reinforced concrete culvert pipes with diameters of D=15000mm (Total volume: 89.76 m3)	m	102
405	Construction of r/c headwalls for D=1000mm and D=1500mm r/c culverts		
405.1	Construction of r/c headwalls for D=1000mm culverts (Total volume: 122.4 m3)	Item	51
405.2	Construction of r/c headwalls for D=1500mm single barrel culverts (Total volume: 49.2 m3)	Item	12
405.3	Construction of r/c headwalls for D=1500mm double barrel culverts (Total volume: 22.9 m3)	Item	12
405.4	Construction of r/c inlet chambers for D=1000mm culverts (Total volume:67.6 m3)	Item	13
406	Supply to site and installation of precast r/c box culverts, including provision of all ancillary works		
406.1	Supply to site and installation of single barrel r/c box culvert sections; Dimensions: 2.0m x 2.0m (Total volume 22.5 m3)	m	10
406.2	Supply to site and installation of double barrel r/c box culvert sections; Dimensions: 3.0m x 2.0m (Total Volume: 195.6 m3)	m	60
407	Construction of r/c headwalls for box culverts		
407.1	In situ casting of r/c headwalls for single barrel r/c box culverts; Dimensions: 2.0m x 2.0m (Total Volume: 10.52 m3)	Item	2
408	In situ casting of r/c headwalls for double barrel r/c box culverts; Dimensions: 3.0m x 2.0m (Total Volume: 35.46 m3)	Item	4
409	In situ placement of C 30/37 grade reinforced concrete for extending existing culverts	m3	93.5
410	Placement of riprap at culverts	m3	356.4
411	Installation of New-Jersey Barriers on the top of culverts (Total Volume: 130 m3)	Item	188
412	In-situ placement of concrete for installation of footing slab for box culverts	m3	145.216
413	Placement of lean concrete filler between D=1500 barrels of double box culverts	m3	27
414	Construction of V-shaped r/c side ditches		
414.1	Placement of sand and gravel bedding	m3	342.8
414.2	Placement of lean concrete (C 8/10) under concrete ditches	m3	599.9
414.3	Supply to site and installation of precast concrete side ditches (Total Concrete Volume: 1,045.54 m3)	m	8570
500	**Construction of Road Junctions and Private Driveways**		
	Construction of junctions		
501	Mechanical pit excavation and in situ spreading of the excavated soil	m3	85.008
502	Manual pit excavation and in situ spreading of the excavating soil	m3	8.5008

Item	Work Description	Unit	Quantity
503	Supply to junction sites and installation of steel drainage pipes (D=400 mm)		
503.1	Placement of sand and gravel bedding under steel pipes	m3	9.8
503.2	Supply to site and installation of steel pipes (D=500 mm)	m	14
503.3	Application of two coats of waterproofing material	m2	21.98
503.4	Construction of rubble concrete headwalls	m3	0.72
503.5	Backfilling and compacting sandy and gravelly soil around pipe	m3	5.6
504	Construction of pavement for junctions		
504.1	Placement of upper (adjustment) layer of sand and gravel mixture above base course existing on the paving area of the junction	m3	51.0048
504.2	Placement and compacting lower layer of sand and gravel base course (h=150 mm)	m2	1700.16
504.3	Spraying of bitumen on the base course	t	1.08192
504.4	Placement of 140mm thick stabilized upper base course layer by mixture composed of imported crush stone (0-40 mm), about 4% cement, 2% bitumen emulsion	m2	1545.6
504.5	Spraying of bitumen	t	0.3864
504.6	Placement of upper wearing course by hot mix of fine grained dense rubbly asphalt concrete, Type B, Grade II, Thickness: 50 mm	m2	1288
504.7	Laying soft shoulders at junctions using sand and gravel mixture	m3	22.4
	Construction of driveways		
505	Mechanical pit excavation and in situ levelling of excavated soil	m3	52.7681
506	Manual pit excavation and in situ levelling of excavating soil	m3	5.27681
507	Construction of driveway pavements		
507.1	Placement of sand and gravel subbase layer	m3	37.6915
507.2	Placement and compaction of h=100 mm thick base course by means of sand and gravel mixture	m3	753.83
507.3	Supply, placement and compaction of crushed stone (0-40 mm) with average layer thickness of h=100mm	m2	685.3
507.4	Spraying of bitumen	t	0.4361
507.5	Placement of upper wearing course by hot mix of fine grained dense rubbly asphalt concrete, Type B, Grade II, Thickness: h=50 mm	m2	623
507.6	Aligning of the wearing course by means of crushed stones (Sieve Size: 0-40 mm; Thickness: h=20 cm)	m3	10.64
600	**Retaining Walls**		
	Construction of retaining walls with aggregated length of L=1103m		
601	Excavation and hauling to dump of loamy soil	m3	7936.51
602	Placement of 40-60 mm thick crush stone bedding under the walls	m3	393.11
603	Construction of cast-in-situ r/c retaining wall (Concrete Grade: C28/34 (B30)), including installation of reinforcement, formworks and all ancillary works	m3	1791.31
604	Treatment of the backside surface of r/c wall with bituminous paint	m2	4061.87
605	Installation of drain pipes; D=100mm, Average length: 0.8m (each)	Item	551.5
606	Installation of clay screen, including supply to site and compacting	m3	450.72
607	Supply and placement of granular filtration material for r/c walls	m3	747.43
608	Installation of geotextile between filtration layer and soil	m2	2773.47
609	Installation of the corrugated drain pipe behind r/c wall (D=150mm)	m	1103
610	Filling of the space behind retaining wall by sand/gravel soil	m3	5133.826667
611	Rehabilitation of the existing r/c and concrete walls by means of d=8 mm diameter reinforcement mesh (with clearances of 15cm x 15cm) and shotcreting with average thickness of w=5 cm; Average Height: h=3.2m; Aggregated Length: L=385m (0+677 - 0+714; 1+255 - 1+280; 3+578 - 3+598; 3+979 - 4+022; 4+391 - 4+459; 5+538 - 5+638; 7+946 - 8+046)	m2	1232
700	**Bridges**		
	Rehabilitation Bridge No. 1 located at km 7+596		
701	Preparatory works		

Item	Work Description	Unit	Quantity
701.1	Installation of temporary road signs during carrying out the works, including their subsequent removal and returning to the base	Item	4
701.2	Installation of temporary demountable r/c blocks (barrier curbs, parapets), including subsequent removal and returning to the base	Item	4
702	Bridge rehabilitation		
702.1	Removing of r/c sidewalk blocks with aggregated length of 43m	m3	10.32
702.2	Removing of cantilevered r/c sidewalks and damaged parapets existing on the bridge abutments	m3	7.62
702.3	Removing of r/c railing existing on the bridge deck	m3	1.5015
702.4	Stripping off the pavement existing along bridge approaches and carriageway down to I-girder surface, including removal of the waterproofing layer	m3	27
702.5	Removing of the existing extension joint (2 x 8.40 m)	m	16.8
702.6	Collection of construction debris, manual loading on dump trucks and hauling to dump place	m3	48.0015
703	Construction of R/C sidewalk	m3	20
704	Enforcement of roadside slope at abutments by wire mesh Gabion no. 1		
704.1	Manual soil excavation and spreading excavated material lover embankment of retaining wall	m3	15
704.2	Placement of san/gravel bedding	m3	3.6
704.3	Installation of gabion boxes (1.5m x 1.0m x 1.0m)	Item	8
704.4	Installation of gabion boxes (2.0m x 1.0m x 1.0m)	Item	4
704.5	Filling of gabion boxes with stones	m3	20
704.6	Building up of roadside slope at bridge abutments with imported sandy and gravelly soil	m3	15
705	Enforcement of retaining/training wall located at upstream side of left abutment by wire mesh Gabion No. 2		
705.1	Placement of sand and gravel bedding layer	m3	2
705.2	Installation of gabion boxes (1.5m x 1.0m x 1.0m)	Item	3
705.3	Filling gabion with stones	m3	4.5
705.4	Filling (reinstating) the scoured slope by large rocky boulders	m3	7.5
705.5	Filling (reinstating) the scoured slope by imported sandy/gravely soil	m3	3
706	Protection of retaining training walls existing at the left abutment, upstream of bridge from scouring using large rocky boulders		
706.1	Placement of large rocky boulders with minimum sizes of 0.5-1.0 m	m3	25
707	Rehabilitation of bridge carriageway and sidewalk		
707.1	Installation of the extension joint	m	16.8
707.2	Placement of 2.5% double-sloped concrete layer over carriageway (concrete C 25/30; 148.4 m2)	m3	7.062
707.3	Installation of roll-type adhesive waterproofing membrane on the bridge deck	m2	170.748
707.4	Drilling of 15 cm deep 16 mm diameter holes into the wing of utmost I-girder of superstructure in 0.5 m intervals for anchoring of the protrusions of reinforcement of r/c sidewalk blocks	Item	86
707.5	Anchoring reinforcement; A-III; Æ16mm	t	0.03397
707.6	Installation of foamy rubber primer over utmost I-girders of superstructure and retaining walls of abutments	m	54.8
707.7	Installation of 14 sidewalk blocks (on bedding of sand and gravel mixture) on bridge deck	m3	12.7
707.8	Placement of 40 mm r/c protection layer(C30 concrete) on wire mesh	m2	150.5
707.9	Wire mesh (wire Æ5mm; mesh size: 50 x 50 mm; 150 m2)	t	0.9740661
708	Installation of extension strip of resin-based bituminous mastic between sidewalk block and asphalt layer	m	54.8
708.1	Placement of 7 cm thick asphalt layer over bridge deck using fine-grained dense asphalt concrete	m2	196
708.2	Plastering/shotcreting of damaged surfaces of bridge concrete structures	m2	21
708.3	Concreting of r/c parapets installed along bridge approaches (C-30 concrete)	m3	4.224

Item	Work Description	Unit	Quantity
708.4	Painting of sidewalk blocks, barrier curb and r/c parapets with waterproof paint (in Zebra pattern)	m2	63.04
708	Installation of metal railing on the bridge with total length of 54.80 m		
708.1	Fabrication of metal railing using square tubes, and installation on the bridge deck and abutments; total length: 54.80 m	t	1.675
708.2	Coating of metal railing with corrosion resistant paint	t	1.675
709	Installation of New Jersey type r/c safety barriers along bridge approaches		
709.1	Installation of 3 meter long sections of r/c New Jersey Barriers; 15 items	m3	10.05
710	Clearing of riverbed		
710.1	Clearing of riverbed from grown trees and shrubs	m2	2000
710.2	Clearing of riverbed from deposited soil (moving by bulldozer to towards the bank; 20 m)	m3	250
	Rehabilitation Bridge No. 2 located at km 7+912		
711	Preparatory works		
711.1	Installation of temporary standard road signs during carrying out the works, including their subsequent removal and returning to the base	Item	4
711.2	Installation of temporary demountable r/c blocks (barrier curbs, parapets), including their subsequent removal and returning to the base	Item	4
712	Bridge rehabilitation		
712.1	Removing of r/c sidewalk blocks with aggregated length of 43m	m3	11
712.2	Removing of cantilevered r/c sidewalks and damaged parapets existing on the bridge abutments	m3	7.6208
712.3	Removing of r/c railing existing on the bridge deck	m3	2.31
712.4	Stripping off the road pavement existing along bridge approaches and carriageway down to I-girder surface, including removal of the waterproofing layer	m3	27
712.5	Removal of the existing extension joint (2 x 8.40 m)	m	16.3
712.6	Collection of construction debris, manual loading on dump trucks and hauling to dump place	m3	49.3708
712.7	Dislocation and adjustment with designed metal bridge railing of wooden and wire mesh fence existing at the right abutment	m	20
712.8	Manual soil excavation	m3	3
712.9	Concreting of supporting concrete curbs of the displaced fence and existing fixing metal tubes (C-25)	m3	6
713	Construction of R/C sidewalk	m3	20
714	Rehabilitation of right abutment		
714.1	Clearing of the weathered surface of right abutment from loose concrete	m2	24
714.2	Drilling of 20 cm deep Æ16mm diameter holes into the weathered surface of right abutment in 0.5m x 0.5m spacing pattern for fixing the wire mesh	Item	119
714.3	Anchoring reinforcement, A-III, Æ16mm	t	0.047005
714.4	Wire mesh (wire Æ5mm, mesh size 50 x 50 mm; 24 m2)	t	0.15403836
714.5	Wire mesh reinforced shotcreting of the right abutment with average thickness of 8 cm	m2	24
715	Enforcement of roadside slope at abutments by wire mesh gabions		
715.1	Manual soil excavation and leveling excavated material on the embankment of retaining wall	m3	15
715.2	Placement of sand-and-gravel bedding	m3	3.6
715.3	Installation of gabion boxes (1.5m x 1.0m x 1.0m)	Item	8
715.4	Installation of gabion boxes (2.0m x 1.0m x 1.0m)	Item	4
715.5	Filling of the gabions with stones	m3	20
715.6	Building up of roadside slope at bridge abutments with imported sandy/gravelly soil	m3	15
716	Protection of the upstream side of right abutment and retaining/training wall from scouring using large rocky boulders		
716.1	Placement of large rocky boulders with minimum sizes of 0.5-1.0 m	m3	25
717	Rehabilitation of bridge carriageway and sidewalk		
717.1	Installation of the extension joint	m	16.3

Item	Work Description	Unit	Quantity
717.2	Placement of 2.5% double-sloped concrete layer over carriageway (concrete C 25/30; 148.4 m2)	m3	7.128
717.3	Installation of roll-type adhesive waterproofing membrane on the bridge deck	m2	176.04
717.4	Drilling 15 cm deep 16 mm diameter holes into the wing of I-girder of superstructure with 0.5 m clearance from each other for anchoring of the protrusions of reinforcement of r/c sidewalk blocks	Item	87
717.5	Anchoring reinforcement; A-III; Æ16mm	t	0.034365
717.6	Installation of foamy rubber primer over utmost I-girders of superstructure and retaining walls of abutments	m	54.8
717.7	Installation of 14 sidewalk blocks (on bedding of sand and gravel mixture) on bridge deck	m3	12.7
717.8	Placement of 40 mm r/c protection layer on wire mesh (C30 concrete)	m2	151
717.9	Wire mesh (wire Æ5mm; mesh size: 50 x 50 mm; 151 m2)	t	0.9773022
718	Installation of extension strip of resin-based bituminous mastic between sidewalk block and asphalt layer	m	54.8
718.1	Placement of 7 cm thick asphalt layer over bridge deck using fine-grained dense asphalt concrete	m2	196
718.2	Plastering/shotcreting of damaged spots of bridge concrete structures	m2	15
718.3	Concreting of r/c parapets installed along bridge approaches (C-30 concrete)	m3	4.224
718.4	Painting of sidewalk blocks, barrier curb and r/c parapets with waterproof paint (in Zebra pattern)	m2	63.04
718	Installation of metal railing on the bridge with total length of 54.80 m		
718.1	Fabrication of metal railing using square tubes, and its installation on the bridge deck and abutments; total length: 54.80 m	t	1.675
718.2	Coating of metal railing with corrosion resistant paint	t	1.675
719	Installation of New Jersey type r/c safety barriers along bridge approaches		
719.1	Installation of 3 meter long sections of r/c New Jersey Barriers; 16 items	m3	10.72
720	Clearing of riverbed		
720.1	Clearing of riverbed from grown trees and shrubs	m2	500
720.2	Clearing of riverbed from deposited soil (moving by bulldozer to towards the bank; 20 m)	m3	100
	Rehabilitation Bridge No. 3 located at km 8+253		
721	Preparatory works		
721.1	Installation of temporary standard road signs during carrying out the works, including their subsequent removal and returning to the base	Item	4
721.2	Installation of temporary demountable r/c blocks (parapets), including their subsequent removal and returning to the base	Item	4
722	Bridge rehabilitation		
722.1	Removing of r/c sidewalk blocks with aggregated length of 22.80 m	m3	5.7
722.2	Removing of cantilevered r/c sidewalk and damaged parapets existing on the bridge abutments	m3	7.2743
722.3	Removing of r/c railing existing on the bridge deck	m3	1.7556
722.4	Stripping off the road pavement existing along bridge approaches and carriageway down to I-girder surface, including waterproofing layer	m3	16.38
722.5	Removal of the existing extension joint (2 x 8.40 m)	m	17.2
722.6	Collection of construction debris, manual loading on dump trucks and hauling to dump place	m3	32.5499
723	Construction of R/C sidewalk	m3	19
724	Enforcement of roadside slope at abutments by wire mesh gabion		
724.1	Manual soil excavation and levelling excavated material on the embankment of retaining wall	m3	15
724.2	Placement of sand/gravel bedding layer	m3	3.6
724.3	Installation of gabion boxes (1.5m x 1.0m x 1.0m)	Item	8
724.4	Installation of gabion boxes (2.0m x 1.0m x 1.0m)	Item	4
724.5	Filling of the gabion with stones	m3	20

Item	Work Description	Unit	Quantity
724.6	Building up of roadside slope at bridge abutments with imported sandy and gravelly soil	m3	15
725	Protection of the upstream side of right abutment and retaining/training wall from scouring using large rocky boulders		
725.1	Placement of large rocky boulders with minimum sizes of 0.5-1.0 m	m3	8
726	Rehabilitation of bridge carriageway and sidewalk		
726.1	Installation of the extension joint	Linear m	17.2
726.2	Placement of 2.5% double-sloped concrete layer over carriageway (concrete C 25/30; 149.0 m2)	m3	3.762
726.3	Installation of roll-type adhesive waterproofing membrane on the bridge deck	m2	98.04
726.4	Drilling 15 cm deep 16 mm diameter holes into the wing of utmost I-girder of superstructure with 0.5 m clearance for anchoring of the protrusions of reinforcement of r/c sidewalk blocks	Item	46
726.5	Anchoring reinforcement; A-III; Æ16mm	t	0.01817
726.6	Installation of foamy rubber primer over utmost I-girders of superstructure and retaining walls of abutments	m	21.8
726.7	Installation of 8 sidewalk blocks (on bedding of sand and gravel mixture) on bridge deck	m3	6.8
726.8	Placement of 40 mm r/c protection layer on wire mesh (C30 concrete)	m2	79.8
726.9	Wire mesh (wire Æ5mm; mesh size: 50 x 50 mm; 151 m2)	t	0.517776
727	Installation of extension strip of resin-based bituminous mastic between sidewalk block and asphalt layer	m	21.8
727.1	Placement of 7 cm thick asphalt cover over bridge deck using fine-grained dense asphalt concrete	m2	84
727.2	Plastering/shotcreting of shallow damaged spots of bridge concrete structures	m2	8
727.3	Concreting of r/c parapets installed along bridge approaches (C-30 concrete)	m3	4.224
727.4	Painting of sidewalk blocks, barrier curb and r/c parapets with waterproof paint (in Zebra pattern)	m2	50.88
727	Installation of metal railing on the bridge with total length of 35.50 m		
727.1	Fabrication of metal railing using square tubes, and its installation on the bridge deck and abutments; total length: 54.80 m	t	1.02
727.2	Coating of metal railing with corrosion resistant paint	t	1.02
728	Wire mesh reinforced shotcreting of the existing retaining/training walls		
728.1	Clearing of the weathered surface of right abutment from loose concrete	m2	12
728.2	Drilling of 20 cm deep Æ16mm diameter holes into the weathered surface of right abutment with clearances of 50 x 50 m for fixing wire mesh	Item	24
728.3	Anchoring reinforcement, A-III, Æ16mm	t	0.00948
728.4	Wire mesh (wire Æ5mm, mesh size 50 x 50 mm; 24 m2)	t	0.0776664
728.5	Wire mesh reinforced shotcreting of the right abutment with average thickness of 8 cm	m2	12
729	Installation of New Jersey type r/c blocks along bridge approaches		
729.1	Installation of 3 meter long sections of r/c New Jersey Barriers; 9 items	m3	6.03
730	Clearing of riverbed		
730.1	Clearing of riverbed from deposited soil	m3	20
	Rehabilitation Bridge No. 4 located at km 9+600		
730	Preparatory works		
730.1	Installation of temporary standard road signs during carrying out the works, including their subsequent removal and returning to the base	Item	4
730.2	Installation of temporary demountable r/c blocks (parapets), including their subsequent removal and returning to the base	Item	4
731	Bridge rehabilitation		
731.1	Removing of r/c sidewalk blocks with aggregated length of 43m	m3	10.2
731.2	Removing of cantilevered r/c sidewalk and damaged parapets existing on the bridge abutments	m3	7.8848
731.3	Removing of r/c railing existing on the bridge deck	m3	4.675

Item	Work Description	Unit	Quantity
731.4	Stripping off the road pavement existing along bridge approaches and carriageway down to I-girder surface, including waterproofing layer	m3	27
731.5	Removing the existing extension joint (2 x 8.40 m)	m	16
731.6	Collection of construction debris, manual loading on dump trucks and hauling to dump place	m3	55.5598
732	Construction of R/C sidewalk at left abutment	m3	10
733	Construction of R/C sidewalk at right abutment	m3	10
734	Enforcement of roadside slope at abutments by wire mesh Gabion no. 1		
734.1	Manual soil excavation and levelling excavated material on the embankment of retaining wall	m3	15
734.2	Placement of sand-and-gravel bedding layer	m3	3.6
734.3	Installation of gabion boxes (1.5m x 1.0m x 1.0m)	Item	8
734.4	Installation of gabion boxes (2.0m x 1.0m x 1.0m)	Item	4
734.5	Filling of the gabion with stones	m3	20
734.6	Building up of roadside slope at bridge abutments with imported sandy and gravelly soil	m3	15
735	Protection of embankment located at the left abutment downstream of bridge with wire mesh Gabion No. 2		
735.1	Placement of sand and gravel bedding layer	m3	2.4
735.2	Installation of gabion boxes (1.5m x 1.0m x 1.0m)	Item	8
735.3	Filling gabion with stones	m3	12
735.4	Filling the scoured slope by gravelly soil	m3	40
736	Protection of retaining/training walls existing at the left abutment, upstream of bridge from scouring using large rocky boulders		
736.1	Placement of large rocky boulders with minimum sizes of 0.5-1.0 m	m3	10
737	Rehabilitation of bridge carriageway and sidewalk		
737.1	Installation of the extension joint	m	16
737.2	Placement of 2.5% double-sloped concrete layer over carriageway (concrete C 25/30; 149.0 m2)	m3	7.0224
737.3	Installation of roll-type adhesive waterproofing membrane on the bridge deck	m2	170.24
737.4	Drilling of 15 cm deep 16 mm diameter holes into the wing of I-girder of superstructure in 0.5 m intervals for anchoring of the protrusions of reinforcement of r/c sidewalk blocks	Item	85
737.5	Anchoring reinforcement; A-III; Æ16mm	t	0.033575
737.6	Installation of foamy rubber primer over utmost I-girders of superstructure and retaining walls of abutments	m	59
737.7	Installation of 14 sidewalk blocks (on bedding of sand and gravel mixture) on bridge deck	m3	12.7
737.8	Placement of 40 mm r/c protection layer on wire mesh (C30 concrete)	m2	139.424
737.9	Wire mesh (wire Æ5mm; mesh size: 50 x 50 mm; 151 m2)	t	0.962354124
738	Installation of extension strip of resin-based bituminous mastic between sidewalk block and asphalt layer	m	59
738.1	Placement of 7 cm thick asphalt cover over bridge deck using fine-grained dense asphalt concrete	m2	206.5
738.2	Plastering/shotcreting of shallow damaged spots of bridge concrete structures	m2	5
738.3	Concreting of r/c parapets installed along bridge approaches (C-30 concrete)	m3	4.224
738.4	Painting of sidewalk blocks, barrier curb and r/c parapets with waterproof paint (in Zebra pattern)	m2	66.4
738	Installation of metal railing on the bridge with total length of 54.80 m		
738.1	Fabrication of metal railing using square tubes, and its installation on the bridge deck and abutments; total length: 54.80 m	t	1.675
738.2	Coating of the metal railing with corrosion resistant paint	t	1.675
739	Installation of New Jersey type r/c safety barriers along bridge approaches		
739.1	Installation of 3 meter long sections of r/c New Jersey Barriers; 16 items	m3	10.72
740	Clearing of riverbed		

Item	Work Description	Unit	Quantity
740.1	Clearing of riverbed from grown trees and shrubs	m2	450
740.2	Clearing of riverbed from carried down soil (moving by bulldozer to towards the bank; 20 m)	m3	150
800	**Road Inventory, Signs, and Marking**		
	Road signs		
801	Installation of warning sign 1.12.1 on steel post L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 17 = 3.4 m3)	Item	17
802	Installation of warning sign 1.12.2 on steel post L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 14 = 3.4 m3)	Item	17
803	Installation of warning sign 1.13.1 on steel post L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 16 = 3.2 m3)	Item	16
804	Installation of warning sign 1.13.2 on steel post L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 10 = 2.0 m3)	Item	10
805	Installation of warning sign 1.14 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 17 = 3.4 m3)	Item	17
806	Installation of warning sign 1.15 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 17 = 3.4 m3)	Item	17
807	Installation of warning sign 1.17 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 4 = 0.8 m3)	Item	4
808	Installation of warning sign 1.23 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 2 = 0.4 m3)	Item	2
809	Installation of warning sign 1.24 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 2 = 0.4 m3)	Item	2
810	Installation of directional signs 1.35.3 and 1.35.6 on steel posts of L=3.2m each (Total length of posts: 1037 linear meters), and diameter of D=76mm, including concreting (Total Concrete Volume: 65 m3)	Item	324
811	Installation of priority sign 1.7.1 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 2 = 0.4 m3)	Item	2
812	Installation of priority sign 1.7.2 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 16 = 3.2 m3)	Item	16
813	Installation of priority sign 1.7.3 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 16 = 3.2 m3)	Item	16
814	Installation of priority sign 1.7.5 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 2 =0.4 m3)	Item	2
815	Installation of priority sign 1.7.6 on steel posts L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 2 =0.4 m3)	Item	2
816	Installation of priority sign 2.3 on steel post L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 21 = 4.2 m3)	Item	21
817	Installation of prohibitory sign 3.24 on single steel post L=3.2m, D=76mm, including concreting (Concrete Volume: 0.2 m3 x 18 = 3.6 m3)	Item	18
818	Installation of special instructional sign 5.16 on steel posts of L=3.2m, D=76mm each, including concreting (Concrete Volume: 0.2 m3 x 4 = 0.8 m3)	Item	4
819	Installation of kilometer sign 5.19 on steel posts with L=3.2m, D=76mm each, including concreting (Concrete Volume: 0.2 m3 x 8 = 0.8 m3)	Item	4
820	Installation of special instructional sign 5.20 on steel posts of L=3.2m, D=76mm each, including concreting (Concrete Volume: 0.2 m3 x 8 = 1.6 m3)	Item	8
821	Installation of kilometer sign7.13 on steel posts of L=3.2m, D=76mm each, including concreting (Concrete Volume: 0.2 m3 x 11 = 2.2 m3)	Item	11
822	Installation of supplementing information sign 8.2.1 (0.7 x 0.35 m2) on single steel post using supports of road signs 1.13.1 and 1.13.2	Item	16
823	Installation of individual Project Information Board (2.0 x 0.68 m2) on single metal post L=3.2 m, D=89 mm) with concreting (5.77 x 6 = 34.62 m3)	Item	6

Item	Work Description	Unit	Quantity
824	Installation of individual Project Information Board (2.0 x 0.68 m2) on two metal posts (L=3.2 m, D=89 mm), including concreting (5.77 x 4 = 23.08 m3)	Item	4
825	Installation of individual Project Information Board (1.5 x 0.68 m2) on single metal post L=3.2 m, D=89 mm), including concreting (1.62 x 4 = 6.48 m3)	Item	4
	Road Marking		
826	Road Marking, Type 1.1	m	9569
827	Road Marking, Type 1.7	m	441
828	Road Marking, Type 1.14.1	m2	10.24
829	Supply and installation of bumps at km 5+103 and km 7+750; 2 sets in total, double items at each site	Item	2
830	Supply to site and installation of roadside posts	Item	2300
831	Supply to site and installation of metal guardrails, including provision of ancillary works	m	6810
832	Construction of bus stop shelters at km 5+103 (left hand side) and km 7+750 (left hand side)	Item	2
900	**Utility lines**		
901	Removing of the existing wooden utility poles and installation of the new r/c poles		
901.1	Removal, loading on dump trucks and hauling to dump place of the existing wooden utility poles	Item	19
901.2	Supply to site, installation into holes and concreting of the new r/c poles, including soil excavation and hauling to dump site, and mixing and placement of C20/25 concrete	m3	46.55
901.3	Attaching of two electrical brackets to the new r/c post and stringing of the existing conductors on the brackets	Item	19
902	Driving of the drinking water pipes through steel casing pipes		
902.1	Excavation and in-situ spreading of the soil for installation of casing pipes (at 10 crossings in total)	m3	270
902.2	Placement of sand/gravel bedding	m3	31.05
902.3	Supply to site and placement on sand-and-gravel padding of steel casing pipes (D=300mm)	m	90
902.4	Coating of steel casing pipes (D=300mm) with corrosion resistant bituminous coat	m2	84.78
902.5	Cutting/removal of the existing water pipes and re-installation of the new drinking water pipes (providing sufficient length increments over the lengths of cut out pipes) into steel casings, including sealing of the casing ends with plast foam, and coating plast foam with bituminous paint	Point	20
902.6	Backfilling and compacting in layers around casing using sand-and-gravel material	m3	112.5
903	Installation of r/c manholes and steel covers at the ends of casing pipes		
903.1	Soil excavation for installation of r/c utility manholes	m3	48
903.2	Placement of sand-and-gravel bedding for r/c manholes	m3	5.8
903.3	In-situ casting of C 20/25 grade concrete slab	m3	4.825
903.4	Supply to site and installation of C 30/37 grade r/c manhole rings/barrels	m3	4.46
903.5	Supply to site and installation of precast C 30/37 r/c slabs and 5 lids over the manholes	m3	2.565
903.6	Backfilling and compacting of the soil around manholes	m3	38.7162
903.7	Installation of marker flags at the ends of casing pipes indicating water pipe depths (flags: reinforcement bars of D=16 mm, L=1.0 m; welded steel board with sizes of 20mm x 3500mm; including coating of the flags with two layers of corrosion resistant paint)	Item	20
1000	**Miscellaneous**		
1001	Installation of rock fall protection wire meshes		

Item	Work Description	Unit	Quantity
1001.1	Supply to rock fall susceptible site and installation of wire and steel rope meshes, including fixing of mashes into rocky slope, provision of all needed materials and other ancillary works	m2	5000

PART A3: LEVEL OF SERVICE

The Contractor is responsible for designing and carrying out the works, services and actions he believes are necessary in order to achieve the Service Levels stated in the contract. The Service Levels are defined from a road user's perspective and may include factors such as average travel speeds, riding comfort, safety features etc.

1. SERVICE LEVELS: DESIGN

Design stage begins simultaneously with Mobilization Stage and will continue during Rehabilitation stage. Detailed designs and associated field investigations will be implemented as follows:

(i) first 4km- after 2 months from start date,
(ii) remaining 6.1 km - after 4 months form the start date,
(iii) Detailed Designs for bridges can be submitted either together with the road design or separately for each bridge.

The Level of Service during the Design Stage is tabulated below.

Item	Service Level	Remedial measures
Survey	Strip plan based on the survey data, C.S., L.S and plan of the road existing showing among others, side slopes of embankments, drains, culverts, bridges, streams and rivers and their flow direction, carriageway, shoulder, gradient, crossfall and chainage references, prepared in accordance with the design specification	Remarks or comments on the drawings to be incorporated in the final drawings
Geotechnical investigation and foundation recommendation	Geo-Technical records, field samples, test results, recommendation for soil and foundations in accordance with the design specification	Additional testrequested by the Project Manager if he is not satisfied with the information
Design and preparation of working drawings for structures	Drains, culverts, retaining walls and bridges designed according to specifications	Additional information or comments requested by the project Manger shall be incorporated in the final drawings and report
Pavement	Pavement design in accordance to specification. Recommendations on structural foundations and pavement design to be presented.	Comments or clarification requested by the Project Manager.
Design and Preparation of Working Drawings	The works are to be designed and detailed in accordance with the Design Specification.	Additional information requested or comments shall be incorporated in the final drawings and report.

The response time for this activity depends on the work plan presented by the Contractor and will not exceed the months established to carry out the design and rehabilitation activities.

2. SERVICE LEVELS: REHABILITATION / CONSTRUCTION

The Level of Service during the Rehabilitation/Construction Stage is tabulated below:

Item	Service Level	Remedial measures
Clearance along ROW	Shall satisfy the specifications during site inspection of the Project Manager.	Acceptance by visual site inspection in general. Compaction will be checked by random in-situ density checks using nuclear gauge, core cutter or sand replacement method
Strengthening and widening embankment/cut formations	Shall satisfy the specifications during site inspection of the Project Manager and present field results.	If the test check fails, the contractor will rework on the entire area notified in his Request for Inspection contained in QAM and notify the Project Manager for new (fresh) inspection
Paved shoulder	The service level will be laboratory tests for bitumen and aggregates , visual inspection at sites , conducting spot check on levels and extracting 90 mm samples from binder course and wearing course and checking gradation, binder content and compaction	In case the test results do not conform to specifications, the contractor will work rework as stated in the QAM and notify the Project Manager for new (fresh) inspection
Pavement	Riding comfort for carriage way will be measured in IRI (International Roughness Index). The service level will be laboratory tests for bitumen and aggregates , visual inspection at sites , conducting spot check on levels and extracting 90 mm samples from binder course and wearing course and checking gradation, binder content and compaction	In case the test results do not conform with specifications, the contractor will work rework as stated in the QAM and notify the Project Manager for fresh inspection.
Bus bay	Riding comfort for carriage way will be measured in IRI The service level will be laboratory tests for bitumen and aggregates, visual inspection at sites , conducting spot check on levels and extracting 90 mm samples from binder course and wearing course and checking gradation, binder content and compaction	In case the test results do not conform with specifications, the contractor will work rework as stated in the QAM and notify the Project Manager for fresh inspection.
Road lane marking	The consultant will verify the product catalogues and physical inspection and measurement of the product ensuring compliance to specifications and drawings	Check the quality of the materials..Rework at the rejected locations
Traffic sign boards	Shall comply with specification and workmanship acceptable to the Project Manager.	Total number specified in the bid.
Desilting	After cleaning no silt or debris shall remain on the floor or wall of structures. All scour holes within ROW of the earth channels shall be filled and compacted with rip rap or weathered rock. All vegetation ,silt deposits, and other materials obstructing flow shall be removed and disposed of to the satisfaction of the Project Manager	Rework to ensure compliance with specifications
Drains in concrete and earth	No stagnation of water at any location and compliance to working drawings and specifications	Rework to ensure compliance with specifications
Slope Protection	Physical checking of workmanship at site with the tape and level	Rework to ensure compliance with specifications
Provision and installation of Reinforced Concrete Pipe culvert	No pounding of water in the inlet outlet and barrel. Funnel type floor aprons at inlet and outlet finished with 15N/mm^2 concrete and cement concrete guide walls	Rework to ensure compliance with specifications
Bridge/Structure Rehabilitation & Improvement	Compliance to the specification and workmanship acceptable to the Project Manager, testing all materials and finished products as specified in the QAS and QMS	Rework to ensure compliance with specifications
Design and construction of guardrails over	Compliance to the specification and workmanship acceptable to the Project Manager	Rework to ensure compliance with specifications

Item	Service Level	Remedial measures
embankments and approaches to bridges		
Construction of new Bridges	The service levels will be accomplished by testing all materials and finished products as specified in the QAS and QMS	Rework to ensure compliance to specifications
Traffic Management	Traffic management shall be in accordance with the Traffic Management Plan.	Improve to ensure compliance
Consultant's office and supplies	The service levels will be accomplished by testing all materials and finished products as specified in the QAS and QMS	The defective materials, fittings, fixtures and furniture not complying to standards specified in the bids and reconfirmed in the QAM shall be replaced. Defective civil works shall be dismantled and reworked to comply with specification and QAM.

3. LEVEL OF SERVICE FOR EACH COMPLETED ROAD SECTIONS

3.1 Methods of Inspection of Service Levels

3.1.1 Formal Inspections of Service Levels

Formal inspections are those scheduled in advance by the Project Manager, and carried out by the Contractor (through his self-control Unit) under the supervision of the Project Manager – Supervision Consultant. The main purpose of the formal inspections is to enable the Project Manager to verify the information presented in the Contractor's statement and to issue the Interim Payment Certificate. The Project Manager must inform the Contractor of his intention to carry out a formal inspection at least 48 hours in advance, indicating the exact date, hour and location where the formal inspection is to begin. The Contractor is obliged to be present at the date, hour and location specified by the Project Manager, providing the physical means needed for the inspection as indicated further below. During the formal inspections, the Project Manager will prepare a brief Memorandum describing (i) the general circumstances of the site visit, including date, road sections visited, persons present, etc., (ii) any non-compliance which may have been detected, and (iii) the time granted by the Project Manager to the Contractor to remedy the detected defects.

Formal inspections will also be scheduled for the follow-up site visits, whose purpose is to verify if the Contractorhas remedied the causes of earlier non-compliance, within the time frame granted by the Project Manager and specified in the Memorandum.

Based on the LS measurements the Contractor will have to carry out among others but not limited to:

- Visual survey: This survey will be carried out for each road section following AASHTO Methodology. The data collected shall be included in the Data Collection Report and also presented in soft copy (CD) in any format or software compatible with Microsoft Excel and Microsoft Access.

- IRI survey: This survey will be carried out for each completely rehabilitated road section using the equipment classified as Class 1 (Precision Profiles such as Road Surface Profilometer). The measures shall be included in the Data Collection Report and also presented in soft copy, (CD) in any format or software compatible with Microsoft Excel and/or Microsoft Access.

- FWD survey: This survey will be carried out for each completely rehabilitated road section using the equipment "Falling Weight Deflectometer (FWD)". The measures shall be included every six months in the Data Collection Report and also presented in soft copy (CD) in any format or software compatible with Microsoft Excel and Microsoft Access.

- Specialized equipment, GPS, Video camera and Database Management System will be used in order to register the results of the studies. The record of the road shall be taken before the commencement of works (during mobilization), after finalized the rehabilitation works. The video information shall be connected with GPS and shall be compatible with commercial Database Management Systems.

3.1.2 Informal Inspections of Service Levels

The Project Manager may carry out informal inspections of Service Levels as part of his general mandate given to him by the Employer. He may do so on his own initiative, at anytime and anywhere on the roads included in the contract. He must use his own means for those inspections. If he detects any road sections where the Service Level criteria are not met, he is obliged to inform the Contractor within 24 hours in writing, in order to enable the Contractor to take remedial action as soon as possible. The results of informal inspections may not be used by the Project Manager for purposes of correcting the Contractor's statements or applying penalties or liquidated damages, except for cases in which the road has been completely interrupted and the criteria of Road Usability has not been met.

3.1.3 Service Levels: Completed Road Sections

The Level of Service for completed road sections is tabulated below:

Item	Service Level	Measurement/ Detection
Potholes	No potholes allowed	Visual inspection and Ruler
Patching	Patches : • Shall be *square* or *rectangular*. • Shall be level with surrounding pavement • Shall be made using materials similar to those used for the surrounding pavement, and Shall not have cracks wider than one (1) mm.	• Visual inspection: for detection of shape and material used • Ruler: to check if patch is level with surrounding pavement Small transparent ruler for cracks
Cracking in pavement	There shall not be any cracks more than 1 mm wide.	Crack widths measured with small transparent ruler. For isolated cracks, the "cracked area" includes 0.5 m on each side of the crack, multiplied by the length of the crack plus 0.5 m at each end.

Item	Service Level	Measurement/ Detection
Rutting	There shall not be ruts deeper than 5 mm. Rutting of more than five (5) mm shall not be present in more than 5 percent of any of the road sections defined in the contract.	Measured with 2 rulers Horizontal ruler of three 3 m length placed perpendicularly across lane; rut depth measured as space between horizontal ruler and lowest point of rut, using a small ruler with scale in mm
Raveling	Raveled areas must not exist	Visual inspection
Loose Pavement edges	There shall not be loose pavement edges, or pieces of pavement breaking off at the edges.	Visual inspection
Height of shoulders vs. height of pavement	Difference in height at edge of pavement shall *not* be more *than 2*0 mm	Measured with ruler, with scale in mm
Paved shoulders	Must always be sealed to avoid water penetration without deformations and erosions. Free of potholes and erosions	Visual inspection

The Contractor is responsible for ensuring that the road roughness is below the threshold values given in the table below:

Item	Service Level	Measurement/Detection
Average Pavement roughness for entire road after rehabilitation.	Average value for entire road or road section must be less than the threshold value given below (in IRI average*): **2.0 IRI***	Measured with calibrated equipment (Class 1 precision and bias specifications as defined by ASTM E-950)

The Contractor is responsible for ensuring that the comfort of shoulder and pavement is at least as specified below:

Item	Service Level	Measurement/Detection
Pavement Width	Pavement width must be at least wide as specified in the contract for each section of road	Manual measurement using a ***metallic*** measuring tape
Shoulder Width	Shoulder width must be at least wide as specified in the contract for each section of road	Manual measurement using a ***metallic*** measuring tape
Roadway cut slopes	On cut slopes, the roadway must be without erosion and material on the shoulders or carriageway.	Visual inspection
Roadway embankments	Embankment must be without erosion and free of organic material, toxic waste, garbage along the ROW	Visual inspection

Specified nominal sealed pavement width	Pavement width must be at least wide as specified in the contract for each section of road	Manual measurement using a ***metallic*** measuring tape
Texture depth	In accordance with AASHTO Specifications for Surface Treatment.	In accordance with AASHTO Specifications for Surface Treatment.

The Contractor is responsible for ensuring that the 95th percentile road deflection of any one-km road section is below the threshold values given in the table below:

Item	Service Level	Measurement/Detection
Deflection	Average of section must be below the threshold values indicated for each road section: 0.7 mm*	Measured with FWD every 250 meters. Threshold value is average for sections of 1000 meters. (Specifications as defined by ASTM D4694)

* This value is based on Design specifications "AASHTO Guide for Design of Pavement Structures 1993" for Falling Weight Deflectometer Equipment. Deflection measures presents charts showing deflection values based on cumulative standard axles, critical condition and types of surface.

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Note: The Service Levels given in the above chart should be met during acceptance of any 2km section for payment (meeting these Service Levels is a pre-condition for acceptance) and again for Final Handling-Over of the whole project road for the purpose of issuance of Certificate of Completion according to the GCC 54. The details of payment are provided in the Particular Conditions of the Contract, sub-clauses 44.2, 46.3, 47.2.

3.1.4 Methods of Verification of Service Levels

Contractor's Quality Assurance Plan

The Contractor shall prepare a Quality Assurance Plan (QAP) which shall clearly describe the systems, procedures and methods that will be used to deliver and monitor the Contract, in particular the compliance of the Works with the requirements of the General and Particular Specifications.

The QAP must include as a minimum a full description of the systems, procedures and methods that will be used to deliver and monitor the Level of Service measures and the documented procedures for at least the following:

i) QAP implementation and internal audits
ii) Procedures for inspection and/or testing the work to ensure compliance with the quality requirements
iii) Evidence of testing apparatus being recently calibrated
iv) Materials supply and delivery processes
v) Program presentation, monitoring and updating
vi) Recording, reporting and analysis of Data
vii) Document control and management of contract administration documents
viii) Emergency procedures and incident response plan
ix) Internal audits and responsibilities for addressing non-compliance
x) Staff training

xi) Environmental, Social, Health and Safety compliance including traffic management
xii) Legislative, labor, community health and safety compliance.

The QAP shall also integrate the Contract work requirements with the Contractor's quality, health and safety and environmental management systems to deliver the Contract Works.

The Contractor shall prepare and submit the draft QAP (including the three supplementary plans: Health & Safety Management, Emergency Procedures & Contingency, and Traffic Management) for the approval of the Project Manager at the same time as the submission of the Programme of Performance (not more than 28 days after contract signature and not later than the start date). The final QAP shall be submitted for approval not later than 14 days after receipt of the Employer's comments.

Laboratory, Equipment and Facilities

The Contractor will be required hire internationally certified independent laboratory. This laboratory shall be fully shared with the Project Manager.

The following minimum equipment shall be supplied by the Contractor:

Topographic Survey Equipment
The topographic equipment shall include at least a total station, auto level, tapes and accessories

Laboratory Equipment
The laboratory equipment shall be determined and agreed with the Project Manager.

Additionally, the Contractor should have the equipment required to carry out tests on quarries, asphalt plants, asphalt mixtures, aggregates according to the prevailing standards.

The Contractor shall provide Project Manager with site-office with air conditioning with a minimum of 150m^2 equipped with relevant furniture (office desk, meeting room, chairs, etc.) and office equipment (computers, printers, scanners, plotters, refrigerators etc.).

The Contracting Entity will install a soil and material laboratory. This laboratory shall be shared with the Supervision Consultant for those tests which require sophisticated and specialized equipments. However, the Contractor will be responsible for personnel, material and procedure to carry out tests to evaluate compliance with the level of services. The minimum equipment required, but not limited to:

Laboratory and other Equipment

Following minimum equipment shall be supplied by the Contractor:

- Topographic Equipment including total station, auto level, tapes and accessories

- Laboratory Equipment
The laboratory shall contain at least the equipment to carry out the following tests:

- Determination of CBR (California Bearing Ratio)
- Determination of Particle Size Distribution, Garnulometric Analysis (Sieving Method)

- Determination of Particle Density
- Determination of Particle Shape of Coarse Aggregate – Flankiness Index
- Determination of Bitumen Content and Gradiation of the Asphalt mix
- Compaction of Bituminous Mixtures using Marshall Apparatus
- Maximum Density of Paving Mixtures (% Voids)
- Bulk Specific Gravity of Bituminous Paving Mixtures using Saturated Dry Specimen
- Percent of Air Voids in Compacted Dense and Open Bituminious Pavements
- Determination of Needle Penertration
- Moisture-Density Relationship
- Density of Soil in-Place by the Rubber Ballon Method
- Determination of the Resistance to Abraison
- Marshall Stability

Additionally, the Contractor should have the equipment required to carry out tests on quarries, asphalt plants, asphalt mixtures, aggregates according to the prevailing standards.

All the parameter must fulfill the level of service required in this document.

- Falling Weight Deflectometer (FWD)
  The required Falling Weight Deflectometer (FWD) should be Impulse Load Device in accordance with ASTM D4694. This device loads the pavement by dropping a known mass through a known distance simulating the effect of a passing wheel load and measuring the response of the pavement. No alternative equipments type will be accepted.

  Vertical deflections are measured in the outer wheel path at the center of theapplied load and at various distances away from the load. The procedure to measure the deflections will meet the requirements of American Society for Testing and Material 2001 (ASTM Standard). The equipment must be calibrated/validated as per the manufacturer's recommendations. This parameter will be measured for each road section finished in order to evaluate the compliance with the required Level of Service and approval for payment.

- ROUGHNESS – IRI
  The Contracor shall measure the roughness using the method of International Roughness Index (IRI). The equipment required must be a Class 1 precision Profile according to the specifications as defined by ASTM E-950. The measure of roughness will be made in a continuous way in the wheel tracks of each lane of the carriageway, meeting the requirements of ASTM. The equipment must be calibrated/validated as per the manufacturer's recommendations. This parameter will be measured for each road section finished in order to evaluate the compliance with the required Level of Service and approval for payment.

  The Contractor shall maintain properly the laboratory equipment, FWD and Roughness at all times. Whenever requested by the Supervision Consultant, the Contractor shall operate this measuring equipment, under the supervision and instructions of the Consultant, at the roads sections indicated by the Consultant.

Health and Safety Management Plans

The purpose of the Health and Safety Management Plan is to foster a responsible attitude towards occupational health and safety and to comply with the provisions of the Environmental and Social Management Plan (ESMP) provided by the Employer.

Because of the nature of the Services, the Contractor may occasionally be exposed to hazardous situations, which could involve risk of various degrees of harm, to the contracting staff and/or the public.

Situations will arise when it is not practical to eliminate or isolate significant hazards. In these situations the hazards must be minimized by ensuring that planned protection systems (e.g. equipment, clothing) are available and are actually used.

The Health and Safety Management Plan and community health and safety requirements must be complied with by the Contractor's personnel and all subcontractors at all times.

The Health and Safety Management Plan shall form part of the Quality Assurance Plan and when implemented shall:

(a) Ensure the systematic identification of existing and new hazards on the work site(s)
(b) Ensure the minimization of significant hazards, where elimination and isolation are both impractical
(c) Ensure the provision and use of appropriate protective measures
(d) Include emergency procedures for dealing with accidental spillage, pollution or imminent danger
(e) Ensure regular review and assessment of each hazard identified and monitor employees' exposure to these hazards
(f) Ensure reporting and recording of work site safety incidents so health and safety problems can be addressed quickly and regularly. It is a requirement of this Contract that any such incident be reported promptly to the Project Manager.

The Health and Safety Management Plan shall be submitted with the draft QAP and, when approved, shall become a part of the QAP.

Emergency Procedures and Contingency Plan

The Contractor shall include in the QAP an Emergency Procedures and Contingency Plan (EPP), which shall establish the roles, practices and procedures during specific types of emergency events identified in the plans. The EPP must be developed by the Contractor and agreed with the Project Manager and any other stakeholders the Project Manager may identify.

The purpose of the EPP is to ensure the safety of the contractor's personnel and road users in the case of emergency and/or road closure. It should include:

a) An effective communication and event recording system
b) The name, contact number and specific duties of the Contractor's personnel nominated to respond to an emergency event. The contact for Emergency Calls will be the Employer's Project Manager or alternative delegated personnel and the Contractor's Contract Manager
c) The contact number of other parties who need to be notified in cases of emergency events, e.g. police
d) Detailed response procedures for all emergency events
e) Possible detour routes in the event of road closures.

The EPP shall be submitted with the draft QAP and, when approved, shall become a part of the QAP.

Traffic Management Plan

The Contractor shall include in the QAP a Traffic Management Plan (TMP). The TMP establishes the practices for traffic management at work sites, both day and night, and shall define and establish procedures appropriate to the types of road and traffic levels under consideration. The Traffic Management Plan must be developed by the Contractor and agreed with the Project Manager. Once agreed, the requirements of the Traffic Management Plan shall be followed in all instances where the conduct of the works impinges on the travelling public or public traffic in any way.

The objectives of the Traffic Management Plan are to:

(a) Clearly define and document the responsibilities and chain of command for the development, implementation and management of traffic control measures and systems
(b) Establish the minimum requirements for temporary traffic control
(c) Establish the minimum geometric, cross section and surfacing standards for temporary works
(d) Establish the minimum traffic management levels including any reviews necessary as a result of changing traffic conditions over the duration of the contract
(e) Provide appropriate transitions and enable safe and efficient traffic flow into, through and out of work sites
(f) Protect the public at all times
(g) Protect the Contractor's personnel at all times
(h) Protect the Asset and the Contractor's resources at all times
(i) Meet the operational requirements for the road.

The Traffic Management Plan must include at least the following:

- A documented process for preparation, review and approval of the traffic management measures
- Layout diagrams, method statements etc. for implementation of traffic control while undertaking each aspect of the Services (including site specific layout diagrams and method statements if the Services require traffic control measures not covered by standard codes of practice)
- Steps to deal with excessive traffic delays which shall be implemented once the traffic delay exceeds 10 (ten) minutes. The Contractor shall be responsible for the monitoring of traffic delay
- A document tracking and control system to ensure that only the latest operative copy of the Traffic Management Plan is in circulation
- Contact details for Contractor, Project Manager, any relevant representative(s) of the Project Manager, emergency services and other stakeholders
- The Contractor's strategy for informing the general public and adjacent landowners about the nature of the planned work activities or events, the implications of the traffic plan (e.g. detours) and their role in maintaining the overall safety of the site. Parties with Access Affected will need to be advised as necessary. Specific attention shall be given to Schools,

Hospitals, Emergency Services, Police and other institutions or businesses located within the work zone or directly affected by the works.

The Contractor shall program work such that contract activities affecting traffic flow are not carried out on-site in urban zones during periods of peak traffic flow, other than emergency or emergency maintenance work and then only with the approval of the Project Manager.

Specific plans requiring either partial (single lane) or full road closure (with detour) shall be submitted to the Project Manager and Employer for approval at least 2 weeks in advance of the programmed closure and should be agreed with traffic police. These plans must stipulate the duration of the proposed closure. Specific Plans not requiring closure shall be registered with the Project Manager at least 5 days prior to the work taking place.

The full cost of all traffic control is to be included in the lump sums for Rehabilitation.

The Implementation of the provisions of the TMP shall be audited by the Project Manager continuously as a part of the supervision of rehabilitation works and on a random basis throughout the duration of the contract.

The EPP shall be submitted with the draft QAP and, when approved, shall become a part of the QAP.

Handoverand Completion Report

The Service Levels given in the section "Service Levels: Completed Road Sections" chart should be met for Final Handling-Over of the whole project road for the purpose of issuance of Certificate of Completion according to the GCC 54 (meeting these Service Levels is a pre-condition for acceptance).

Immediately prior to the completion of the contract the Contractor shall prepare a *Handover Report*. The Report will:

- Include the most recent complete set of data on the roads covered by the contract, and
- As made drawings will be updated to capture the most accurate situation of the road.

Pavement Shape

Completed asphalt pavement shall comply in all respects with the requirements of the Specifications for shape and regularity of surface as well as with the roughness limitations set out below. A comprehensive check on the final shape of the paved surfaces shall be carried out as a part of the Completion procedure.

Non-conformance with the pavement shape requirements shall be rectified in accordance with the provisions of the Specification.

Pavement Roughness

The roughness of a road is taken to be an indication of its Usability. The indicator to be used to determine the road roughness will be the International Roughness Index (IRI), whose measure unit is expressed in meters per kilometre (m/km). A profilometer meeting the Class 1 precision and

bias specifications of ASTM E-950 shall be used to measure the IRI. The measure of roughness must be made in a continuous manner in the wheel-tracks of each lane of the carriageway. The equipment must be calibrated/validated in accordance with the manufacturer's recommendations and from observation during previous use.

If the measurements reveal that the road roughness is above the threshold stipulated in the Specification the Project Manager will not approve payment and will request the Contractor to correct the defect.

Pavement Strength – FWD Survey

The deflection of a road is taken to be an indication of its load carrying capacity (Durability). It will be checked at road sections selected by the Project Manager based on non-destructive testing (NDT) evaluation. Measurement is carried out with a Falling-Weight-Type Impulse Load device (FWD) in accordance with ASTM D 4694. The FWD measures the vertical deflection response of the surface to an impulse load applied to the pavement surface. Vertical deflections are measured in the outer wheel path at the centre of the applied load and at various distances away from the load.

The Contractor is required to guarantee that the pavement deflection is below the threshold stipulated in the Specification. If the measurements reveal that the pavement deflection is above the threshold stipulated in the Specification the Project Manager will not approve payment and will request the Contractor to correct the defect.

The Employer is entitled to retain the performance guarantee provided by the Contractor until all sections of the road comply with the pavement deflection criteria.

Roadway Cut and Embankment Slopes

Earth embankment and cutting slopes shall be in good condition.

There shall be no visible signs of erosion to embankment or cutting slopes at any point in any the length of road submitted for Completion following rehabilitation.

Bridges

For the purpose of issuance a Certificate of Completion, according to GCC 54.1 - any bridge shall be in good structural order and with, as a minimum:

- No ascertainable defects to concrete or steel elements;
- Expansion joints, , sealed and with functioning drainage;
- Bearings, bearing shelves clean and free draining;
- All steel work, both structural and ancillary (handrails, guard rails, etc.) completely corrosion free and with approved paint systems applied and in good order;
- Wingwalls and retaining walls in sound condition with no visible defects or erosion problems;
- All necessary erosion protection measures in place, functional and defect free;
- Road surface, sidewalks, kerbs, barriers to bridge and approaches in place, functional and defect free.

Culverts

Culverts shall be completed as a part of the length of road in which they are located. No alternative arrangements for completion of culverts will be agreed.

For the purpose of issuance a Certificate of Completion, according to GCC 54.1 - all culverts shall be in good structural order and with, as a minimum:

- No ascertainable defects to any concrete elements;
- All steel work, (handrails, guard rails, etc.) completely corrosion free and with approved paint systems applied and in good order;
- Wing-walls, aprons and training walls in sound condition with no visible defects or erosion problems;
- All necessary erosion protection measures in place, functional and defect free;
- Road surface, sidewalks, kerbs, barriers, guardrail in place, functional and defect free.

Reports to be Submitted

The reports to be submitted during this contract describe the Contractor's performance in managing the contract outputs as detailed below:

- Details of Performance including QAP, HSMP, ESMP, EPP, TMP
- Design Reports
- Monthly Progress Reports
- Quarterly Environmental Reports
- Monthly Safety Report
- Monthly Quality Control Report
- Completion Report

To the extent agreed with the Project Manager, the various monthly reports listed in the table above may be combined into one or more physical reports for convenience. However, this is a relaxation which is entirely at the discretion of the Project Manager and the Employer.

The reports with Service Level, Control Activity and tolerance permitted are tabulated below:

Item	Service Level	Control Activity	Tolerance Permitted
Details of Performance incl. QAP, HSMP, ESMP, EPP & TMP	Submission 28 days after Contract Signature or by Start Date whichever is later. Must include all details required by Contract.	Acceptance by Project Manager/Employer for review and comment.	Must be submitted by due date.
Approved Programme of Performance	Submission not more than 7 days after receipt of the Employer's comments on initial submission.	Acceptance by Project Manager/Employer.	Revision and resubmission must be completed within ***seven (7) days*** after the official letter informing of comments.

Design Report	Preliminary submission at least 28 days prior to programmed date for commencement of construction activities. Submission of Approved report not later than 7 days after receipt of Project Manager's comments.	Review and comment /approval by Project Manager and/or Employer.	Modification must be completed within ***seven (7) days*** after the official letter informing of comments.
Monthly Progress Report	Submission and approval of monthly report summarizing activities carried out, progress, difficulties, updated work plan, etc. This report must initially be submitted within the first 10 days after each month of works.	Review and comment/Approval by Project Manager and/or Employer.	Initial Submission by due date. Revision and resubmission must be completed within ***seven (7) days*** after the official letter informing of comments.
Quarterly Environmental Report	Submission and approval of quarterly report summarizing all environmental activities and issues. This report must initially be submitted within the first 10 days after each quarter of works.	Review and comment/Approval by Project Manager and/or Employer.	Initial Submission by due date. Revision and resubmission must be completed within ***seven (7) days*** after the official letter informing of comments.
Monthly Safety Report	Submission and approval of monthly report detailing all safety related events, summarizing activities carried out, progress, difficulties, etc. This report must initially be submitted within the first 10 days after each month of works.	Review and comment/Approval by Project Manager and/or Employer.	Initial Submission by due date. Revision and resubmission must be completed within ***seven (7) days*** after the official letter informing of comments.
Monthly Quality Control Report	Report to provide complete details of all quality control tests (including statistical analysis of test results) and conformance with the QAP.	Review and comment/Approval by Project Manager and/or Employer.	Initial Submission by due date. Revision and resubmission must be completed within ***seven (7) days*** after the official letter informing of comments.

Completion Report	Complete description of all construction details (with final design report annexed), ongoing problems (minor issues which will be dealt with during the DLP with prior approval from a Project Manager) and maintenance requirements, current pavement condition (incl. strength, roughness and estimated pavement life) and "As Built" drawings.	Review and comment/Approval by Project Manager and/or Employer.	To be submitted 30 days after completion of the Improvement/Construction works. Modifications to be completed and submitted within ***fifteen (15) days*** after receipt of comments.

Part B - General Specifications for Design and Road Works

Symbols and Abbreviations

PART B 1, DESIGN SPECIFICATION

1. General Design Obligations
1.1 Design Responsibility
1.2 Contractors Documents
1.3 Technical Standards and Regulations

2. Surveys and Investigations
2.1 Topographical Surveys
2.2 Geotechnical Investigations for Road Embankment
2.3 Bridge Site Ground Investigations
2.4 Material Source Survey

3. Design
3.1 Road Design
3.2 Pavement Design
3.3 Drainage Design
3.4 Road Furniture Design
3.5 Road Marking Design
3.6 Environmental Protection

PART B 2, CONSTRUCTION SPECIFICATION

1. General Requirements
1.01. Acceptance of Works
1.02 N/A
1.03 Mobilisation
1.04 Laboratory Testing
1.05 Record Drawing
1.06 Traffic Management
1.07 Control of Material
1.08 Construction Material
1.09 Possession of Site
1.10 Health, Safety and Accidents
1.11 Environmental Protection
1.12 Basic Survey and Setting Out

2. Preparatory Works
2.01 Site Clearance
2.02 Clearing and Re-grading of Existing Ditches
2.03 Removal of Structures, Obstructions and Trees
2.04 Utilities

3. Earthworks
3.01 Excavation and Embankments
3.02 Ditch Construction
3.03 Milling of Bituminous Bound Pavement

4. Pavement
4.01 Sealing of Cracks and Joints and Patching
4.02 Levelling Courses
4.03 Granular Subbase and Base Course
4.04 Bituminous Prime and Tack Coat
4.05 Hot Asphalt Concrete Pavement
4.06 Surface Tratment
4.07 Shoulder Reconditioning
4.08 Asphalt Concrete for Sidewalks and Islands
4.09 In-Place Cold Recycling of Bituminous Pavements
4.10 Pavement Rectification

5. Drainage
5.01 Culverts
5.02 Reconditioning of Existing Drainage Structures
5.03 Spillways, Gullies and Lined Ditches
5.04 Manholes, Inlets, Outlets and Catch Basins

6. Road Furniture
6.01 Guardrails
6.02 Permanent Traffic Control
6.03 Permanent Pavement Markings
6.04 Temporary Traffic Control
6.05 Bus Shelter

7. Retaining Structures
7.01 Gabions
7.02 Reinforced Concrete Retaining Wall

8. Bridge Works
8.01 Removal of Concrete Elements
8.02 Structural Excavation and Backfill
8.03 Scaffolding and Formworks
8.04 Reinforcement
8.05 Concrete Works
8.06 Repair of Small Concrete Damages without Forms
8.07 Painting of Steel Structures
8.08 Down Pipes
8.09 Down Pipes
8.10 Bearings
8.11 Expansion Joints
8.12 Waterprofing and Protective Layer

9. Rockfall Protection
9.01 Wire Mesh and Cable Net Drapery

SYMBOLS AND ABBREVIATIONS

i) SYMBOLS

Symbols for units of measurement conform to the SI system as set out in BS 5775 (ISO 31/1.). Examples are given below:

°C	Degrees Celsius
dia	Diameter
g	Gram = kg x 10-3
ha	Hectare
hr or h	Hour
km	Kilometre
km2	Square kilometre
kg	Kilogram
kg/m3	Kilogram per cubic metre
l	Litre
µ	Micron = m x 10-6
m	Metre
m2	Square metre
m3	Cubic metre
mg	Milligram = kg x 10-6
mg/l	Milligrams per litre
min	Minute
mm	Millimetre
mm2	Square millimetre
N	Newton
N/m2	Newton per square metre
rad	Radian
sec	Second
t	Tonne = kg x 103
wt	Weight

ii) ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
AAV	Aggregate Abrasion Value
ACV	Aggregate Crushing Value
AIV	Aggregate Impact Value
ALD	Average Least Dimension
BA	Bitumen Affinity
BD	Standards – Bridges and Structures
BS	British Standard
CARES	Certification for the Construction Industry (U.K.)
CCTV	Closed Circuit Television
CBR	California Bearing Ratio
CEM I	Portland Cement complying with BSEN 197-1 Class 42.5N
CP	British Standard Code of Practise
CRCP	Continuous Reinforced Concrete Pavement

EN	European Standard
FI	Flakiness Index
FRP	Fiber Reinforced Polymer Composite Materials
FTD	Flat Traffic Delineators
HD	Standards - Highways
ITSM	Indirect Tensile Stiffness Modulus
LAA	Los Angeles Abrasion Value
LL	Liquid Limit
LS	Linear Shrinkage
MC	Moisture Content
MDD	Maximum Dry Density
MENR	Ministry of Environment and Natural Resources Protection
OMC	Optimum Moisture Content
OPC	Ordinary Portland Cement
PC	Portland Cement
PI	Plasticity Index
PL	Plastic Limit
PM	Plasticity Modulus (PI x % passing 0.425 mm sieve)
RLAT	Repeated Load Axel Test
SATS	Saturation Ageing Tensile Stiffness
SCC	Self-Compacting Concrete
SE	Sand Equivalent
SG	Specific Gravity
SI	International Standard Units of Measurements
SO_4	Sulphate
SRPC	Sulphate-resisting Portland Cement
SSS	Sodium Sulphate Soundness Test, loss on 5 cycles
STV	Standard Tar Viscosity
TRL	Transport Research Laboratory (U.K.)
TS	Tensile Strength
UC	Uniformity Coefficient
UCS	Unconfined Compressive Strength
VIM	Voids in Mix
VMA	Voids in Mineral Aggregates
w/c	Water cement (ratio)

Bidders should note, that below specifications are prepared by an independent consultant and are based on GOST and SNiP standards, but the Contractor shall be free to propose any equivalent or higher internationally accepted standards during execution of the Contract.

PART B1, DESIGN SPECIFICATION

The Design Specification defines the Contractor's general design obligations, and other specific requirements related to surveys, investigations and design.

Section 1 of the Design Specification details the Contractor's general design obligations.

Section 2 of the Design Specification details specific requirements in respect of surveys and investigations that are to be carried out by the Contractor.

Section 3 of the Design Specification details design criteria and specific requirements in respect of design that is to be carried out by the Contractor.

SECTION 1, GENERAL DESIGN OBLIGATIONS

1.1 Design Responsibility

The Contractor shall carry out and be responsible for the design of the Works which shall be carried out in accordance with the Design Specification and all other requirements of this Contract.

On completion of the design, the Contractor shall provide a certificate to the Engineer confirming that it has exercised due care in the preparation of the design.

The surveys and investigations to be carried out by the Contractor as detailed in Part 2 of the Design specification are deemed to be part of the design of the Works.

Design shall be carried out by qualified designers who are professional engineers. For each part of the Works, the prior consent of the Engineer shall be obtained to the designer and design

The Contractor holds itself, its designers and design Subcontractors as having the experience and capability necessary for the design. The Contractor undertakes that the designers shall be available to attend discussions with the Engineer at all reasonable times during the period of the Contract.

1.2 Contractor's Documents

The Contractor's Documents shall comprise of all design (including survey and investigation) drawings, calculations, models, reports, and other manuals and information of a similar nature that the Contractor shall prepare and submit to the Engineer, the Employer and other statutory bodies as part of its design obligations.

The Contractor shall prepare the Contractor's Documents in sufficient detail to demonstrate that it has complied with the requirements of the Contract, to satisfy all regulatory approvals, and to provide sufficient instruction to execute the Works. The Engineer shall have the right to review and inspect the preparation of the Contractor's Documents, wherever they are being prepared.

The Contractor shall submit a schedule to the project Manager within 28 days of the Commencement Date showing each Contractor's Document that will be submitted together with the intended submission date. This schedule shall be reviewed and updated by the Contractor and re-submitted at monthly intervals.

Each of the Contractor's Documents shall, when considered ready for construction use, be submitted to the Project Manager for pre-construction review and consent. Each submission of a Construction Document made by the Contractor in an agreed format and shall be accompanied by notice that the Contractor considers the Construction Document ready for a pre-construction review and suitable for construction. The Project Manager shall review each Contractor's Document for compliance with the Employer's Requirements and the Project Manager shall have a review period of 28 days, calculated from the date on which the Contractor's Document is received to carry out the pre-construction review and grant consent. If the Project Manager, within this review period, notifies the Contractor that such Contractor's Document is incomplete or fails (to the extent stated) to comply with the Employer's Requirements, it shall be rectified, resubmitted and reviewed in accordance with this Clause at the Contractor's cost.

Following the granting of the Project Manager's consent to any Contractor's Document, the Contractor shall submit it to the Employer for approval, together with a copy of the Project Manger's consent. The Contractor shall also provide any additional or supplementary documents requested by the Employer.

The Employer will be responsible for obtaining Construction Permit which is required before any construction works shall proceed. The Construction Permit is obtained based on Detailed Design prepared and submitted by the Contractor and approved by the Project Manager and the Employer. Construction Permit will be obtained by the Employer for each stage of Detailed Design as described above when such will be submitted and approved.
Note: Obtaining of Construction Permit requires approximately 1 month from the date of approval of the Detailed Design.

For each part of the Works, and except to the extent that the prior consent of the Project Manager and Employer shall have been obtained:

(i) construction shall not commence prior to the expiry of the review periods for the Contractor's Documents which are relevant to the design and construction such part;

(ii) construction shall be in accordance with such Contractor's Document; and

(iii) if the Contractor wishes to modify any design or document which has previously been submitted for such pre-construction review, the Contractor shall immediately notify the Project Manager, and shall subsequently submit revised documents to the Project Manager for pre-construction review and consent. The Contractor shall also submit all revised documents to the Employer for approval.

If the Project Manager instructs that further Construction Documents are necessary for carrying out the Works, the Contractor shall upon receiving the project Manager's instructions prepare such Construction Documents.

If errors, omissions, ambiguities, inconsistencies and other defects are found in the Construction Documents, they and the Works shall be rectified by the Contractor at its cost.

1.3 Technical Standards and Regulations

The design and the Construction Documents shall comply with Georgia's national specifications, technical standards, building, construction and environmental regulations, ESMP provided to the Contractor, and the standards quoted in these Contract Specifications. References in the Contract to such specifications or standards shall be understood to be references to the edition applicable on the Contract Commencement Date. If substantially changed or new applicable national specifications, technical standards or regulations come into force after the Contract Commencement Date the Contractor shall submit proposals for compliance to the Project Manager.

SECTION 2, SURVEYS AND INVESTIGATIONS

2.1 Topographical Surveys

The Contractor shall carry out the following topographical surveys:

(i) topographical survey and level survey along the full length of the road between the commencement point and the termination point, over a survey corridor width of 30 meters, either side of the existing road centerline. The survey shall be suitable for plotting at a scale of 1 to 1,000. The width of the survey corridor shall be extended as required to ensure that the survey covers the full extent of the proposed Works.

(ii) cross section survey of the roads detailed below;

(iii) topographical survey of the site of all new bridges which shall be plotted out on 1 to 200 scale drawing(s).

All topographical surveys shall be referenced relative to the Georgian national grid and national level datum.

The Employer will provide the contractor with details of the survey control points, bench marks and topographical survey data established during the preliminary design phase for the rehabilitation works. The Contractor will be responsible for verifying the accuracy of all such survey information provided by the Employer, prior to using it for the design and construction of the Works.

The Contractor shall provide a specification for the topographical survey that shall be submitted to the Project Manager as a Contractor's Document. This specification shall:

(i) contain details of primary control points, secondary control points to be established;

(ii) provide details of the methods by which the topographical survey shall be carried out, and the instruments to be used;

(iii) provide details of the required accuracy of the survey and permitted error tolerances

A plan topographic survey shall be conducted to locate man-made features such as roads, buildings, etc to prepare plans to a scale of 1 to 1000. and natural features such as creek, canals, etc along the road section using the plan co-ordinates and heights of the primary control monuments and secondary control points.

All features shall have elevations based on the National Datum benchmarks. The extent of the plan map survey shall be at least 30m either side of the existing road centreline, and this survey corridor shall be extended as required to ensure that the full extent of the existing road construction is covered.

Where features cannot be surveyed to the required accuracy without extensive clearing or due to other obstructions, the Contractor will seek the instruction of the Project Manager.

The line or point to be surveyed on a feature shall be at the features intersection with the ground-surface unless otherwise instructed by the Project Manager. Any feature, which is in a state of change during the survey, will be annotated to this effect, with the proposed boundary changes marked, if known.

The ground surface shall be surveyed to truly indicate any change in feature, vertical alignment or horizontal alignment.

Appropriate references such as road section name, section limits (km-marks), north and east co-ordinates, benchmarks and other important data shall be shown in the topographic plans and profiles.

A survey of the site of the new bridges shall be carried out to prepare plans to a scale of 1 to 200. This survey shall cover the dry river bed for a minimum distance of 250 metres from the bridge location, on the upstream side and 200 metres on the downstream side. All other requirements for the survey shall be as specified above for the topographical survey of the roads.

The requirements for all survey plans shall be as follows:

(i) all survey drawings shall be prepared on A1 size drawing sheets;

(ii) names and annotations shall be aligned parallel to the gridlines except for names relating to linear features which shall be aligned parallel with those features;

(iii) all final drawings shall be provided with a standard border of 50mm for the left margin and 25mm for the remaining margins. Each drawing will be labelled with the date of generation, and version number.

(iv) the overlap of adjacent drawings shall give a minimum overlap of 75mm of detail common to each drawing and match lines shall be included on each drawing;

(v) the co-ordinates and heights of all primary control monuments, secondary control points and the existing National Datum benchmarks within the survey limits shall be shown on the drawings;

(vi) copies of the survey drawings shall be form part of the Contractor's Construction Documents.

The survey drawings shall be used as the base for the detailed design and as-built Drawings that the Contractor is required to prepare.

2.2 Geotechnical Investigation for Road Embankment

The Contractor shall carry out a geotechnical investigation along the full length of the road to determine the ground conditions below the new road embankment. This geotechnical investigation shall consist of 1.5 meter deep trial pits excavated at 0.5 kilometer intervals.

The trial pits shall record the thickness and classification of all soil types, including top-soil. Bulk disturbed samples shall be taken whenever there is a change of soil type. Laboratory tests including those listed below shall be carried out on each bulk disturbed sample:

- moisture content;
- particle size analyses;
- liquid and plastic limits;
- maximum dry density;
- California Bearing Ratio (CBR).

In-situ dynamic cone penetration (DCP) tests would also be carried out in each trial pit at intervals of 0.3 meters. In-situ CBR values shall be calculated from the results of each DCP test.

2.3 Bridge Site Ground Investigation

The Contractor shall carry out a ground investigation at the site of each new bridge to be constructed to provide data for the design of the bridge foundations.

A minimum of 1 borehole shall be drilled at the location of each abutment and pier, to a depth of at least 20 meters (in normal material). If rock is encountered, the drilling can be terminated after penetrating the rock for the following minimum depths:

7 meters in weathered rock;
3 meters in soft rock;
1 meter in hard rock.

In-situ standard penetration tests or equivalent shall be carried out in each borehole to obtain the data required for the design of the foundations.

The Bridge foundation ground investigation shall be carried out according to the AASHTO Manual on Subsurface Investigations, 1988.

2.4 Materials Source Survey

The Contractor shall carry out a materials source survey to determine the locations of all existing or new borrow pits and quarries that are proposed as sources of embankment fill material, capping layer material, all granular pavement layer materials, asphalt aggregates and concrete aggregates. The survey shall determine the quantity of material available from each proposed borrow pit and quarry and laboratory testing shall be carried out on samples taken from each proposed borrow pit and quarry to demonstrate that the materials complies with the requirements of the Construction Specification.

The materials source survey shall also locate proposed sources of bitumen, cement, pre-cast reinforced concrete items and other construction materials necessary to meet contract requirements.

SECTION 3, DESIGN

3.1 Road Design

Road Cross Section

The general road cross section that shall be adopted is as follows in accordance with the Georgian geometric design standard, Geometrical and Structural Requirements for Georgian Automobile Roads, Ministry of Regional Development and Infrastructure, Roads Department, Tbilisi 2009:

Number of lanes:	2
Lane width:	3.00 m
Carriageway width:	6.00 m
Width of shoulder:	1.00 m
Total road width:	**8.00 m**

In areas where a concrete drainage side drain is located directly at the paved carriageway, the shoulder width will be reduced to 0.65 m.

Horizontal Alignment

The designed horizontal alignment shall be a smooth flowing alignment that matches the existing road alignment as closely as possible. This alignment is to be computed from survey data collected during the topographical survey. Horizontal curves shall be designed to comply with the geometric standards given in the Georgian Stnadard, Geometrical and Structural Requirements for Georgian Automobile Roads, Ministry of Regional Development and Infrastructure, Roads Department, Tbilisi 2009, for a design speed of 40 km/h. In urban areas and difficult terrain, the design speed may be reduced as required to enable the designed alignment to follow the existing alignment. The prior approval of the Employer shall be obtained for any reduced design speed in certain sections of the road.

Vertical Alignment

Wherever possible, the vertical alignment shall follow the existing alignment, considering the construction of additional new pavement layers. If possible, vertical curves shall be designed to comply with the geometric standards given in the Georgian Standard, Geometrical and Structural

Requirements for Georgian Automobile Roads, Ministry of Regional Development and Infrastructure, Roads Department, Tbilisi 2009, for a design of 40 km/h.

Superelevation shall be designed to comply with the geometric standards given in the Georgian Standard, Geometrical and Structural Requirements for Georgian Automobile Roads, Ministry of Regional Development and Infrastructure, Roads Department, Tbilisi 2009, for a design of 40 km/h.

The desired geometrical design parameters for the selected design speed of 40 km/h are as follows:

Min. horizontal radius	65 m
Max. vertical slope (gradient)	8%
Min vertical slope	0.4%
Min. crest curve	400 m
Min. sag curve	850 m
Min cross section slope	2.5%
Max superelevation:	7%

3.2 Pavement Design

Following preliminary pavement design for the road rehabilitation habe been designed according to the AASHTO guide for Design of Pavement Structures.The proposed pavement structure has been determined with the following composition:

Road section	Asphalt surface course (mm)	Cement stabilized basecourse (mm)	Capping layer (Sand-Gravel mix) (mm)	Total pavement thickness (mm)
Kidistavi-Ateni-Boshuri, km 12.4 – 22.5 (Project Chainage 0+000 – 10+010)	50	140	150	340

The layer thicknesses have been designed taking into consideration the requirements of AASHTO for minimum thicknesses, the maximum aggregate size of the different material mixtures and construction considerations as practicality and maximum single layer thickness in terms of compaction.

The minimum design structural number should 76 in accordance to AASHTO Guide for Design of Pavement Structures 1993.

This pavement structure requires less new high quality aggregates and bitumen by utilising the cement stabilised granular base course

The Contractor shall refine the nominal pavement design for construction purposes that shall be based on geotechnical and other data determined in the surveys and investigations. The pavement design shall have a 20 year design life.

3.3 Design of Structures

The structural arrangements and requirements for bridge sub-structures and superstructures, the bridge deck surfacing, bridge deck drainage, bridge deck approach slabs, parapets, wing-walls and bridge bearings shall be as given in the SNIP 2.05.03-84, Standard for Bridges and Pipes.

The Contractor shall design the bridge works so that they can safely sustain the most critical combination of the various loads, forces and stresses that can coexist as given in the SNIP 2.05.03-84, Standard for Bridges and Pipes.

Alternatively structural design should be carried out in accordance to AASHTO LRFD design specification.

3.4 Design of Intersections

Intersection designis to be undertaken in accordance with Georgian national standards.

Improvements to intersecting roads are to extend sufficient distance to ensure all geometric and safety requirements are satisfied in terms of design, construction and operation.

3.5 Drainage Design

Culverts

The Contractor shall rehabilitate all culverts in the existing road. All the culverts are to have inlet and outlet structures. Protection works are also to be provided on embankment slopes and channel beds to prevent erosion of the embankment and channels.

The Contractor shall also carry out a hydrological study to verify the location and dimensions of the culverts being provided under the existing road reconstruction contracts. Any additional culverts that are found to be necessary in the hydrological study shall be provided by the Contractor under both carriageways.

The structural details of the culverts and headroom requirements shall conform to the Georgian standard requirements and SNIP 2.05.03-84, Bridges and Pipes.

Guiding ditches shall be provided wherever necessary to give an unimpeded flow of water run off into and out of culverts. The locations of guiding ditches shall be selected by site inspection and by reference to the topographical survey plans.

Rehabilitation of Side Drainage

Effective side drainage shall be provided where necessary to ensure no surface water run off ponds against the carriageway and that all surface water run off is led away from road into culverts or towards ground that slopes away from the road.

This rehabilitation of side drainage shall involve re-establishing unlined side drains adjacent to existing embankment slopes.

The locations of these works shall be selected by site inspection and by reference to the topographical survey plans.

3.6 Road Furniture Design

Road Signs

The Contractor shall provide warning road signs and regulatory road signs and all road signs necessary for safe and effective traffic operations. The road signs shall be in accordance with national standards.

Sign plate and text height dimensions for all road signs shall be suitable for a traffic speed of 40kilometres per hour.

This road furniture shall include embankment edge delineators and kilometer posts.

Guardrail (Crash barrier)

Guardrails are to be provided along the outside shoulder at culverts, bridge approaches and all other locations where the embankment height is more than 3 meters, within 15 meters in horizontal direction form road edge

The guardrails are to be provided with suitable termination details to ensure that the fence ends are not presented to oncoming traffic.

In the design of the crash barrier, EN 1317 Standard shall be considered.

3.7 Road Marking Design

The Contractor shall provide the following road markings on all roads, in accordance with national standards:
(i) centre line marking for normal conditions
(ii) warningcentre line marking at approaches to junctions, at horizontal curves with small radii and other locations where potential hazards
(iii) no overtaking centre line marking where the adequate overtaking sight distance is not provided
(iv) carriageway edge
(v) carriageway edge line at lay byes
(vi) give way line at (vii) stop line atjunctions.

3.8 Use of Other International Standards

Any other internationally accepted standards that ensure substantial equivalence to the Specifications attached to this Contract can be accepted subject to the Project Manager's prior review and Employer's written approval. Differences between the Contract Specification and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Project Manager at least 2 months prior to the date when the Contractor desires the Project Manager's approval. In the event that the Project Manager determines that such proposed deviations do not ensure substantially equal performance, the Contractor shall comply with the standards specified in the documents.

3.9 Environmental Protection

The Contractor shall incorporate all physical environmental and social impact mitigation measures provided in the ESMP into the design of the project and comply with ESMP

requirements regulating environmental and social aspects of construction practice in the course of works. ESMP is provided by the Emplyer and is an integral part of the present contract.

PART B 2, CONSTRUCTION SPECIFICATION

SECTION 1, GENERAL REQUIREMENTS

The specification defines the standards and quality of materials and workmanship to be used in the Project.

This Specification shall be read in conjunction with all the other documents forming the Contract. Any ambiguity between the documents forming the Contract shall be referred to the Project Manager for clarification in accordance with the Conditions of Contract.

The Contractors shall be deemed to have acquainted themselves with the requirements of all current statutes, ordinances, by-laws, rules, regulations or other instruments having the force of law in Georgia including without limitation those relating to protection of the environment, health and safety, importation of labour and training, taxes, duties, royalties and other levies.

The Engineer refers to the Project Manager in accordance to the Clause 1.1 of the General Condition of Contract.

1.01 Acceptance of Work

1.01.01 Conformity with Contract and Project Requirements

If any Clause or Sub-Clause in the Specifications includes a reference to International standards, the requirements of Local standards must be satisfied in first place. International standards might be used if they ensure equal or higher quality and are accepted by the Project Manager. The standards referred to are listed in the Annex of these Specifications.

References to standard test methods and other recognised standards authorities refer to the methods in effect on the date of solicitation for bids. Equipment, materials, or workmanship meeting other standards which ensure equal or higher quality than the standard specified will also be acceptable.

Perform work according to the present specification and the project (further "Project") requirements. Perform all work to the lines, grades, cross-sections, dimensions, and processes or material requirements shown on the plans or specified in the contract or design documents.

Plan dimensions and contract specification values are to be met unless a variance is allowed by the Project Manager. Perform work and provide material that is uniform in character and meets the specified requirements.

Acceptable work conforming to the contract will be paid for at the contract unit bid price unless otherwise stated in the specifications or conditions of contract. Three methods of determining conformity and accepting work are described in the Subsections 'Technical Inspection', 'Certification of Compliance' and 'Measurement or Tested conformance' inclusive. The primary method of acceptance is specified in each Section of work. However, work may be rejected at any time it is found by any of the methods not to comply with the specifications and drawings.

Work that does not conform to the project and contract requirements or to prevailing industry standards where no specific contract requirements are noted, shall be removed and replaced at no cost to the Employer.

As an alternative to removal and replacement, the Contractor may submit a written request to the Project Manager to:

(a) Have the work accepted at a reduced price, or

(b) Be given permission to perform corrective measures to bring the work into conformity.

The request shall contain supporting rationale and documentation. When standard manufactured items are specified, (such as fence, wire, plates, rolled shapes, pipe conduits, etc. that are identified by gage, unit weight, section dimensions, etc.) the identification will be considered to be nominal weights or dimensions. Unless specific project and contract tolerances are noted, established manufacturing tolerances will be accepted.

1.01.02 Technical Inspection

Acceptance is based on technical inspection of compliance of executed works with the contract documents and prevailing relevant technical standards. Payment for work during the course of the project will be made as the work progress providing that it meets the conditions of the plans and specifications

1.01.03 Certification of Compliance

Provide materials, fabricated products and structures (further in text "materials") from a manufacturer with an effective testing and inspection system. Require the manufacturer to finish documentation of the testing and inspection systems with a Certificate of Compliance that states the work complies with all contract requirements.

Require the manufacturer to furnish a "product certificate" for material commercially produced to a standard specification. The manufacturer shall clearly mark the material or package with unique product identification. Only one "product certificate" may apply to all the supply of material or product incorporated into the project for the one type of manufactures described.

Require the manufacturer to furnish a "product certificate" for material that:

(a) Is custom made for the project, or

(b) Is produced or shipped in bulk and therefore not readily identifiable as to manufacturer and product, or

(c) Has a specific contract requirement.

A "product certificate shall accompany each shipment of material and place of manufacture as well as the lot number or other means of cross referencing to the inspection and testing system. Furnish specific test results on material from the same lot upon request

Materials or assemblies accepted on the basis of a Certificate of Compliance may be sampled and tested at any time. If found not to be in conformity with the contract requirements, all the materials or assemblies will be rejected weather in place or not until the items in place are tested and approved by the Project Manager.

1.01.04 *Measurement or Tested Conformance*

Provide all necessary production processing and control performance of the work so that all of the work complies with all the contract requirements.

Results from inspection or/and tested used to support acceptance of the work incorporated into the project shall have values within the specified tolerance or specification limits. When no tolerance values are identified in the contract, the work will be accepted based on customary manufacturing and construction tolerances.

1.02 N/A

1.03. Mobilisation

1.03.01 Description

This work consists of moving personnel, equipment, material and accessories to the project and performing all work necessary before beginning work at the project site.

Readiness for commencing works will be considered as fulfilled when the Contractor has provided at least 30% of necessary building materials (bitumen, sand, aggregate, mineral powder) to the site.

All building materials shall have laboratory test certificates on suitability.

1.04 Laboratory Testing

1.04.01 Description

This section contains the description and Specifications for the Site Laboratory and other quality control testing services to be provided by the Contractor together with definition of the responsibilities of the Contractor for such laboratory and testing. Whenever the term ‘Laboratory” is used it shall include the space, utilities and sampling and testing equipment as hereinafter detailed, unless otherwise specified in the Contract documents or the Bills of Quantity.

The Contractor shall provide, to his own design as approved by the Project Manager, a site laboratory for carrying out sampling and testing as required by the technical specifications.

The location shall be as close as possible to the work being done in order to provide continuous control over material being used. The laboratory shall not be removed from the project until so ordered by the Project Manager.

The size and layout of the laboratory shall be suitable to carry out all sampling and testing of materials and workmanship. It shall contain special storage rooms for samples of materials etc., as approved by the Project Manager.

The Contractor shall provide the equipment and consumables necessary for carrying out the sampling, testing and recording required by the Technical Specification and additional numbers of tests instructed by the Engineer.

The Contractor shall provide a sufficient number of qualified personnel to perform sampling and testing duties when so directed by the Engineer. The Contractor shall bear all the costs pertaining to obtaining specimens of materials, asphalt mixes and samples cut from the paving courses after compaction, including the provision of necessary equipment and plant for obtaining these specimens and samples and transporting them to the laboratory and for conducting all tests, all as directed by the Engineer.

The Contractor shall provide a suitable vehicle as approved by the Project Manger with competent driver and including fuel, maintenance, insurance and licensing during the contract period for the exclusive use of the site laboratory. The vehicle should be capable of transporting the driver plus 4 people and samples of materials to be delivered to the site laboratory.

The Contractor shall also provide mobile facilities for sampling and testing which can be carried out in the field at the location of works.

The laboratory shall be maintained in a clean and tidy condition to the satisfaction of the Project Manager.

The laboratory shall be completed and ready for use within 4 weeks of the Start Date. If the Contractor commences any selection or testing of materials for submission to the Project Manager for approval of any permanent works before the 4 weeks period, temporary testing facilities, if approved by the Project Manager, maybe used.

The Contractor shall allow the Project Manager to carry out his own tests for the Contract, using the Contractor laboratory, his equipment, consumables etc., or to have tests carried out by the Contractor's staff

The facilities provided by the Contractor for the Site laboratory shall remain as the property of the Contractor and the Contractor shall remove facilities after completion of the project and receiving final acceptance. He shall restore the site to match the adjacent surfaces and materials as approved by the Project Manger.

Approval of the Laboratory. Prior to the start of the work,the Project Manger shall inspect the proposed laboratory to ensure the Contractor’s compliance with these Specifications. In the event the Contractor fails to comply with these Specifications at any time during the Contract period, the Project Manger may order any or all of the following:

1. Stoppage of all work until the specifications have been complied with;
2. Stoppage of any portion or phase of the work and the Specifications have been complied with;
3. A penalty assessment of for each day that specifications are not complied with, which shall commence 7 days after notification of such noncompliance

Equipment and required tests for the laboratory. The laboratory shall contain at least the equipment to carry out the following tests:

1. Determination of Particle Size Distribution, Granulometric Analysis (Sieving Method)
2. Determination of Particle Density
3. Determination of Particle Shape Of Coarse Aggregate - Flakiness Index
4. Determination of Bitumen Content And Gradation of The Asphalt Concrete Mix
5. Compaction of Bituminous Mixtures Using Marshall Apparatus
6. Maximum Density of Paving Mixtures (% Voids)
7. Sbulk Specific Gravity of Bituminous Paving Mixtures Using Saturated Dry Specimen
8. Percent Of Air Voids In Compacted Dense and Open Bituminous Pavements
9. Determination of Needle Penetration
10. Moisture-Density Relationship
11. Density of Soil In-Place by the Rubber Balloon Method
12. Determination of The Resistance To Abrasion
13. Marshall Stability
14. Determination of CBR

1.05 Record Drawings

The Contractor shall prepare and furnish the Project Manager with accurate record for reconstruction roads and streets drawings to full size and scales as otherwise stipulated showing complete Works as executed with existing and finished levels (top, invert and formation levels, plans, cross and longitudinal sections, locations of all functions, manholes, inlets, extent of concrete beds and structures and all things necessary to form a complete record of the finished Works). Also to be shown are the locations of existing utilities. The Contractor shall provide plans with longitudinal profile and cross sections for sections were asphalt concrete and surface treatment works have been carried out.

The Contractor shall prepare all record drawings to provide accurate and complete record drawings acceptable to the Project Manger. During the course of the work, the Project Manger shall have the right to call for record drawings at any time so that he may check them for accuracy and completeness. The Contractor shall provide a minimum of two prints of each record drawing for this purpose. The Contractor shall finish the record drawings as specified within five days of the date of the request to submit in writing by the Project Manger.

Drawings shall be dated and signed by the Contractor's representative and, if approved, by the Project Manager. The Contractor shall furnish three hard copies of the drawings and three CD's of electronic versions such as AutoCad files, in both English and Georgian languages.

1.06 Traffic Management

1.06.01 Description

The Contractor shall, based on due consultation with and requirements of the Police and relevant Local Authorities, submit a traffic management plan for the Project Manager's consent within 28 days prior to the commencement of any works affecting public or private rights of way. This shall

show the proposed scheme of traffic safety and management measures including all construction details, temporary lighting and signing, and programme of works. Thereafter the Contractor shall provide such further details as necessitated by the Works or required by the Project Manager.

The work consists of controlling and protecting public traffic adjacent to and within the project according to the active traffic rules and regulations in Georgia.

1.06.02 Accommodating Traffic During Work

The Contractor shall provide safe movement of vehicles and pedestrians through work zones in accordance to BCH 37-84. The Contractor shall submit traffic control implementation drawings and alternate traffic control proposals including the following:

1) A detailed diagram, which shows the location of all traffic control devices, including advance construction signs and speed limit signs, method, length and time duration for lane closures; and location of flaggers and time duration of flagging operation.

2) A tabulation of all traffic control devices shown in the detail diagram.

3) An access maintenance plan for all properties requiring access during construction. This plan shall also indicate the areas where equipment will be stored, vehicles parked, construction signs and materials stored, if within the construction site limits. The Contractor shall also indicate ingress and egress to the construction site unless otherwise approved.

4) A pedestrian traffic control plan.

The work should be performed in a manner that assures the safety and convenience of the public and protects the residents and property adjacent to the works. Accommodate public traffic on roads within the project until the work is accepted. The contractor will cooperate with local traffic police and obtain all permission required to implement traffic control plan. All lane closures shall be subject to the approval of the Project Manager. Request for each lane closures shall be made at least twenty-four hours in advance of the time the lane closure is to be implemented. Lane closures will not be allowed to remain for more than needed for work execution.

1.06.03 Maintaining Roadways During Work.

Perform roadway maintenance as follows:

a) Maintain intersections with trails, roads, streets, enterprises, parking lots, residences, guarantees, farms, and other objets.

b) Remove accumulations of soil and other material from travelled way.

The Contractor shall maintain the roadway in a safe and acceptable condition. If corrective action is requested and the corrective action is not taken immediately, the condition may be corrected and the Contractor will be charged for the cost of the corrective action.

1.06.04 Maintain Roadways during suspension of works

Maintain Roadway for public traffic during all work suspensions.

1.06.05 Limitations on construction operations.

When the traffic way is open for public traffic, restrict the construction operations as follows**:**

(a) Operate equipment in the direction of traffic;

(b) Complete construction of adjacent traffic lanes to the same .elevation each day, except that differences in excess of 75 mm with a 3:1 fillet may be left overnight with "Uneven pavement" warning signs

(c) Complete the construction of shoulders to traffic lanes to the same elevation within the period of time specified by the Project Manager. Sign shoulder drop of in excess of 75 mm with a warning sign "Road Works" and plate "Low Shoulder".

(d) Provide minimum lane width of 3.5 meters. Use barricades, drums, or other approved device to delineate traffic lanes through areas where the edge of intended path has been obliterated by construction operation

(e) Locate staging areas at least 4 meters from the traveled way or approved traffic barriers. Obtain approval of the location and access to staging areas. Store unused traffic control devices at staging areas.

(f) Park equipment at least 4 meters from the traveled way or behind approved traffic barriers.

(g) Provide parking areas for employees' personal vehicles in approved areas.

(h) When switching traffic to a completed lane, provide adequate personnel and equipment to set or relocate traffic control devices.

(i) Limit construction caused delays to public traffic.

(j) Install permanent traffic barriers within 30 calendar days of completing the surface course.

1.06.06 Working Hours

The Contractor shall perform construction operations during the hours of daylight (after sunrise to before sunset) or as directed by the Project Manger.

1.06.07 Traffic and Safety Supervisor

The Contractor shall provide a competentTraffic and Safety Supervisor for the project. The Traffic and Safety Supervisor shall:

a) Have traffic safety training or experience in maintaining traffic control devices and protecting traffic through highway construction projects.

b) Understand the contract requirements

c) Understand the uniform requirements for Methods of Roadway Movement of Organization of Roadway Movement, during Roadway Construction, published Moscow 1989.

d) Inspect the condition and position of traffic control devices in use.

e) Review the project for traffic control devices needed to maintain safe and efficient traffic movement.

f) Correct all traffic control deficiencies

g) Coordinate maintenance of traffic operations with the Project Manager

h) Review work areas, equipment operation and storage, and material handing and storage related to traffic safety

i) Conduct weekly traffic safety meetings for contractor's employees. Advice the Project Manager of improved safety measures. Invite the Project Manger to attend these meetings.

1.07 Control of Material

1.07.1 Source of Supply and Quality Requirements

The Contractor selects sources and provides acceptable material. Notify the Project Manager of all proposed sources before delivery to the project, to expedite material inspection and testing. The Contractor shall not incorporate material requiring submittal testing into the work until approved.

Material must be approved at the source of supply before delivery to the project. This approval does not constitute the acceptance of material. If an approved source does not continue to supply acceptable material during the life of the project, further use of that source may be denied.

1.07.2 Local Material Source.

Source of rock, sand, gravel, earth, of other natural material location will be used by the permission of the Employer. Indicated sources are listed as information to aid the Contractor in locating a source. The decision to use an unidentified source is solely that of the Contractor.

(a) **Employer-listed sources.** The Employer may list possible material sources. The Employer makes no representation as to the quality or quantity of material, or rights to the availability of the material from these sources. These sources are considered to be Contractor-located sources under (b) below.

(b) **Contractor-located sources.** The Contractor is responsible for these sources, including established commercial sources. Use sources that fulfill the contract quantity and quality requirements. Determine the quantity and type of equipment and work necessary to select and produce acceptable material. Secure all clearances for use of the source and provide copies of the document.

Provide laboratory tests report and data indicating the acceptable material is available from the source .Do not use material from a source that is unacceptable to the Employer. Dispose of unacceptable material and locate another source at no cost to the Employer.

1.07.3 Storing and Handing Material

Store and handle material to preserve its quality and fitness for the work. Stored material approved before storage may again be inspected before use in the work. Locate stored material to facilitate prompt inspection.

Use only approved portions of the right-of-way for storing material and placing plants and equipment.

Provide all additional space needed. The Contractor shall not use private property for storage without written permission of the owner or lessee. Restore all Employer provided storage sites to their original condition.

The Contractor is responsible for the security of all stored material.

1.07.4 Use of Material Found in the Work.

The right to use material found in the work does not include the use of material for other work except for the disposal of waste material. Waste material must be disposed on site if approved by the Project Manager. The Contractor shall be responsible for locating and securing off site waste if required, at no cost to the Employer. If the Contractor produces or processes material from Employer lands in excess of the quantities required for the contract, the Employer may:

(a) Take possession of the excess material and direct its use, paying the Contractor only for the cost of production, or
(b) Require removal, replacement with suitable fill material and recondition of the over excavated area to a satisfactory condition at no cost to the Employer.

1.08 Construction Material

1.08.1 Cement

Portland and Masonry Cement

Portland Cement and Masonry Cement shall be according to GOST 10178

Do not use different brands or types of cement, or the same brand or type of cement from different mills without approval of the Project Manager.

Provide suitable means of storing and protecting the cement from dampness. Do not use cement that:

(a) Has become partially set
(b) Contains lumps of caked cement
(c) Is salvaged from discarded or previously opened bags.

1.08.2 Bitumen

Bitumen shall comply with GOST 22249-90 and corresponds to the grade shown on the drawings or listed in the specifications.

Requirements to the quality of heavy bitumen (GOST 22245-90), Table 1

Indices	B 40/60	B 60/90	B90/130	B 130/200	Test Methods
Penetration under 25°C 0.1 mm, not less than 0°C	40-60 13	61-90 20	91-130 28	131-200 35	GOST 11501
Softening temperature	51	47	43	40	GOST 11505
Spreading in cm. not less + 25°C°C	45 -	55 3.5	65 4.0	70 6.0	GOST 11505
Brittle temperature not more °C	-12	-15	-17	-18	GOST 11507 Att., 3.2.
Flash point °C	230	230	230	230	GOST 4333
Softening temperature after warm-up, not more °C	5	5	5	6	GOST 18180 GOST 11506 Att., 3.3.
Penetration index	From -1.0 to +1.0				Attachm. 2
Water content %, not more	0.30	0.30	0.30	0.30	GOST 11510

Application Temperatures.

Bitumen should be applied under the temperature ranges shown below in accordance with GOST 22245-90.

Bitumen	Application temperature in °C
B 40/60	130 - 150
B 60/90	130 – 150
B 90/130	130 - 150

Bitumen Supply and Quality Control

Bituminous material will be supplied by the Contractor.

The Contractor has to provide for Project Manager's approval quality certificate for each type of bitumen he intends to use as well as a sample for control testing.

1.08.3 Aggregates

Aggregate for Portland Cement Concrete

Aggregate for Portland Cement Concrete shall conform to VSN 24-88 (17.5.21-5.5-23).

Aggregate for Subbase and Base (SNiP 2.05.02-85)

Aggregates shall consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel meeting the requirements of GOST 8267-93.

Furnish a material that is free from organic matter and lumps or balls of clay. Do not use material that break up when alternately frozen and thawed or wetted and dried.

Obtain the aggregate gradation by crushing, screening, and blending processes as necessary. Fine aggregate, material passing the 5 (6) mm sieve, shall consist of natural or crushed sand and fine mineral particles.

Hot Asphalt Concrete and Surface Dressing Aggregates

Aggregate for hot asphalt concrete pavement and surface dressing shall consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel. Crushed gravel must contain completely crushed particles accounting for at least 30 % by weight of particle sizes in excess of 6 mm and completely uncrushed particles accounting for no more than 30 % by weight. The aggregate may not contain any detrimental amount of impurities, such as clay, peat, organic matter etc.

Aggregates for hot asphalt concrete and surface dressing shall meet also the requirements of GOST 8267-93 and GOST 10260-82

The Los Angeles Test Value shall be less than 16 and the Flakiness Index less than 15 for coarse aggregate. (Strength can be measured by using GOST method, if ball mill apparatus is not available). Aggregate for hot asphalt concrete must be sieved to at least three fractions. Size, grade, and combine the aggregate fractions for the mixture in such proportions that the resulting composite blend conforms to the requirements of section 'Hot Asphalt Concrete Pavement'.

1.08.4 Sand (natural or crushed)

Requirements for fine aggregate in bituminous mixtures are shown in GOST 8736-85. Sand for bed course shall conform to SNiP 3.06.03.85.

1.08.5 Mineral Filler

Mineral filler for hot bituminous mixes shall conform to GOST 16557-78.

1.08.6 Water

Only potable water may be used. Water used for concrete shall meet the requirements of GOST 23732-79.

1.08.7 Alternative Materials

The Contractor may propose the use alternative materials to the ones specified in the design. In these cases, the Contractor shall inform the Project Manager about his technical proposal at least 4 weeks before the material is to be used.

1.09 Possession of Site

1.09.1 Description and Requirements

The operations of the Contractor shall be confined to the area of and immediately adjoining the works included in this Contract. Clearance shall be kept to the satisfaction of the Project Manager to permit the statutory authorities or other Contractors to enter the site to carry out other works and to maintain the free flow of traffic so far as is practical with safety on the existing carriageway.

The Contractor shall obtain the approval of the Project Manager for the setting of temporary roads, diversions, paths etc., necessary for the execution of the Contract.

The Contractor must allow for safe crossing by construction traffic of existing roads and tracks.

Where it is necessary to work outside the road reserve and to enter either private or occupied land during the course of road construction or maintenance for the purpose of making temporary road diversions, widening road construction or maintenance materials or for any other reason, the land owner or occupier shall first be consulted by the Contractor and his written permission obtained.

In the event of the owner or occupier withholding their permission, the full circumstances of the case shall be referred to the Project Manager and no further action shall be taken until his instructions are received. In that case the Contractor will not be liable for compensation for idle time.

When the Contractor intends to move his establishment to a new location during the construction period, advance notice of at least 14 days must be given to the Project Manager. The Contractor must allow in his rates for such intended moves.

1.10. Health, Safety and Accidents

1.10.1 Description and Requirements

The Contractor shall ensure, so far as is reasonably practicable and to the satisfaction of the Project Manager, the health, safety and welfare at work of his employees including those of his sub-contractors and of all other persons on the Site. His responsibilities shall include:

(a) the provision and maintenance of Constructional Plant and systems of work that are lighted, safe and without risks to health;
(b) the execution of suitable arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;
(c) the provision of protective clothing and equipment, first aid stations with such personnel and equipment as are necessary and such information, instruction, training and supervision as are necessary to ensure the health and safety at work of all persons employed on the Works all in accordance with Laws and all local Bye-Laws;
(d) designation as Safety Officer of one of his senior staff who shall have specific knowledge of safety regulations, and experience of safety precautions on similar works and who shall advise on all matters affecting the safety of workmen and on measures to be taken to promote such safety;

(e) the provision and maintenance of access to all places on the Site in a condition that is safe and without risk of injury;
(f) the provision of adequate water-borne sanitation, refuse collection and disposal, complying with the Laws and all local Bye-Laws and to the satisfaction of the Project Manager, for all houses, offices, workshops, and laboratories erected on the camp site or sites;
(g) the provision of suitable latrines and other sanitary arrangements at sites where work is in progress to the satisfaction of the Medical Officer in the area and of the Project Manager;
(h) the execution of appropriate measures in consultation with the appropriate Public Health Authority to control within the Site, including the camp sites, mosquitoes, flies and pests including the application of suitable chemicals to breeding areas;
(i) reporting details of any accident to the Project Manager as soon as possible after its occurrence.

1.11 Environmental Protection

All works must be undertaken in full compliance with the Envionmental and Social Management Plan provided by the Employer and the national environmental legislation of Georgia.

1.12 Basic Survey and Setting Out

1.12.1 Description

This section covers the setting out of the horizontal alignment, taking and setting levels (survey beacons) and the general site clearance, stripping of topsoil and removal of bushes and trees, structures and other obstructions.

1.12.2 Basic Survey

The Project Manager will provide sufficient basic survey information to enable the Contractor to set out the Works and the Contractor shall be responsible for setting out all necessary reference points and for the maintenance thereof.

Should the Contractor discover any error in line level, or dimension in the basic survey information provided by the Project Manager, he should at once notify the Project Manager. If the information is confirmed to be in error the Project Manager will issue amended drawings or instructions regarding the correction of the error.

Prior to commencing construction, the Contractor shall establish reference points to define the road construction limits at 100 m intervals on both sides or at other intervals instructed by the Project Manager.

The Contractor shall establish temporary benchmarks along the road at intervals not exceeding 200 m and shall provide the Project Manager with a schedule of their levels and locations.

1.12.3 Detailed Setting out

The Contractor shall set out the line and level of the Works at intervals of not more than 25 m or such lesser intervals as are required to construct the Works. Reference pegs clearly and indelibly marked with all relevant information shall be provided clear of the road and at right angles to it

from which the centre line and level can be re-established at any time. These shall be maintained by the Contractor as long as they are needed by the Project Manager to check the work.

1.12.4 Levels

After completion of setting-out and site clearance, the Contractor shall take ground cross-sections at intervals of 25 m, or such intervals as the Project Managermay require, and these shall be plotted and submitted to the Project Manager for agreement. If the Contractor fails to take the requisite levels, levels determined by the Project Manager shall be taken as correct.

The Contractor shall programme for a period of 21 days between submitting the ground cross-sections and being issued with final road levels. Final road levels will be determined by the Project Manager after studying the original ground cross-section levels following site clearance and may be different from the road levels shown on the drawings.

1.12.5 Survey Beacons

The Contractor shall not remove, damage, alter or destroy in any way any plot beacons, survey beacons of the National Survey of Georgia or those reference beacons positioned by the Design Consultants for this project.

Should the Contractor consider that any beacon will be interfered with by the works he shall notify the Project Manager who, if he considers necessary, will make arrangements for the removal and replacement of the beacon.

If the Contractor removes or disturbs a beacon without permission of the Project Manager, he shall be liable for the full cost of its replacement and, as appropriate, a fine under the Survey Ordinance in force.

SECTION 2, PREPARATORY WORKS

2.01 Site Clearance

2.01.1 Description

This section covers general site clearance, and removal of bushes and trees, structures and other obstructions

2.01.2 Construction Requirements

No clearance of or alteration to any main service or apparatus shall be done unless specifically ordered by the Project Manager.

Site clearance is defined as the clearing, grubbing, removal and disposal of all vegetation, grass, debris, bushes, scrub, dense bush, trees, hedges, undergrowth, stumps, roots, shrubs, plants and backfilling of holes left by the removal of stumps and roots.

The width and length over which site clearance is to be carried out shall be shown on the Drawings or instructed by the Project Manager.

Site clearance over the area of quarries, borrow pits, stockpiles, spoil tips, road junctions, ditches and drains and other areas shall be carried out where shown on the Drawings or instructed by the Project Manager.

The Project Managermay give instructions that specific trees, stumps or objects shall not be removed during the site clearance operation.

Dispose of clearing and grubbing debris off the project site to a dump area approved by the Project Manager.

2.02 Clearing and Re-grading of Existing Ditches

2.02.1 Description

This work consists of all clearing, grubbing and re-grading of existing ditches for the project.

2.02.2 Construction Requirements

Clear, grub and re-grade as required for ditches. Remove debris by methods that prevent damage to vegetation not be removed. Dispose of clearing and grubbing debris off the project site to a dump area approved by the Project Manager.

Slope, grade, and shape existing ditches. Remove all roots, stumps, rock, or similar matter. Maintain all ditches in an open condition and free from leaves, sticks, and other debris.

2.03 Removal of Structures, Obstructions and Trees

2.03.1 Description

This work consists of salvaging, removing, and disposing of trees; signs and posts; sign pole mounts, and any other obstructions.

2.03.2 Material

Material shall conform to the following Subsection ‘Backfill material’

2.03.3 Construction Requirement

Salvaging material. Salvage, with reasonable care, all material designated to be salvaged. Salvage in readily transportable sections or pieces. Replace or repair all members, pins, nuts, plates, and related hardware damaged, lost or destroyed during the salvage operations. Wire all loose parts to adjacent members or pack them in sturdy boxes with the contents clearly marked.

Stockpile salvaged material to a designated area on the project.

Removing Material. Saw cut curbs and pavements when partial removal is required.
Except in excavation areas, backfill and compact cavities left by removal of structures with backfill material in horizontal layers not exceeding 20 cm in depth. Bring backfill up evenly on all sides

of the cavity and/or structure as appropriate. Extend each layer to the limits of the excavation or to natural ground. Compact backfill with small approved mechanical or vibratory compactors.

Cutting of trees. Remove trees designated by the Project Manager. Trunks of the trees and major roots shall be removed under travelled way and shoulders to 1 m depth from surface of the road. On other areas trees shall be cut to the same level as the surface of the area. Backfill and compact cavities left by removal with backfill material to the level of the finished ground.

Disposing of Material. Dispose of material not designated for salvage as follows:

(a) Removal from the Project. Make necessary arrangements with property owners and haul debris to suitable disposal locations. Furnish a signed copy of the disposal agreement to the Project Manager.

(b) Burn. Obtain necessary burning permits. Furnish a copy of the burning permits to the Project Manager before burning begins. Use high intensity burning processes that produce minimal emissions. Provide a competent watch person during the burning operation. When burning is complete, extinguish the fire. Dispose of unburned material according to (a) above.

2.04 Utilities

2.04.1 Description

The work under this Section includes but is not limited to the relocation, replacement and rerouting of all utilities located on the Project. The contractor is responsible for working closely with any utility company having their infrastructure located within the public right-of-way.

2.04.2 Material

Materials used in the repairing, replacing, rerouting of any utility company's equipment shall be compatible with the existing utility and approved by the utility company's representative.

2.04.3 Construction Requirements

Before any construction is begun the Contractor shall notify the utility companies of the proposed work area and request that they mark the location of any types of equipment in the area.

The Contractor shall establish the position of existing services such as pipelines, sewers, surface water drains, cables for electricity and telephones, overhead lines and water mains, before starting any excavation or other work likely to damage them.

The Contractor shall be responsible for arranging in liaison with the appropriate Authority, the moving of or alterations to services such as pipelines, power and telephone lines, water mains, sewers and surface water drains which are affected by the Works. The arrangements for such moving or alteration shall be subject to the agreement of the Project Manager and the appropriate Authority.

The Contractor is responsible for any and all damage caused to any utility during construction and shall repair them with his equipment or, if the utility company desires, they shall be allowed a free use of his equipment and personnel as required in order to complete repair works.

Should the utility company chose to repair the damaged utility themselves costs incurred shall be the responsibility of the Contractor.

If any utility equipment is encountered in the proposed work area the Contractor shall submit to the Project Manager for approval his proposal to relocate the utility outside the construction limits in writing. This proposal shall include, but not be limited to the proposed duration of the works, plans and details of a new utility route, materials to be used, together with any required certification that the material meets the utility company's specification and details of protection methods to be used for any utility materials to be left in place. After the utility has been rerouted the interested utility company shall be notified to inspect the work prior to commencing the backfill operation. The Contractor shall take all necessary steps required and as directed by the Project Manager to ensure that all utilities are protected from damage by frost.

SECTION 3, EARTHWORKS

3.01 Excavation and Embankments

3.01.1 Description

This type of works include all works on road sub-grading, excavation,embankments (soil replacement, layer by layer placing and soil compaction, road-bed layout and slope grading) in accordance to designed profiles.

3.01.2 Definitions

(a) Excavation. Excavation consists of the following:

(1) Roadway excavation. All material excavated from within the right-of-way or easement areas, except subexcavation specified below in (2). Roadway excavation included all material encountered regardless of its nature or characteristics.

(2) Unsuitable material excavations. Unsuitable material excavated from below subgrade elevation or from below the natural ground in embankment sections. Excavation does not include conserving the top soil.

(3)Borrow excavation. Material used for embankment construction that is obtained from outside the right of way limits of the project road. Borrow excavation includes unclassified borrow, select borrow, and select topping.

(b)Embankment construction shall be done following the requirements of SNiP 2.05.02-85.

(c) Embankment material.

There is no limitation in using of soils and slag that change their strength and stability only slightly under the influence of weather and climate. Where rock-fill is being used, a leveling course of not less than 0.5 m in thickness shall be provided on the fill between embankment and road pavement, The material for this layer should be of uniform grain size not exceeding 0.2 m in size. When the soil embankment is designed, if the moisture content of the material exceeds the permissible limit, arrangements to provide the required stability of subgrade shall be foreseen in accordance with Clause 6.31 of SNiP 2.05.02-85.

Permissible soil moisture content during the compaction

Soil type	Permissible moisture content $W_{ôâü}$ in percentage of optimal moisture content under the required degree of compaction m_b			
	1.0	1.0-0.98	0.96	0.90
Clayey sand; light, coarse-grained loamy sand	1.3	1.35	1.6	1.6
Light and clayey loamy sand	1.20	1.25	1.35	1.6
Heavy clayey loamy sand and light clayey loam	1.10	1.15	1.30	1.50
Heavy loam and heavy clayey loam, clay	1.0	1.05	1.20	1.30

The upper layer of subgrade (operational layer) shall consist of non-swelling and non-subsidence soil
(SNiP 2.05.02.-82 Attachment tables 4, 5)

Soil variety (under 0.5 Wo moisture content)	Relative deformation of swelling, thickness % of moistening layer)
non-swelling	less than 2

Soil variety	Coefficient of subsidence	Relative deformation of subsidence, thickness % of wetting layer
Non-subsidence	aver.moist. 0.92	Less than 2

(d) Conserved topsoil. Excavated material conserved from the excavation and embankment foundation areas that is suitable for growth of grass or other cover plants. A material reasonable free from hard soil, rock, clay, toxic substances, litter, or other deleterious material shall be used according to SNiP 3.06.03-85 and SNiP 2.06.02-85.

3.01.3 Material

Material shall conform to SNiP 2.05.02-85 and SN 449-72

3.01.4 Construction Requirements

Preparation for Roadway Excavation and Embankment Construction.
Clear the area of vegetation and obstructions according to section ‘Site Clearance’ and ‘Clearing and Re-grading of Existing Ditches’.

Conservation of Topsoil. Conserve topsoil from roadway excavation and embankment foundation areas. Stockpile conserved topsoil in wind rows immediately beyond the rounding limits of cut and embankment slopes or in other approved locations. Separate topsoil from other excavated material.

Roadway Excavation. Excavate according to SNiP 3.06.03-85. The preparation of subgrade for earthworks shall be done in accordance with 4.6-4.12 of SNiP 3.06.03-85, and excavation and embankment works in accordance with 4.13-4.25 and 4.51-4.56 of SNiP 3.06.03-85. The

compaction degree of subgrade, defined by compaction ratio, shall meet the requirements of SNiP 2.05.02-82 table 22.

Material Replacement. Excavate unsuitable material to the limits designated by the Project Manager. Prevent unsuitable material from becoming mixed with the backfill. Dispose of unsuitable material as approved by the Project Manager. Backfill the subexcavation with topping, or other suitable material. Compact the material according to Subsection 'Compaction' below.

Borrow Excavation. Do not use borrow excavation until all suitable roadway excavation is used. Use select borrow and select topping as shown on the plans. All excess borrow excavation will be deducted from the appropriate borrow excavation quantity.

Obtain borrow source approval according to Subsection 'Local Material Sources'. Develop and restore Government located and provided borrow sources as approved by the Project Manager. Do not excavate beyond the established limits. When applicable, shape the borrow source to permit accurate measurements when excavation is complete. The borrow pit shall be landscaped after the excavation.

3.01.5 Preparing Foundation for Embankment Construction.

Prepare the foundation for the embankment construction as follows:

(a) Embankment less than 1.2 m high over natural ground. Completely break up the cleared ground surface to a minimum depth of 150 mm by ploughing or scarifying. Compact the ground surface according to Subsection 'Compaction' below.

(b) Embankment less than 0.6 m high over an existing asphalt, concrete, or gravel roadsurface. Scarify gravel roads to a minimum depth of 150 mm. Scarify or pulverize asphalt and concrete surfaces to 150 mm below the pavement. Reduce all pieces to a maximum size of 150 mm and a uniform material, prior to placing embankment.

(c) Embankment across ground not capable of supporting equipment. Dump successive loads of embankment material in a uniformly distributed layer to construct the lower position of the embankment. Limit the layer thickness to the minimum depth necessary to support the equipment.

(d) Embankment on an existing slope steeper than 3:1. Cut horizontal benches in the existing slope to a sufficient width to accommodate placing and compacting operations and necessary equipment. Bench the slope as the embankment is placed and compacted in layers. Begin each bench at the intersection of the original ground and the vertical cut of the pervious bench.

3.01.6 Embankment Construction.

Construct embankment conforming to the requirement of SNiP 3.06.03-85.

3.01.7 Compaction.

Compact as follows:

(a) Rock embankment. Adjust the moisture content of the material to a moisture content suitable for compaction. Compact each layer of material to the full width with:

(1) Two passes of 20 - 25 t compression-type roller, or
(2) Two passes of a vibratory roller having a minimum dynamic force of 18 t impact per vibration and a minimum frequency of 1,000 vibrations per minute, or
(3) Eight passes of 9 t compression-type roller or
(4) Eight passes of a vibratory roller having a minimum dynamic force of 13.6 t impact per vibration and a minimum frequency of 1,000 vibrations per minute.

Proportion the compactive effort for layers deeper than 300 mm as follows:
For each additional 150 mm or fraction thereof, increase the number of roller passes in (1) and (2) above by two.
For two additional 150 mm or fraction thereof, increase the number of roller passes in (3) and (4) above, by four.
Operate compression-type rollers at speeds less than 6 km/h and vibratory rollers at less than 2.5 km/h.

(b) Earth embankment. Adjust the moisture content of the material to within 2 per cent of the optimum moisture content. Determine the optimum moisture content according to AASHTO T 180-93 use Method C or Method D as appropriate (GOST 22733-77 is also acceptable).

Compact material placed in all embankment layers and the material scarified to a uniform density of not less than 95 per cent of the maximum density. Determine the maximum density according to AASHTO T 180-93. When more than 50 per cent of the material passes the No. 4 (4.75 mm) sieve, use Methods C. Use Method D for earth with 50 per cent or more retained on the No. 4 (4.75 mm) sieve. The maximum density may be determined in conformity with GOST 22733-77, if approved by the Project Manager.

Determine the in-situ density and moisture content using AASHTO T 205-86 or other approved test procedures. When required, use AASHTO T 224-86 to correct for coarse particles. The density and moisture content may be determined in conformity with GOST 5180-84 and using Kovalev device if approved by the Project Manager.

3.01.8 Ditches

Slope, grade, and shape ditches. Remove all projecting roots, stumps, rock, or similar matter. Maintain all ditches in an open condition and free from leaves, sticks and other debris.

Form furrow ditches by plowing or using other acceptable methods to produce a continuous furrow. Place all excavated material on the downhill side so that the ditch is approximately 500 mm below the crest of the loose material. Clean the ditch using a hand shovel, ditcher, or other suitable method. Shape to provide drainage without overflow.

3.01.9 Sloping, Shaping, and Finishing.

Slope, shape, and finish according to SNiP 3.06.03-85.

3.02 Ditch Construction

3.02.1 Description

This work consists of constructing new ditches and provision and installation of rip rap protection where required..

3.02.2 Construction Requirements

Preparation for Ditch Construction
Clear the area of vegetation and obstructions.

Ditches
Excavate ditches according to the Drawings. Slope, grade and shape ditches. Remove all roots, stumps, rock, or similar matter. Maintain all ditches in an open condition and free from leaves, sticks, and other debris. No extra material is allowed to be left on ditch edges.

Rip-Rap

The work shall consist of a protective covering of stone, constructed on an earth bed. Rip-rap shall be constructed at the locations and in conformity with the dimensions shown on the plans or designated by the Project Manager.

Rip-rap materials, for culverts and other drainage work, shall consist of hard and durable field stones, boulders, or quarry rock that is resistant to weathering and water action and free of organic and spoil material. Do not use boulders, shale, or rock with shale seams. Conform to the following:

(a) Apparent specific gravity, AASHTO T 85	2.50 min.
(b) Absorption, AASHTO T 85	4.2% max.
(c) Coarse durability index, AASHTO T 210	52 min.

The diameter of the largest stone size should be 1.5 times the d_{50} size.

Excavation for Rip-rap

Aprons and slopes to be rip-rapped shall be excavated to provide adequate foundation upon which the rip-rap shall rest, as shown on the plans or specified by the Project Manager. The whole area to be rip-rapped shall be trimmed to a uniform and even surface. Ensure area is sufficiently stable and compacted to receive the stone.

A geotexile membrane shall be placed on top of the earth bed prior to placing the rip-rap, as shown on the Drawings.

Rip-rap shall be placed in such a manner that all relatively large stones shall be essentially in contact with each other, and all voids filled with the finer materials to provide a well graded compact mass. The stone shall be dumped on the slope in a manner that will ensure the riprap attains its specified thickness. When dumping or placing, care shall be used to avoid disturbing the underlying material. Sufficient hand work shall be performed to produce a uniform surface.

Tolerance for riprap shall be plus 150 mm, with no under-tolerance permitted.

After installation is complete, the area surrounding the rip-rap shall be cleared of all debris.

3.03 Milling of Bituminous Bound Pavement

3.03.1 Description

This work consists of milling of existing asphalt pavements, breaking down material and adding gradation as necessary to comply with the requirements of granular subbase and base material.

3.03.2 Construction Requirements

Where cold-milling of bituminous bound flexible pavement is required, the area of carriageway to be milled shall be removed by a suitable milling machine. The process shall be carried out so as not to produce excessive quantities of dust, which shall be minimized by damping with water sprays.

The cut edges shall be left neat, vertical and in straight lines. The Contractor shall brush and sweep the milled surface by mechanical means to produce a clean and regular running surface with a groove depth not greater than 10 mm, and with a uniform texture.

Existing ironwork shall not be disturbed by the milling action. Where necessary, surfacing in the vicinity of ironwork and in small or irregular areas shall be cut out by pneumatic tools or other suitable methods and removed.

Where milling is carried out on a carriageway open to traffic, temporary ramping to ensure the safe passage of vehicles shall be provided.

If the milled surface profile varies by more than 10 mm, when measured transversely or longitudinally by a 3 meter straight edge, adjustments or replacements shall be made to the cutting teeth on the milling drum before work continues. Any discontinuity between adjacent milling passes exceeding 10 mm, when measured transversely by a 3 meter straight edge, shall be rectified by further milling or regulating before placing bituminous materials.

Where milling is required over extensive areas, the Contractor shall programme the work to allow removal of full lane widths unless this is impracticable. The Contractor shall notify his proposed programme of milling to the Project Manager prior to commencement of the work.

Immediately after milling, surplus materials shall be removed by a machine of suitable and efficient design and the milled surface swept to remove all dust and loose debris.

The material removed from the carriageway shall be removed from site, unless otherwise directed by the Project Manager. No stockpiling shall be allowed on Site unless the material is to be used in the Works.

Carriageways which are closed to traffic to permit milling shall be resurfaced after milling prior to reopening the carriageway to traffic unless otherwise agreed by the Project Manager.

48 hours prior to cold-milling the Contractor shall carry out a sweep of the area(s) to locate any buried metalwork within the layer to be cold-milled. The sweep shall be carried out with electronic detection equipment suitable for the purpose. The surface shall be clearly marked above all objects to show their detected extent. The objects shall be referenced and their location and depth reported to the Project Manager within 6 hours of discovery. Surfacing in the vicinity of such objects shall be excavated using pneumatic tools or other suitable methods.

The existing bituminous pavement made from cold asphalt shall be milled and sieved to grading for re-use as subbase material or base material. The existing bituminous pavement material does not conform to any given grading, but consists locally of larger gravel and finer material.

SECTION 4, PAVEMENT

4.01 Sealing of Cracks and Joints and Patching

4.01.01 Description

This work consists of saw cutting (when applicable) patching of potholes, reconditioning of designated areas of asphalt pavement, and cleaning and filling cracks and joints in the asphalt pavement.

4.01.02 Material

Material shall conform to the following:

Bitumen	GOST 22245-90
Aggregate	AC 8
Joint sealant	GOST 25192-82 and 26633-85

4.01.03 Construction Requirements

Equipment

Furnish the equipment with the following capabilities:

(a)Compressed air lance.A lance capable of providing clean, oil-free compressed air at a volumepressure and temperature necessary to apply the sealant.

(b) Application wand.A crack sealant applicator wand attached to a heated hose that is attached to a heated sealant chamber should be supplied as directed by the Project Manager. The temperature controls shall maintain the temperature of the sealant within tolerances given by the manufacturer.

(c) Heating kettle. An indirect-heating-type double boiler with a space between the inner and outer shells filled with oil or other heat Take-Over medium capable of constant agitation volume. Provide an accurate and calibrated thermometer having a range from 100°C to 350°C in 5°C graduations. Locate the thermometer so that the temperature of the joint sealant may be safely and reliably checked.

(d) Squeegee.A hand-held squeegee for ensuring that the crack is filled to the existing surface.

(e) Pneumatic hammer. A pneumatic hammer shall be used for cutting out deformed sections of the asphalt pavement.

Crack Cleaning and Sealing

Clean the existing surface of all loose material, dirt, or other deleterious substances by brooming, flushing with water, or other approved methods. Clean all cracks and/or potholes with an average opening of 6 mm or more to make a sealant reservoir to the depth of the crack or at least 20 mm deep. Dry cracks before sealing.

When using the hot-compressed air lance, keep it moving so as not to burn the surrounding pavement and the join. Place and finish the sealant within 5 minutes after heating with the hot-compressed air lance.

Seal with hot-poured elastic sealant.Immediately screed the joint sealant or asphalt mixture to the elevation of the existing surface. Use a squeegee to ensure that a 75 mm wide band is centered on the finished sealed crack. Cover the sealed crack with a light application of blotter.

Resealing Defective Joints or Cracks. Reseal areas exhibiting adhesion failure, damage, missed areas, foreign objects in the sealant, or other problems which may accelerate failure.

Patching of potholes and designated areas. Cut sides of the area to form vertical sides and straight edges, remove and dispose of material in an area designated by the Project Manager. Depth of the cut must be $\geq$ 30 mm. Patch the areas with approved asphalt concrete mix that conforms to and is compatible with the adjacent pavement structure. Where lower layer or base course are necessary to prepare, construct them to meet the requirements as directed by the Project Manager. Tack coat must be applied according to Section 'Bitumen Prime and Tack Coat' prior to filling the holes. The patch must make an even surface with the adjacent surface requirements roughness.

4.02 Leveling Courses

4.02.1 Description

This work consists of building a leveling course of hot asphalt concrete mix.

4.02.2 Material

The applicable hot asphalt concrete mix and materials for mix fabrication shall conform to the requirements for fine graded porous asphalt concrete. Hot asphalt concrete mix and materials shall conform to GOST 9128-84. Bitumen content can be reduced as directed by the Project Manager.

4.02.3 Construction Requirements

General. The mix design and placing, and the equipment used shall meet the requirements of the relevant Subsections of Section 4, 'Pavements'.

The lowest limit of compaction shall conform to 0.98 (98 %). The thickness of the leveling layer shall conform to the design thickness.

The completed leveling shall also meet the requirements of SNiP 3.06.03-85 regarding surface roughness and cross fall.

Mixing and Spreading. Prior to placement of the leveling layer the existing asphalt surface shall be prepared according to the Section 'Bitumen Prime and Tack Coat'. Carefully place tack coat as specified in section 'Bitumen Prime and Tack Coat' to all surfaces to be leveled. Measure the aggregate and asphalt into the mixer according to the approved job mix formula, mix until all the particles are completely and uniformly coated with asphalt. If the thickness of the leveling layer is less than 50 mm, the maximum aggregate size of the hot asphalt concrete asphalt shall be 8 mm. Maintain the discharge temperature within the approved range given in sub-section 'Hot Asphalt

Concrete Pavement'. Spread the mixture on the prepared surface in a uniform layer. Do not place the mixture in a layer exceeding 50 mm in compacted thickness. When more than one layer is necessary, shape and compact each layer before the succeeding layer is placed. Approved asphalt paving equipment shall be used for laying leveling courses. On small areas as instructed by the Project Manager, hand spreading is acceptable. Shape the final layer to line, grade, and cross-section. Tack coat between layers will be applied (if required by the Project Manager) according to Section 'Bitumen Prime and Tack Coat'. No traffic will be allowed during the application of the tack coat.

Acceptance Sampling Procedure. Gradation, bitumen content of the mix and density of the course shall be tested according to the Subsection 'Hot Asphalt Concrete Pavement'.

Compacting. At least two rollers shall be required at all times: one self-propelled pneumatic-tired and one steel-wheeled roller. As many additional rollers as necessary shall be used by the Contractor to provide specified asphalt density and surface characteristics in an orderly, efficient and continuous manner.

Immediately after asphalt mix has been spread the surface shall be checked and any irregularities adjusted.

To prevent adhesion of the mix to steel-wheeled rollers, the wheels shall be kept properly moistened but excess water will not be permitted. Only water is accepted for moistening, solvents such as gasoline, diesel etc. are strictly forbidden.

Rolling shall start longitudinally at the sides of the road and shall gradually progress towards the center. On superelevated sections, rolling shall begin on the low side and progress to the high side. The line of rolling shall not be charged suddenly or the direction reversed suddenly.

Surface Tolerance. Use a 3 m straight edge to measure the final surface in cross and longitudinal directions. A defective area is in this case an area with surface deviations of more than 6 mm in either of the directions. Correct all defective areas by loosening the material, adding or removing material, reshaping and compacting.

4.03 Granular Subbase and Base Course

4.03.1 Description

This Section covers the provision, laying and compacting of natural gravel material for sub-base and base courses.

Road base: Part of road structure, which provides distribution of traffic load, as well as reduces the pressure, on sub-base layers of pavement structure or directly on subgrade.

Sub-base layers (frost-resisting -, filter -courses): Layers between subgrade and upper pavement layers providing frost-resistance and drainage of pavement as well as preventing the mixing of pavement structure from subgrade.

4.03.2 Materials

Sub-base layers: Sand and gravel (sand and crushed stone) mix for sub-base layers shall meet the requirements of GOST 25607-83 and of the table 45 of SNiP 2.05.02-85;

Mix Number	Total remainder, % in mass, on sieves of holes size, mm								
	70	40	20	10	5	2.5	0.63	0.16	0.05
1	0	10-20	20-40	25-65	40-75	60-85	70-90	90-95	97-100
2	0	0-5	0-10	10-40	30-70	45-80	60-85	75-92	87-100

Crushed stone (gravel) of mix for additional base layers for roads of I - III categories shall have the strength grade of not lower than 200 (crushability shall be at least 24 for gravel and aggregate made out of gravel).

For filter layers of pavement the sand in accordance with GOST 8736-93 is permissible without additional testing, if the fraction of less than 0.14 mm in grain size is less than 25% of the total mass and clay fraction of no more than 5% of the total mass. The clay fraction for natural sand shall not be more than 0.5% of the total mass and for crushed stone not more than 1%, respectively. The permeability under maximum density shall not be less than 1 m/day (SNIP2.05.02-85, p.7.49).

Base course: Materials to used for crushed stone and gravel pavement, and for base-course shall meet the requirements of GOST 25607-83 (mix No.3 and 5 for pavement and No.1,2,4,6 and 7 for base-course) (p.7.47 SNiP 2.05.-2-85). Grade on strength and frost-resistance of crushed stone/gravel in the mix shall meet the requirements of table 44 of SNiP 2.05.02-85.

Property indices of stone materials	For pavement	For base
Strength grade of stone crush in saturated state;		
minimum value		
- volcanic and metamorphic rocks	**800**	**600**
- sedimentary rock	**600**	**200**
Gravel and crushed stone out of gravel	**crushability 12**	**crushability 24**
Grade by wear out abrasion, not lower than	**abrade III**	**abrade IV**
Grade by frost-resistance for regions with average;		
Monthly air temperature of the coldest month, ° C		
- from 0 up to minus 5	**15**	**-**
- from minus 5 up to minus 15	**25**	**-**
- from minus 15 up to minus 30	**50**	**15**
Quantity of crushed grains; % on mass, not less than:	**70**	**25**

4.03.3 Construction Requirements

Placing and Compacting

(a) Spreading of Materials

The materials shall be evenly spread over the whole of the designated area for the layer concerned and in such quantity that the compacted thickness of the layer complies with the specified requirements.

Any new layer of less than 75 mm compacted thickness shall be bonded to the previous layer by scarifying the previous layer to a depth so that the total compacted thickness of the new layer plus the scarified portion of the previous layer will not be less than 100 mm.

(b) Breaking Down and Preparation of the Material

The material placed on the road shall be thoroughly broken down throughout the layer by means of equipment suited to this purpose to a size not exceeding two-thirds of the compacted layer thickness.

Any oversize material, which cannot be broken down to the required size, shall be bladed off the road, loaded, transported and disposed of or utilized as directed by the Project Manager.

Where the coarse and fine fractions of the material are not uniformly distributed or have been allowed to become segregated, the material shall be thoroughly mixed on the road by blading in successive cuts over the full depth of the layer, after the required amount of water has been added. Such mixing shall continue until a uniform mixture of the various size fractions of the material has been obtained.

(c) Watering and Mixing

Any water required before material is compacted shall be added to the material in successive applications by means of water sprinklers fitted with sprinkler bars or by means of pressure distributors all capable of applying the water evenly and uniformly over the area concerned.

The water shall be thoroughly mixed with the material to be compacted by means of soil mixers or other suitable equipment. Mixing shall continue until the required amount of water has been added and until a uniform mixture is obtained. Thereafter compaction may proceed.

The amount of water to be added shall be sufficient to bring the material to the optimum moisture content for the compaction equipment used.

(d) Compaction

Compaction shall be carried out in a series of continuous operations covering the full width of the layer concerned and the length of any section of a layer being compacted shall, wherever possible, be not less than 150 m nor more than can be properly compacted with the available equipment. The Project Manager reserves the right to order the Contractor to reduce the length of any layer compacted in any single operation if the proper compaction of such a layer is not being achieved.

The types of compaction equipment to be used and the amount of rolling to be done shall be such as to ensure that specified densities are obtained without damaging lower layers or structures. During compaction the layer shall be maintained to the required cross-section shape.

If at any time after compaction the layer is damaged by drying out or is damaged by rain, it shall be scarified, aerated and/or watered and re-compacted as specified above, all at the Contractor's expense.

(e) Disposal of Oversize Material

The Project Manager will direct that oversize material be disposed of or utilized elsewhere in one of the following ways:

(i) The material is bladed off the road and utilized in the uniform widening of fills outside the road prism.
(ii) The material is bladed off the road, loaded, transported and taken to spoil.
(iii) The material is bladed off the road, loaded, transported to the point of use and utilized in other item of construction.

The Contractor shall exercise all reasonable care not to bring onto the road material which cannot be broken down to the required size by processing on the road.

Moisture Content and Compaction

The moisture content of the sand and gravel mix during the construction shall close to the optimal and the deviation shall not be more than +/- 5 %. If the moisture content, differs more the mix shall be moistened as required 20-30 minutes before the compaction is carried out (SNiP 3.06.03-85 p.7.9). The placed mix shall be compacted in accordance to requirements of p.7.1 and p.7.5 of SNIP 3.06.03-85. Construction of base-course and pavement structure by penetration method shall be carried out in accordance with p.9.1 and p 9.32-9.39 of SNiP 3.06.03-85.

Protection and Maintenance

The compacted layers shall be adequately drained and shaped to prevent water from standing on or scouring the finished work. Windrows shall be removed to facilitate drainage of water from surface.

No material for a succeeding layer shall be placed if the underlying layer is softened by excessive moisture.

The Contractor shall protect and maintain the completed layer at his own expense. Maintenance shall include the immediate repair of any damage or defects that may occur and shall be repeated as often as it is necessary to keep the layer continuously intact. Repairs shall be done in a manner that will ensure restoration to an even and uniform surface.

4.03.4 Quality Control

Quality Control shall follow the requirements and methods indicated below:

(a) aggregate, gravel pavement and sub-base construction; p.1.13, p.7.35-7.36 of SNiP 3.06.03.85.
(b) base course and pavement by penetration method; p.9.50 of SNiP 3.06.03.85

4.04 Bitumen Prime and Tack Coat

4.04.1 Description

This work consists of applying a cut back bitumen prime and tack coat or emulsified bitumen.

A prime coat means an application of low viscosity bituminous binder to an absorbent non-bituminous surface.

A tack coat shall mean a light application of bituminous binder to a bituminous or concrete surface.

4.04.2 Material

Material shall conform to Section 'Bituminous Material'. Bitumen shall comply with GOST 22245-90:

For prime coat, the binder shall be a medium-curing cut-back unless otherwise instructed by the Project Manager.

For tack coat, the binder shall be a rapid-curing cut-back, a medium-curing cut-back, a quick-breaking emulsion or a slow setting emulsion diluted with water.

4.04.3 Construction Requirements

Equipment

Equipment to be used shall be approved by the Project Manager.Bitumen shall be sprayed from a pressure distributor and no hand-spraying shall be permitted except in small areas, or to make good a defective area caused by a blocked nozzle.

The nozzles shall be arranged to give a uniform spray and shall be tested prior to spraying by discharging on to suitable material (such as building paper, metal sheets, etc.,) or into purpose made troughs. Testing shall not take place on the road, and any bitumen spilt on the ground shall be cleaned off.

Surface Preparation

Prepare the surface for a prime coat as follows:
Clear the existing surface of all loose material, dirt, or other delirious substances by approved methods. Any defect of the surface shall be made good as instructed by the Project Manager, and bituminous material shall be laid or sprayed or sprayed until the Project Manager has approved the surface. Where required by the Project Manager, immediately prior to the application of prime coat, the surface of the base layer shall be lightly sprayed with water, but in no case saturated.

In order to bring the surface to be primed to the condition required, water shall be applied in small increments by a distributor. Any water on the surface after spraying shall be brushed off or allowed to drain away before the prime coat is applied.

Prepare the surface for a tack coat as follows:

(a) Patching. Remove and dispose of unsuitable asphalt material in the area to be coated. Smoothen all rough edges within the pothole. Clear the existing surface of all loose material, dirt, or other delirious substances by approved methods.

(b) Pre-leveling. After pre-leveling dips, depressions, sags, excessive or non existing crown or other surface irregularities shall be corrected. Clear the existing surface of all loose material, dirt, or, other delirious substances by approved methods.

(c) Asphalt surfaced roads. Clean the existing surface of all loose material, dirt, or other delirioussubstances by approved methods**.**

Weather Limitations. Apply binder prime and tack coat on a dry, unfrozen surface.

Bitumen Application.

Calibrate the bitumen distributor spray bar height, nozzle angle, and pump pressure and check longitudinal and transverse spread rates weekly.

Protect the surfaces of nearby objects to prevent spattering or marring. Spread building paper on the surface for a sufficient distance from the beginning and end of application so that the flow through the distributor nozzles may be started and stopped on the paper. All equipments to be used in the work must be in good condition and functioning property.

Prime coat application is to be at the rate of 0.6 – 1.0 kg/sq.m, or as required in the plans or instructed by the Project Manager.

Tack coat application is to be at the rate of 0.2 – 0.3 kg/sq.m, or as required in the plans or instructed by the Project Manager.

The Project Manager will approve the exact application rate, temperature, and area to be treated before the application and may make adjustments for variations in the field conditions. Apply the bitumen uniformly with an asphalt distributor. Move the distributor forward at the proper application speed at the time the spray bar is opened. Use care not to apply excess bitumen at the junction of spreads.

Apply the coat at a rate to be established by the Project Manager. When a tack coat cannot be applied with an asphalt distributor spray bar, apply the tack coat uniformly and completely by fogging with a hand spray attachment or by another approved method.

If excess binder material is applied, squeegee the excess from the surface. Allow the primed or tacked surfaces to completely cure before placing the covering course. Place the covering course within 8 hours of placing the prime/tack coat.

4.05 Hot Asphalt Concrete Pavement

4.05.1 Description

Asphalt concrete pavement works consist of supply and construction of binder and wearing courses, spreading and compaction

4.05.2 Material

Materials for asphalt concrete mix shall comply with the requirements of existing standards. The quality of bitumen by its physical properties shall complywithGOST 22245-90.

Indices	B 40/60	B 60/90	B90/130	B 130/200	Test Methods
Penetration under 25°C 0.1 mm, not less than 0°C	40-60 13	61-90 20	91-130 28	131-200 35	GOST 11501
Softening temperature	51	47	43	40	GOST 11505
Spreading in cm. not less + 25°C°C	45 -	55 3.5	65 4.0	70 6.0	GOST 11505
Brittle temperature not more °C	-12	-15	-17	-18	GOST 11507 Att., 3.2.
Flash point °C	230	230	230	230	GOST 4333
Softening temperature after warm-up, not more °C	5	5	5	6	GOST 18180 GOST 11506 Att., 3.3.
Penetration index	From -1.0 to +1.0				Attachm. 2
Water content %, not more	0.30	0.30	0.30	0.30	GOST 11510

Bitumen testing shall be carried out in accordance with GOST 11501-78, 11505-75, 11506-73, 11507-78, 11510-65, 18180-72. Bitumen grade depends on asphalt concrete mix type, climatic conditions and road category.

Coarse aggregate (crushed stone) shall comply to requirements of GOST 9128-84, p.3.2

Fine aggregate (sand) shall comply to requirements of GOST 9128-84, p. 3.3

Filler (mineral powder) shall comply to requirements of GOST 16557-78

4.05.3 Asphalt Concrete Mix

Asphalt concrete mix shall be designed taking into account asphalt concrete type, grade and usage indicated in designs. Physical and mechanical characteristics should correspond to GOST 9128-84.

(a) Physical and mechanical indices shall be as follows:

Indices	Asphalt concrete mix grades	
	I	II
1. Required strength in compression, MPa (kg/cm^2),at temperature: a) 20°C, not less than	2.5 (25)	2.2(22)

b) 50°C, not less than, for a/c type A/B	0.9(9)/ 1.3 (13)	0.8(8)/ 1.2(12)
c) 0°C, not more than	13(130)	13(130)
2. Water stability ratio, not less than	0.85	0.8
3. Water stability ratio under long term saturation, Not less than	0.75	0.7
4.Swelling, % in mass, not more than	0.5	1.5

(b) Residual porosity of asphalt concrete shall be 1 … 3 % of volume.

(c) The grading of the asphalt concrete mix shall comply with the following requirements in accordance to GOST 9128-84:

Mix Type	Grading limits; Grading (passing %)										
	Sieve size (mm)										
	0.071	0.14	0.31	0.63	1.25	2.5	5	10	15	20	40
Fine	2-8	3-15	4-22	7-28	10-38	18-50	27-65	45-76	57-100	70-100	-
Coarse	2-8	3-15	4-22	7-28	10-38	18-50	27-65	45-76	57-100	70-100	95-100

(d) Recommended bitumen content in mix is 5 - 7 %

(e) Tolerance in dosage of asphalt concrete mix component compared to the total mass of each component is as follows:

- Coarse and fine aggregates (crushed stone and sand): +/- 3 %
- Filler and binder (mineral powder and bitumen): +/- 1.5 %

(f) Mix temperature during the discharge from mixer should correspond to the values shown in the table below:

Binding agent	Preparation temperature in °C
B 35/50	165 ±15
B 50/70	160 ±15
B 70/100	155 ±15
B 100/150	150 ±15
Bitumen 60/90, Bitumen 90/130	140 - 160
Bitumen 130/200	120 - 140

Preparation of Asphalt Concrete Mix. The preparation of asphalt concrete mix should be carried out according SNiP3.06.03-85 p. 10.3-10.5, p 10.8-10.13.

Paving. Asphalt concrete mix placing should be performed according to SNiP 3.06.03-85 p. 10.16-10.32

Quality Control. Quality control should be carried out according SNiP 3.06.03-85 p. 10.39-10.41

4.05.4 Equipment

Mixing Plant
The mixing plants should be approved by the Project Manager. The asphalt plants shall be of batch mix type with automatic controls and with a capacity of at least 50 tons/hour. At least four cold

bins for different aggregate fractions are required. All bins shall be covered to prevent the ingress of moisture.The weighs of the plant shall be calibrated before the start of the production or whenever directed by the Project Manager. Asphalt concrete mix should be weighed on vehicle scales up to 2% in accuracy.

The bitumen tank shall be capable of maintaining its contents at the specified temperature within a tolerance of plus or minus 5°C and shall be equipped with a thermostat to prevent the temperature rising above 180°C and a fixed thermometer easily read from outside the tank. Any bitumen which has been heated above 180°C or has suffered carbonization from prolonged heating shall be removed from the plant.

Pavers
Pavers shall be approved by the Project Manager and shall be of modern manufacture and equipped with ramming timber and vibrating screed. It shall be capable of laying asphalt concrete with no segregation, dragging, burning or other surface defects and within specified level and surface regularity tolerances. Delivery augers shall not terminate more than 20 cm from the edge plates.

Compaction Plant
The Contractor shall provide sufficient rollers of adequate size and weight to achieve the specified compaction. Prior to commencing the laying of bituminous mixes in the permanent Works, the Contractor shall carry out Site Trials to demonstrate the adequacy of his plant and to determine the optimum method of use and sequence of operation of the rollers.

4.05.5 Road Base Preparation

The surface shall be prepared according to Section 'Bituminous Prime and Tack Coat'. An even bitumen prime or tack coat shall be applied along entire surface, contact surface of curbs, gutters, manholes and other structures, according to SNiP 3.06.03-85. Nearby areas shall be protected from spatter or splashing during the application.

4.05.6 WeatherLimitations

Works, on asphalt concrete pavement and sub-grades construction shall be carried out in dry weather and during daylight hours. Place hot mixes at the air temperature of not less than +5°C.

4.05.7 Asphalt Preparation

Heat evenly the bitumen to provide a continuous supply of the heated bitumen from storage to the mixer. Do not heat bitumen above 170 °C.

4.05.8 Aggregate Preparation

Prior to mixing supply, heat, dry, and deliver crushed stone (gravel) and sand to the mixer at a temperature sufficient to produce a mixture within approved temperature range. Reduce the moisture content of the aggregate up to 1 per cent or less. Adjust flames used for drying and heating to prevent damage to and contamination of the aggregate.

4.05.9 Mixing

Measure the aggregate and bitumen into the mixer is in accordance to the job-mix formula approved by the Project Manager. Mix until all the particles are completely and uniformly coated with bitumen. The temperature of mix shall all the time during mixing and loading be maintained within the specified range.

4.05.10 Hauling

Use vehicles with tight, clean, and smooth surface for hauling asphalt concrete mixtures and provide each vehicle with necessary documentation related weigh calibration. The duration of asphalt concrete hauling is determined by the minimum temperature condition for spreading in accordance with Subsection 'Compaction' below. The surface of beds should be covered by thin coat of approved material to prevent the mixture from adhering to the beds. Do not use petroleum derivatives or other coating materials which contaminate or alter the characteristics of the mixture. Drain the bed before mix loading. Equip each truck with a canvas cover or other suitable material of sufficient size to protect the mixture from the weather influence. Where necessary to maintain the mix temperature, use insulated truck beds and securely fastened covers. Provide access ports or holes for checking the temperature of the asphalt mixture in the truck.

4.05.11 Placing and Finishing

Mixture placing and finishing must be arranged without any unnecessary pauses and the temperature of the mixture shall not drop below the permissible temperature. The laying temperature measured from several points of the load has meet the requirements of mixing temperature. If the temperature is incorrect the load must be rejected, if not approved by the Project Manager to be used in secondary places. Before beginning of laying the adjustments of the machinery, which have effect on how well the mix moves in the paver and the quality of surface, must be put in order. The auger and compacting beam must not be so worn out, to cause segregation or unevenness. Place the asphalt concrete mixture as continuously as possible. Work and traffic arrangements must be done in a way that the traffic does not damage the edges of laid pavement. The damaged edges must be cut and repaired by repaving the damaged area. Asphalt concrete mix shall be placed by paver providing full width of the strip.

4.05.12 Compacting

Compact the mixture so that the asphalt concrete residual porosity is within the range of 2.5% - 5%. The density of asphalt concrete of hot mix of "A" type shall not be less than 0,99, and of porous asphalt concrete type not less than 0,98. The number of rolling equipment must be sufficient compared with the capacity of the production. Compact the surface so that no harmful roller tracks or cracks will appear. Do not pass rollers over the unprotected end of a freshly laid mixture or leave the roller on freshly laid soft surface. The proper evenness and pavement cross-fall shall be kept continuously during rolling. Do not allow traffic on newly laid pavement before it has cooled down enough to avoid rutting.

Start compaction immediately after placing, keeping the temperature range of the mix at the beginning not less than 120° C. Mix of asphalt concrete of A and B types and for porous asphalt concrete shall be compacted first with a pneumatic-tyred roller at least 16 tons in weight (6-10 passages) or with a steel-wheel roller at least 10-13 tons in weight (8-10 passages) or by vibrating rollers 6-8 tons in weight (5-7 passages). Intermediate rolling should be carried out with a pneumatic-tyred roller and final rolling with a steel-wheel 11-18 tons in weight (6-8 passages). Rolling shall begin at the side and proceed longitudinally parallel to the centre-line, each trip

overlapping one-half of the roller width. On super-elevated curves, rolling shall begin at the low side.

At the beginning the speed of roller should not exceed 5 km/hour for steel-wheel roller, 3 km/hour for vibrating roller and 10 km/hour for pneumatic-tyred roller. The roller wheels should be continuously moistened to avoid the adhesion with surface of the mix laid.

4.05.13 Joints, Trimming Edges, andClean Up

At connections to the existing pavement and previously placed lifts, make the transverse joints vertical to the depth of the new pavement. Form transverse and longitudinal joints by cutting of the previous layer to expose the full depth of the course. No ruts or unevenness should be formed to the joint area. Joint area must be carefully cleaned and if cooled it must be heated or coated with tack coat before doing adjacent pavement. Apply a bitumen tack coat to the edge of the joint for both transverse and longitudinal joints. Avoid the rolling along non-protected ends of newly laid mix. Cut material from edges and dispose all discarded asphalt material to a site, approved by the Project Manager.

4.05.14 Pavement Smoothness

Measure the smoothness of the finished surface course after final rolling. For smoothness measurement both in cross direction and in parallel to the centre line a metal straightedge 5 m in length shall be used. A defective area is considered an area with surface deviations in excess of 7 mm between the straightedge and the surface (number in parenthesis is for finished surface with unbound base). Correct defective area and measure again after the correction for acceptance. New pavement should be uniform without segregations, cracks, bleeding of binder etc.

4.05.15 Acceptance Procedures for Asphalt

Asphalt materials will be accepted in accordance Section ‘Measurement and Payment’, provided that the work conforms to the Specifications and is approved by the Project Manager.

(a) **Certification.** Deliver a certification signed by the supplier to cover the quality and the quantity of materialand the condition of container for each shipment. Provide test result as required by the Project Manager.

(b) **Acceptance sampling procedures.**Mix and asphalt concrete samples for acceptance will be selected, obtained and tested, as follows:

1) Gradation of asphalt concrete and bitumen content: At starting of asphalt production and in case of job-mix formula is changed or if in any doubt of the right composition of the mixture, the required number of samples is taken from asphalt plant for testing. One sample for every 500 tons to be taken randomly or one sample at least daily from placed but not compacted pavement.

2) Thickness and density of samples selected from the finished asphalt concrete layer: A set of 5 core samples from carriageway is taken at the beginning of works, thereafter one set after 10 000 m^2 has been laid and thereafter one set per each 20 000 m^2 of pavement. Core samples shall be taken randomly and thickness and density shall be determined. If required, the additional set of cores might be taken. Marshall samples

shall be taken, when the density requirement is not fulfilled, the mix cracks during rolling or the grading is suspected.

3) One sample of bitumen shall be taken from each shipment to the plant and from each binder type as directed by the Project Manager.

4) Aggregate samples shall be tested in the beginning of the production and, if aggregate is changed or as directed by the Project Manager.

5) Mineral filler is tested for each 5000 tons of mix production in a single plant or whenever the shipment is suspected as directed by the Project Manager.

4.05.16 Acceptance

Mineral filter will be accepted under Subsection 002.03.
Hot asphalt concrete pavement construction will be accepted under Subsection 002.04.
Asphalt content, aggregate gradation and density will be accepted under Subsection 002.02.

(a) Density (void content). Core samples will be taken and tested by the Contractor to verify the requireddensity of the compacted pavement. The unit price of asphalt concrete is reduced as follows, if the requirement for density is not fullfilled:

Hot asphalt concrete, type A:
For full payment acceptance criteria for density is 0.99 (99 %). For each 0.001 (0,1 %) part, that the density is less than the required value the price of the asphalt concrete is reduced by 1%. The maximum deduction is 10 %. If the average density is less than 0.98, the corresponding production is rejected.

Porous asphalt concrete:
For full payment acceptance criteria for density is 0.98 (98 %). For each 0.001 (0,1 %) part, that the density is less than the required value the price of the asphalt concrete is reduced by 1 %. The maximum deduction is 10 %. If the average density is less than 0.97, the corresponding production is rejected.

Extra sample set may taken, if so directed by the Project Manager

(b) Pavement smoothness. The acceptance criteria are given in Section 'Hot Asphalt Concrete Pavement'.

(c) Thickness. Required amount is indicated in the drawings or Bill of Quantities and it is the minimumaverage amount requirement of laid and compacted pavement. Amount is calculated from core samples (same sample set as for density) and evaluated for amount per unit area. If the amount is less than allowed tolerance, the amount representing each sample, 2300 m^2 may be rejected or if directed by the Project Manager approved by lower price using following formula:

thickness of sample per ordered thickness multiplied 2300 times unit price.

Average thickness (weight per unit area) is also calculated daily on the basis of mix weighted on asphalt plant and total production (m2) in the same day. The average

thickness (amount laid per unit area) shall not be less than ordered. If the amount is less the value of that day's production is reduced by amount corresponding the difference to the ordered amount.

(d) Bitumen content and gradation. If the bitumen content for the whole asphalt concrete work calculated from the total used bitumen amount and produced asphalt concrete is less or more than ordered amount the value of the work is deducted using following formula:

Binder content deviation %-units	Value deduction % of AC- works value
< 0.05	0
0.10	- 4
0.15	- 9
0.20	-13

Intervals are interpolated and if needed table is continued linearly.

4.06 Surface Treatment

4.06.1 Description

This work consists of either single or double surface treatment of asphalt concrete pavement.

4.06.2 Material

Materials for surface treatment (aggregate, bitumen or emulsion) shall meet requirements of existing norms.. For surface treatment crushed stone of grade over 1000 kp/cm2 of metamorphic rocks with non-polishing properties shall be used. The grain size of the aggregate shall be 12-16mm, and in double surface treatment for upper layer aggregate of the size 8-12 mm shall be used.

The grading of the aggregates shall comply with the following requirements:

Aggregate	Grading limits; Grading (passing %)										
	Sieve size (mm)										
	0.063	0.125	0.25	0.5	1	2	4	8	11.2	16	22.4
8-12	0-1	0-2	0-2,5	0-3	0-3,5	0-4	0-10	0-50	90-100	100	100
12-16	0-1	0-2	0-2,5	0-3	0-3,5	0-4	0-5	0-10	0-50	90-100	100

Crushed stone shall be clean, without any dust and clay. Clay in form of lumps and any other harmful debris, like organic matter, is not acceptable. Crushed stone shall not be wet. The heavy bitumen, emulsified bitumen or cut back bitumen may used as a binder. Binder for surface treatment shall be used in temperatures providing normal adhesion to the aggregates. The adhesion improving additives may used for bitumen binders, but not for emulsion. The bitumen viscosity is determined on the basis of the climatic conditions. Bitumen emulsion BE SIP or cut back bitumen are recommended to be used.

Surface treatment shall be arranged in compliance with BCH 38-90.

4.06.3 Construction Requirements

Surface treatment shall be made on clean, dust free and dry surface – for bitumen application and on wet surface - for emulsified bitumen application. Binder is applied at temperature of 75°C - 85°C, if bitumen emulsion is used, and at 140°C +/-10°C, if cut-back bitumen is used. Aggregate shall be mechanically spread immediately after binder pouring and rolled by pneumatic-tyred roller of 16-18 tons in weight with 4 to 5 passages along one trace. The placing shall be performed as a continuous operation. The surface treatment shall be carried out after repair of all damages and deformations on pavement and after carefully cleaning from dust. The guiding amounts of binder and aggregate are given below:

	Chipping size in mm	
	8-12	12-16
Heavy Bitumen		
Binder consumption kg/m2	1.0	1.2
Chipping consumption l/m2	12	14
Bitumen emulsion		
Binder consumption kg/m2	2.1	2.3
Chipping consumption l/m2	12	14
Cut back bitumen		
Binder consumption kg/m2	1.5	1.7
Chipping consumption l/m2	12	14

Binder consumption depends on existing pavement condition, traffic volume and special factors of the site. It is required to adjust the quantity of binder by trial tests at the site before the work is commenced. If the underlay is worn and traffic volume is low, then the binder quantity shall be increased. If the underlay is even and impermeable and traffic volume is high, then the binder consumption shall be decreased.

The spraying of the binder shall be done using binder ramp. The stream of each nozzle shall be regulated separately. The driving speed shall not vary. If any of the nozzles does not work properly the spraying shall be interrupted immediately.

The chipping is spread in an even course immediately after the binder has been sprayed. Coarse, open places and aggregate accumulations are leveled by hand at once by the advancement of the work.

When a double surface treatment is being made, the second layer shall be placed as soon as is practical after the first layer has been finished, rolled and cooled, and the Project Managermay at his discretion request cleaning of the first layer. Traffic should not be allowed on the road surface between the laying of the first surface treatment and the second surface treatment. Transverse joints in succeeding layers shall be offset at least by 2 meters.

Surface treatment shall be rolled by a pneumatic-tyred roller. Care must be taken in rolling of areas that traffic does not use often. Loose chippings are removed by brushing at the latest one day after

opening to traffic. During the first 3 days after surface treatment has been finished the Contractor shall provide traffic speed limit of 40 km/h and vehicle distribution on full pavement width. Loose aggregate shall be removed after that.

If bitumen emulsion is used as a binder the surface treatment is made in following order: pouring emulsion on surface in the amount of 30 per cent of the required volume, spreading 70 per cent of required quantity of aggregates, pouring remaining emulsion, spreading remaining aggregate, rolling. Surface treatment is possible to do in one operation. However, in this case it is recommended to use sand 0-4 mm in grain size in amount of 2-3 l/m2 before rolling to form mastics between chipping.

Surface treatment is not allowed to be done on frozen or wet surface or during rain and the air temperature shall not be less than $+15^0$C. When using emulsified bitumen the air temperature shall not be less than $+5^0$C, provided the temperature is rising.

4.07 Shoulder Reconditioning

4.07.1 Description

This work consists of removing, filling up shoulders and paving with aggregate.

4.07.2 Material

Material for filling shall meet the following requirements:
Aggregate SNiP 2.05.02-85
Sand/gravel SNiP 2.05.02-85
and should be in accordance with GOST 23735-79.

4.07.3 Construction Requirements

Removing and filling up shoulders. Filling up shoulders is done on the sections where roadway is to be widened, in areas, where emergency lanes are located, in areas where embankment height is increased, or when existing shoulders are to be paved with asphalt concrete.

Filling up shoulders is done after placing sand bed course and pavement construction or widening is completed.

Filling up shoulders is done after removing existing shoulders. Material may be reclaimed and used in embankment fill, if it conforms to the requirements. If not, is to be removed and disposed of by the Contractor. Spoil area will be the responsibility of the Contractor.

Compaction shall be done layer by layer according to SNiP 2.05.02-85 relevant to construction subgrade layers. Compaction will be done at optimum mixture content.

Borrow sources for shoulder filling material shall be approved by Project Manager.

4.07.4 Aggregate or gravel/sand mix paved shoulders

Shoulder strengthening with a 15 cm thick layer of crushed stone or gravel/sand mix shall be done using material with maximum particle size less than 70 mm.

Material will be spread in one layer using self-propelled grader and compacted with rollers according toSNiP 3.06.03-85 for aggregate bases. To reduce friction between grains water shall be spread during compaction.

4.08 Asphalt Concrete for Sidewalks and Islands

4.08.1 Description

This work consists of constructing hot asphalt concrete for sidewalksandislands.

4.08.2 Construction Requirements

Composition of Mixture (Job-Mix Formula). Provide an asphalt concrete mixture composed of crushed stone or gravel and bitumen mixed in a plant approved by the Project Manager. Mix type AC 12 or 16 in accordance with Section 'Surface Treatment' shall be used if not otherwise required by the design or the Project Manager.

Submit the strength, quality, and gradation specifications for the asphalt concrete mixture to the Project Manager. Include copies of laboratory test reports which demonstrate that the properties of the aggregates, bitumen cement, additives, and mixture meet the specifications. Also submit the maximum laboratory density of themixture.

Surface Preparation. Prepare the surface according to Section 'Bitumen Prime and Tack Coat'. Apply a bitumen tack coat to contact surfaces of curbing, gutters, manholes, and other structures. Protect nearby areas from spatter or splashing during the application.

Weather Limitations. Construct asphalt concrete pavements and base courses in dry weather, on unfrozen surface. Place hot and cold mixes at the ambient air temperature of not less than $+5^0$C.

Hauling. Use vehicles with tight, clean, and smooth metal beds for hauling asphalt concretemixtures.

Thinly coat the beds with an approved material to prevent the mixture from adhering to the beds. Do not use petroleum derivatives or other coating material which contaminate or after the characteristics of the mixture. Drain the bed before loading.

Equip each truck with a canvas cover or other suitable material of sufficient size to protect the mixture from the weather. When necessary to maintain temperature, use insulated truck beds and securely fastened covers. Provide access ports or holes for checking the temperature of the asphalt mixture in the truck.

Placing. Place the mixture with mechanical paver. In areas where mechanical spreading and finishing is impractical, spread and finish each course by hand raking, screeding, or by other approved methods. Construct a surface that is uniform in texture and cross-section.

Compacting. Compact the mixture to a minimum of 96 per cent of laboratory mix design density using a roller weighing not less than 135 kg or with a small power roller. Compact areas that are not accessible by rollers by vibrating plates or other methods.

Pavement Smoothness. Use a 3m metal straightedge to measure at right angles and parallel to the centerline at designated sites.

Defective areas are surface deviations in excess of 5 mm between any two contacts of the straightedge with the surface. Correct defective areas using approved methods.

4.09 In-Place Cold Recycling of Bituminous Pavements

4.09.1 Description

This work consists of a recycling process, where the existing bituminous layers are reclaimed and transformed into a homogeneous mixture by an in-place mixing process using cement and bitumen emulsion as stabilizing agent and, if required, additional coarse aggregates and granular material. The homogeneous mixture is then graded and compacted. The works include:

- Milling, breaking down and recovering material from upper layers of the existing road pavement
- adjusting the grading of the recovered material by addition of imported material
- procuring and mixing of stabilizing agents with the recovered material
- placing and compacting to produce a new pavement layer

4.09.2 Materials

Provide materials that comply with the applicable requirements.

Bitumen emulsion:	Residue by distillation	60 % +- 2%
	Penetration at 25°C, 100g,5s	100 – 200 dmm (mm*0.1)
	Ductility at 25°C and 5 cm/min	60 cm

Cement: CEM II 32.5 or CEM III 32.5

Crushed aggregates:	Plasticity index	< 6 %
	Liquid limit	< 25 %
	Los Angeles value	< 45 %

Recommended grading for stabilized material from recycled asphalt and natural material:

Sieve size mm	Percentage by mass of total aggregate passing min %	max %
50	100	
31.5	75	100
16.0	50	90
8.0	40	70
4.0	30	50

1.0	10	35
0.063	0	15

For all materials intended to be used in the works material certificates and/or acceptance testing shall be provided for the approval of the Project Manager.

Material Storage

Cement shall be stored in steel silos, if possible near the site. Total storage capacity shall allow for at least one day of recycling operation.

Bituminous emulsion shall be continuously delivered by the supplier. Short term buffer storage of emulsion shall guarantee that there is no interruption of recycling operation due to shortage of emulsion. Tank/Tankers for supply and/or storage of bitumen emulsion shall be equipped with a thermometer to show the temperature of the contents and a heating system capable of raising the temperature of the contents.

Crushed aggregates shall be prepared to provide a sufficient reserve near the construction site to minimize hauling activities. The storage place should be clean, well drained and prevent both segregation and mixing with improper material and soil.

Construction Requirements

Mix Design (Job-Mix Formula). The Contractor shall submit to the Project Manager for approval a mix design 7 days prior to commencing cold recycling operations.

The reclaimed stabilized layer shall correspond to the following characteristics:

Cement content	< 4 % *)
Bitumen emulsion content	2.5 – 4.5 %
Compaction degree	98 % (Modified Proctor Method)
Tensile strength at 5 °C after 7 days	0.8 – 1.3 MPa
Tensile strength at 5 °C after 28 days	1.2 – 2.0 MPa
Void Content after compaction	8 – 15 %

***)**The use of cement in excess of 2% by mass should be avoided as it has a negative effect on the flexibility and fatigue properties of the stabilized layer.

The control of the moisture content in the recycled material is one of the most important aspects of stabilizing with bitumen emulsion. Therefore existing moisture content in the recycling section has to be verified.

Test Strip. At the start of the project, the Contractor shall process the first 100 linear meter of the full width of the section of road to be rehabilitated as a test strip. This test strip will serve to demonstrate that the equipment and processes used by the Contractor are in accordance with the specification herein. The test strip shall also establish all necessary parameter, including target gradation of the reclaimed material and optimum rolling pattern.

Recycling operation will only resume after acceptance of the test strip by the Project Manager.

When there is a significant change in mix proportions, weather conditions or other controlling factors, the Project Manager may require construction of a new test strip to check target parameters.

Surface Preparation. Clean or clear away all debris and vegetation within 1 m of pavement edge. Reclaimed material must be free of organic materials, soil, or other foreign substances.

Soft spots /weak subgrade. Areas of weak subgrade or soft spots which have been identified either by preliminary investigations or during the recycling process shall be treated as follows:

- Removing and recovering the material of the pavement layers overlying the unstable material and stockpile for reuse
- Excavating the soft/unsuitable material to required depth and disposal
- Backfilling the excavation with suitable material in layers not exceeding 200mm

In-place Recycling. The in-place recycling shall consist of two separate operations: reclamation and stabilization. Reclamation and stabilization in one operation is not permitted, unless otherwise approved by the Project Manager in writing.

(a) The recycling equipment shall be operated to ensure that the in-situ material is broken down to a gradation acceptable to the Project Manager. Virgin aggregates conforming to the requirements of these specifications shall be incorporated into the design if the existing aggregate does not conform to the required gradation.

(b) Where distortion of the existing road pavement is in excess of the specified thickness for reclamation, the depth shall be adjusted to ensure that the entire bituminous pavement is reclaimed.

(c) Grading of non-stabilized reclaimed material shall be conducted in such a manner as to ensure that the surface levels and shape of the completed reclaimed material layer is in conformance to the lines and grades established by the Project Manager.

(d) When necessary, the addition of granular material, meeting the requirements of these specifications, shall take place after the reclamation process and prior to or in conjunction with the stabilization operation. Full, homogenous mixing of the reclaimed material, virgin granular material and the binder shall be performed.

(e) Adjust cement and emulsion content as pavement conditions change. Add water as necessary to facilitate uniform mixing. The stabilization agent shall not be spread on the road ahead of the stabilization equipment.

Surface Levels and Shaping Requirements. The final grading operation shall be conducted in such a manner as to ensure that the placing of the stabilized layer meets the lines and grades of the design.

Care shall be exercised while spreading the stabilized layer to prevent undue segregation.
To prevent the final surface from tearing and scarring the level and cross-sectional shape requirements shall be addressed prior the material receiving the full compaction.

Compaction Requirements. Rolling shall commence as soon as possible after placing and shall follow the sequence determined in the test strip.

The maximum time elapsed between mixing the recycled material with a stabilizing agent and compacting the placed material shall be the shortest for the individual used stabilizing agents:

Cement : three hours
Bitumen emulsion: before the emulsion breaks

The stabilized reclaimed material shall be compacted to a minimum of 98 % of the modified AASHTO density. Where bitumen emulsions are used the term moisture content is replaced by "total fluid content" in defining the moisture density relations. Maximum density is achieved at the Optimum Total Fluid Content (OTFC) which is the combined mass of moisture and bitumen emulsion (before breaking) in the mix.

Stabilized material, which for any reason cannot be compacted to the specified density, shall be removed and replaced with hot mix meeting the requirements of the corresponding clause for 'Hot Asphalt Concrete Pavement'.

Watering and Finishing. After compaction, the road surface shall be treated with light applications of water or diluted bitumen emulsion and rolled with pneumatic-tired rollers to create a close-knit texture.

The final layer shall be free from surface laminations, segregated areas, corrugations, or any defects that the Project Manager deems may adversely affect the performance of the layer. Defective sections shall be repaired at Contractor's expense to the satisfaction of the Project Manager.

Curing. The stabilized surface should be protected against drying out and covered by asphalt layer latest on the third day after construction. Until that time it is preferable that no traffic is permitted on the recycled surface.

Weather Limitations. Recycling operations shall not be performed when the ambient air temperature is below 10°C, when the weather is foggy or rainy, or when the conditions are such that in the Project Manager's judgment, proper mixing, spreading and compaction of the material cannot be accomplished.

4.10 Pavement Rectification

Where any pavement area does not comply with the Specification for regularity, surface tolerance, thickness, macrotexture depth, material properties or compaction, the full extent of the area which does not comply with the Specification shall be made good and the surface of the pavement course shall be rectified in the manner described below:

(i) Unbound and hydraulically bound materials
The top 75 mm shall be scarified, reshaped with material added or removed as necessary, and re-compacted. The area treated shall be not less than 20 m long and 2 m wide. For hydraulically bound materials, all rectification shall be completed within 48 hours of the binder being added to the material.

(ii) Cement bound subbases and bases

The method of correction will depend on the period which has elapsed between detection of the error and the time of mixing of the material. If this is less than 4 hours, the surface shall be scarified to a depth of not less than 50 mm, surplus material removed or freshly mixed material added as necessary, and re-compacted in accordance with the Specification. If the period is 4 hours or more the full depth of the layer shall be removed from the pavement and replaced with material in accordance with the Specification. In either case the area treated shall be at least 5 m long and the full width of the paving laid in one operation. Alternatively, for subbases under concrete pavements the Contractor may make up low areas to a level within the tolerances of this Clause with a 1:4 cement and sand mortar or with 0/4 mm size fine graded surface course complying with BS 4987-1.

(iii) Bituminous bases

With coated macadam or asphalt bases, the full depth of the top layer as laid shall be removed and be replaced with fresh material laid and compacted in accordance with the Specification. Any area so treated shall be at least 5 m long and the full width of the paving laid in one operation. Alternatively for low areas in bituminous bases, the Contractor may make up the level with additional binder course material.

(iv) Surface courses and binder courses

These shall have the full depth of the course removed and replaced with fresh material laid and compacted in accordance with the Specification.

The area rectified shall be the full width of the paving laid in one operation, and at least 5 m long if binder course, or 15 m if surface course.

Where the number of surface irregularities exceeds the limits in Table 7/2, the area to be rectified shall be 300 m or 75 m long as appropriate and the full width of the lanes affected, or such lesser length as necessary to make the number of surface irregularities conform with the limits and shall be the full width of the lanes affected.

Checking of the surface course for compliance with this Clause shall be carried out as soon as possible after completion of the surfacing and remedial works completed before the road is opened to traffic.

Where the macrotexture depth requirement is not met for:

(a) a section 1000 m in lane length; or

(b) the full lane length of a section less than 1000 m long as the balance of a complete scheme; or

(c) the full lane length of a scheme less than 1000 m long;

then sufficient 50 m lengths shall be replaced, starting with that length having the least macrotexture depth, until the average requirement for the section length is complied with.

A minimum length of 50 m and the full lane width shall be removed and replaced either:

(a) to the full depth of the surface course; or

(b) to a depth of 20 mm when replaced by the repave method process as approved by the Project Manager.

Areas to be removed shall be delineated both longitudinally and transversely by saw cutting prior to the material being removed. Joints shall be formed either by coating the exposed sawn face with hot bitumen or heating by a suitable heater. The heater shall raise the temperature of the full depth of the course immediately before laying the new material to a figure within the range of minimum rolling temperature and maximum temperature at any stage specified for the material and for a width of not less than 75 mm.

(v) Concrete slabs

Concrete slabs shall be rectified by planing, grinding or bump cutting. Large depressions, which cannot be dealt with in this way, shall be rectified by cutting out the surface and replacing by a thin bonded surface repair using an approved repair mortar.

Retexturing of hardened concrete shall be carried out by sawing grooves in accordance with the Specification. Texturing of replaced surfaces shall be by brushing in accordance with the Specification. Where the slab cannot be rectified as above, the full depth of slab shall be removed and replaced with a slab constructed in compliance with BS 8500-2 to the extent required to obtain compliance with the Specification. Remedial works involving the placing of fresh concrete shall be completed in sufficient time for the concrete strength to have developed as required in BS 8500-2, before that section of pavement is opened to traffic.

SECTION 5, DRAINAGE

5.01 Culverts

5.01.1 Description

This work consists of constructing culverts, extending existing culverts and/or replacing culverts.

5.01.2 Material

General. Culverts and materials used for works of the present section shall meet requirements of SNiP 2.05.03-84, SNiP 2.05.02-85, Album of type constructions GOST 35-27.0-85, GOST 5781-82 and 13015.2-81.

Joint fill. Apply joint fill of the type and mix design approved by the Project Manager.

Pipes. Culvert pipes shall conform to SNiP 2/05.03-85 and GOST 6482-88. The length of culvert pipes shall be as stipulated in the Album of typical drawings unless otherwise specified. Metal pipes shall conform with VSN 176-78

Concrete pipe will be accepted for use in the project if "product certification" is furnished to the Project Manager by the manufacturer stating that it has been commercially produced according to a standard specification.

5.01.3 Construction Requirements

General. Use the same material on all continuous pipe sections and extensions. Use special sections, such as elbows and branch connections that are the same material and coating as the attached pipe. Culvert material, sizes, and approximate locations are shown on the plans.

Use special sections, such as elbows and branch connections that are the same material and coating as the attached pipe. Culvert material, sizes, and approximate locations are shown on the plans.

Extension of the existing culverts. Extension of the existing culverts shall be started from removing the existing culvert heads. Start at the lower end and lay the bell or groove end upgrade. Fully joint all sections. Structures and materials should be moved to special areas and disposed or buried. Extension of the existing culverts shall be done according to the designs. Placing materials and structures shall be done only after the Project Manager's approval.

Replacement of existing culverts. Before replacing existing culverts scarify the existing pavement and remove pavement and subgrade and pile in approved areas.

The Contractor shall prepare provisional schemes of traffic control during the construction periods and get approval from the relevant authorities and the Project Manager.

Demounted culverts and culvert heads shall be disposed by the Contractor. The work consists of excavation, placing crushed stone bed foundation, installation of culverts, making culvert joints, waterproof new culvert, inlet installation and waterproofed, backfilling and soil compaction, concrete inlet and outlet at culvert heads.

The soil for back filling shall meet requirements of Section 'Excavation and Embankments'. Laying and compaction of the pavement shall conform to Section 'Reconstruction and Widening of Existing Pavement'.

Metal pipes shall be protected from corrosion according to the requirements of SNIP/GOST 21513-83

Construction of new culvert. Construction of a new culvert shall be done in accordance with these Specifications, except for existing culvert removing.

5.02 Reconditioning of Existing Drainage Structures

5.02.1 Description

This work consists of cleaning existing culverts in place, reconditioning existing inlets, and repairing and cleaning existing spillways and chutes.

5.02.2 Materials

1. Concrete Composition. Concrete shall conform to Section 'Minor Concrete Structures'. Before batching concrete submit the proposed concrete proportions for approval to the Project Manager. As a minimum, submit the following:

(a) Type and source(s) of all material proposed for use.

(b) Material certification for all material proposed for use.

(c) Saturated surface dry weight of the fine and course aggregate per cubic meter of concrete.

(d) Gradation of find and coarse aggregate.

(e) Weight of mixing water per cubic meter of concrete.

(f) Weight of cement per cubic meter of concrete.

(g) Entrained air content of concrete mix in percent by volume

(h) Maximum slump of concrete mix in cm.

2. Joint mortar used for concrete minor structure shall consist of the following:

(a) One part hydraulic cement (see GOST 25192-87, GOST 26633-89 and table 3.1 of SNiP 2.05.02-85) shall not contain lumps, be partially set, or come from previously opened bag subject to hydration.

(b) Two parts fine sand free of clay or other deleterious materials.

(c) Water as required to obtain a freely working mix capable of being forced into small interstices.

3. Inlet metal grates shall be used as available from local suppliers.

5.02.3 Construction Requirements

Cleaning Culverts in Place. Remove and dispose of all foreign material within the barrel and appurtenances of the culvert by any method that does not damage the culvert.

Reconditioning Drainage Structures. Remove all debris from inlets designated to be reconditioned. Repair all leaks and structural damage.

5.03 Spillways, Gullies and Lined Ditches

5.03.1 Description

This work consists of constructing lined spillways, gullies, and similar ditches.

Lined ditches will be constructed according to the Project and Typical Album.

Spillways, gullies, and ditches will be precast of Portland cement concrete, available from local suppliers and will require a product certification from the manufacturer stating that it has been commercially produced in conformity with standard specifications.

5.03.2 Material

Material shall conform to Typical Album No. 503-09-7.84.

5.03.3 Construction Requirements

General. Form the bed parallel to the finished surface of the waterway.

Concrete Spillway and Gullies. Perform the work according to Section ‘Minor Concrete Structures’, utilizing commerciallyavailable precast units.

Lined Ditches. Ditch lining with crushed stone and prefabricated concrete slabs shall be done according to the typical drawings, specifications and designs.

5.04 Manholes, Inlets, Outlets and Catch Basins

5.04.1 Description

This work consists of constructing or adjusting inlets, outlets and aprons.

5.04.2 Materials.

1. Concrete Composition. Concrete shall conform to the requirements of Section 'Minor Concrete Structures'.
2. Joint mortar shall conform to the Section 'Reconditioning Existing Drainage Structures'.
3. Inlet grates shall be used as available from local suppliers.

5.04.3 Construction Requirements

Concrete Construction. Construct concrete inlets according to the corresponding Section of these Specifications. Concrete structures must be cast-in-place.

Grout all joints and opening to make them watertight.

Finish the channel flow line in inlets accurately to match the pipe flow line. Set metal frames in a fill joint mortar bed.

Grade Adjustment of Existing Structures. Adjust metal frames and grates to finish grade before placing the surface course.

Remove and clean the frames, covers, and grates. Trim the walls down to the solid material. Reconstruct the walls with the same material as existing and reset the cleaned frames at the required elevation.

When inlets are adjusted to grade and abut existing concrete structure, separate the castings from the adjacent concrete with a performed expansion joint no less than 15 mm in thickness.

Clean each structure of all accumulated silt, debris, or foreign matter.

SECTION 6, ROAD FURNITURE

6.01 Guardrails

6.01.1 Description

This work consists of constructing guard-rails and modifying, removing, resetting, and raising existing guard-rails. Guard Rails shall conform to EN 1317.

6.01.2 Materials

Material shall conform to the following:

Concrete	Section 'Minor Concrete Structures'
Galvanised steel rail	GOST 26804-86, Serial #3.503.1-89
Guard-rail hardware	GOST 26804-86,Serial #3.503.1-89
Guard-rail posts	GOST 26804-86,Serial #3.503.1-89

Paint for guard-rail posts. Painting of guard-rail posts shall be performed under specification approved by the road police.

Guard-rail installation shall conform to GOST 23457-86 and SNiP 2.05.02-85.

6.01.3 Construction Requirements

Posts. When pavement is within 1 m of the guard-rail, set posts before placing the pavement. Do not shorten guard-rail posts unless the cut end is set in concrete. Drive posts into pilot holes that are punched or drilled. The dimensions of the pilot hole shall not exceed the dimensions of the post by more than 15 mm. Install posts back-fill, and compact.

Rail Elements. Install the rail elements after the pavement adjacent to the guardrail is complete. Do not modify specified hole diameters or slot dimensions.

Steel rail. Shopbend all curved guard-rails with a radius of 45 cm or less.

Erect rail elements in a smooth continuous line with the top lapped in the direction of traffic flow. Use bolts that extend at least 6 mm but not more than 25 mm beyond the nuts. Tighten all bolts.

Terminal Sections. Construct cast-in-place or precast concrete end anchors according to GOST 26804-86. Do not connect the guard-rail to cast-in-place anchors until the concrete has cured 7 days. Install the end anchor cables tightly without slack.

Removing and Resetting Guard-rail. Remove and store the existing guard-rail, posts, and appurtenances. Remove and dispose of posts that are set in concrete. Replace all guard-rail, posts, and hardware damaged during use, removal, storage, or resetting.

Raising Guard-rail. Remove the existing guard-rail and appurtenances. Replace and reset posts as needed. Replace all guard-rail, posts, and hardware damaged during the removal and raising.

6.02 Permanent Traffic Control

6.02.1 Description

This work consists of constructing permanent traffic control signs, supports, delineators, and object markers.

6.02.2 Material

Material shall conform to the following:

All sign panels shall be manufactured according to Corrections #3 to GOST 10807-78.

Marker posts shall be equipped with reflectors of class 2 according DIN EN 12899-3.

Faces for permanent traffic signs shall be High Intensity Prismatic Reflective Sheeting shall be used in accordance with EN 12899-1, Class Ref 2 or ASTM D4956-13 Type IV.

All hardware and signposts shall be manufactured according to GOST 25458-82, GOST 25459-82 and Typical Album Serial # 3.503.9-80.

Delineators are to be manufactured according to Typical Album Serial # 3.503.1-89.

Concrete shall be as specified in Section 'Minor Concrete Structures'.

6.02.3 Construction requirements

General. Furnish traffic control devices according to GOST 23457-79, *Technical Methods of Organising Traffic Movement*, and Corrections #3 to GOST 10807-78. Submit the sign list, roadside and delineator soaking for approval to the Project Manager before ordering. The design of traffic sign and their installation shall be approved by the road police.

Supports. Sign locations and delineator locations shown on the plans may be changed in agreement with the Project Manager to fit the field conditions. The lengths of posts at time of staking should be determined by the Contractor.

Drive posts with a suitable driving head or set posts in drilled or punched holes. Replace all posts damaged by driving. Erect sign supports plumb, backfill, and compact.

Construct concrete footings according to Section 'Minor Concrete Structures'.

Panels. Road sign panels are installed on posts in accordance with Album # 3.503.9-80. Mounting of individual signs consisting of prefabricated panels may be made at the place of installation. Do not field drill holes in any part of the panel. Use anti-theft fasteners where possible. Paint all bolt heads, screw heads, and washers that are exposed on the sign face. Match the colour of the paint to the colour of the background or the message area at the point where the fitting is exposed.

If a sign message is not applicable, completely cover the face of the sign with an opaque material.

Maintain the covering in good condition until the message becomes applicable. Do not use adhesive tape on the face of a sign.

Repair or replace damaged parts including reflective sheeting.

6.03 Permanent Pavement Markings

6.03.1 Description

These works consist of applying permanent pavement markings on the completed pavement.

6.03.2 Material

Material shall conform to GOST 13508-74 and Correction No. 4 of GOST 13508-74. The materials are conventional traffic paint and thermoplastic markings.

6.03.3 Construction requirements

General. Where existing and final pavement marking locations are identical, stake the limits of all existing pavement markings (no-passing zones, edge stripes, etc.) before any pavement work. Upon completion of the final surface course, establish line limits for the new pavement for approval before marking. Establish markings according to GOST 13508-74.

Remove loose particles, dirt, tar, grease, and other deleterious material from the surface to be marked. Apply markings to a clean, dry surface according to GOST R 50597-93.

At least 7 days before starting pavement marking applications, furnish a written copy to the Project Managerof the marking manufacturer's recommendations for use. A field demonstration may be required to verify the adequacy of recommendations.

Ship marking material in appropriate containers plainly marked with the following information as appropriate for the martial being furnished:

(a) Manufacturer's name and address
(b) Name of product
(c) Lot/batch number
(d) Colour
(e) Net weight and volume of contents
(f) Date of manufacture
(g) Date of expiration
(h) Statement of contents, if mixing of components is required
(i) Mixing proportions and instructions
(j) Safety information

Apply pavement marking in the direction of traffic according to GOST 13508-74. Apply all markings to provide a clean-cut, uniform and workmanlike appearance by day or night.

Protect marked areas from traffic until the markings are dried to no-tracking condition. Remove all tracking marks, spilled marking material, markings in unauthorised areas, and defective markings.

Conventional Traffic Paint

(1) Apply paint when the pavement and air temperatures are above + 5ºC. Spray paint at 0.4 mm minimum
wet film thickness at a rate of 2.6 m^2/l
(2) Apply paint HI-501 when the temperature of road pavement and air is over + 15ºC. Spray paint at
0.35 mm minimum wet film thickness at a rate 350 $g/m^{2.}$

Thermoplastic markings

(1) Apply thermoplastic when the pavement and air temperature are above + 10°C. Spray or extrude the thermoplastic at + 220 +/-5°C. For centre lines and lane lines, spray or extrude 2.5 mm minimum dry film thickness or at a rate of 2.5 kg/m^2. For edge lines spray or extrude 1.5 mm minimum dry film/ thickness or at a rate of 1.5 kg/m^2.

(2) Apply thermoplastic IE 5142 with extruder at about + 170ºC at 3 mm thickness at a rate 5 to 6 kg/ m^2.

The minimum bond strength of the thermoplastic shall be in accordance with manufacturer's specifications.

6.04 Temporary Traffic Control

6.04.1 Description

This work consists of furnishing, maintaining, relocating, and removing temporary traffic control devices and services as ordered for the control and protection of public traffic through the project work zone.

Barricades and warning light types are designated as shown in the '*Uniform Requirements for Methods of Organisation of Roadway Movement, UtilisedDuring Roadway Construction'*, published in Moscow, 1989.

6.04.2 Material

Material shall conform to the above document and the following Standards:
Construction sign panels: Correction #3 to GOST 10807-78
Retro-reflective sheeting: Correction #3 to GOST 10807-78

Temporary traffic control devices:
Uniform Requirements for Methods of Organisation of Roadway Movement, UtilisedDuring Roadway Construction, published in Moscow, 1989.

6.04.3 Construction Requirements

General. Install and maintain temporary traffic control devices adjacent to and within the project according to the approved traffic control implementation drawings, and the document (VSN 37-84). Install and maintain traffic control devices as follows:

(a) Furnish and place traffic control devices before the start of construction operations.

(b) Install only those traffic control devices needed for each stage or phase.

(c) Relocate temporary traffic control devices as necessary.

(d) Remove devises that no longer apply to the existing conditions.

(e) Whenever the Contractor removes, obliterates, or overlays any pavement markings, he shall replace them on a daily basis in accordance with the contract or as directed by the Project Manager.

(f) Immediately clean, or replace any device that is lost, destroyed, or damaged or when its retro-reflectivity is reduced by 50% of its required retro-reflectivity.

(g) Keep temporary traffic control devices clean.

(h) Repair scratches and rips in the retro-reflective sheeting.

(i) Remove all temporary traffic control devices upon contract completion or when approved.

Barricades. Perform the work described in the above document. Use wood, metal, or plastic barricades.

Cones. Perform the work described in the above document and as described in the plans.

Construction Signs. Recto-reflective sheeting shall be usedon all signs for temporary traffic control. Use wood, metal, or other approved posts. Remove or completely cover all unnecessary signs with metal, plywood, or other acceptable material.

Flagmen. Train flaggers in their duties.Useflagmen or striped black and white batons.

Vertical signs. Perform the work described in the above document. Use wood, metal, or plastic vertical signs.

Warning Lights. Perform the work described in the above document.

Temporary pavement. Temporary roadways shall consist of detour pavement as specified herein as indicated on the Drawings and as approved by the Project Manager. Earthwork shall be constructed in accordance with the requirements of Section ‘Excavation and Embankments’ and as approved by the Project Manager to provide acceptable grade transition where adjoining existing pavements. Temporary drainage shall be provided.

Prior to placement of detour pavement at temporary roadways, the Contractor shall clear and grub the roadway area. The top 30 cm of sub-grade shall be compacted to 95 per cent of maximum density as determined by compaction control tests. The sub-grade material within the upper 30 cm of the roadbed shall have a minimum CBR of 10 when in accordance with AASHTO T-193 or SNiP 2.05.03.84.

On the above prepared sub-grade the Contractor shall place and compact the detour pavement for temporary roadway pavement.

When directed by the Project Manager or when existing conditions require same, the Contractor shall provide necessary and acceptable means of protection for utilities or services (existing or new) under detour pavement and/or temporary roadway to protect side utilities or services from any and all damages.

When no longer required, the Contractor shall remove all detour pavement and construction at temporary roadways and restore the Site.

The Contractor is responsible for maintaining existing pavement within the limits of construction used for detouring traffic.

All materials resulting from removal of detour pavement at temporary roadways shall be disposed of.

Temporary construction barriers, traffic cones and traffic delineators. The Contractor shall furnish maintain and remove on completion of the Works or when directed by the Project Manager all temporary construction barricades, traffic cones, traffic delineators and appurtenances as indicated on the drawings or required where roads are closed, partially closed, or where required to direct, inform or assist traffic in the area of construction. The Contractor shall relocate all temporary construction barricades and traffic cones as required by the construction stages or steps and his sequence of construction operations.

Temporary construction barricades, traffic cones and traffic delineators shall be placed as indicated on the drawings and as directed by the Project Manager to direct traffic smoothly and safely.

Temporary construction barricades shall have yellow lamps in the steady and/or flashing mode at the side bordering the line of traffic for the sake of giving warning. The light shall be placed in such a way that it lights the barricades without the use of vehicle light.

Maintenance of all temporary construction barricades furnished under this Contract shall include, but not limited to all reflective sheeting, lighting, flashing warning lights, replacement or other work required to maintain barricade in a condition and position as approved by the Project Manager.

At the completion of construction or when directed by the Project Manager, the Contractor shall remove and dispose of all barricades, cones and delineators, as approved by the Project Manager.

Temporary Marking of Signs. Sign legend that conflicts with the construction signing shall be completely covered by the Contractor so that none of the covered sign or legend is visible to traffic. If the whole sign is to be covered, it shall be covered with a non-transparent material that covers the entire face at the sign.

6.05 Bus Shelter

6.05.1 Description

The works cover complete installation of bus shelter including ancillary works.

6.05.2 Material

The Contractor shall before placing any order for manufactured bus shelter submit to the Project Manager the names of the firms from whom he proposes to obtain such materials and manufactured articles giving for each firm a description of the materials and manufactured articles to be supplied, their origin, the manufacturer's specification, quality, weight, strength and any other relevant details. The Contractor shall deposit with the Project Manager samples of such materials and manufactured articles when requested and, where appropriate, manufacturer's certificates of recent tests carried out on similar materials and manufactured articles.

The Contractor shall provide the Project Manager with copies of all orders for the supply of materials and manufactured articles required in connection with the Works as the Project Manager may require.

6.05.3 Construction Requirements

Bus stop shelters shall be constructed as shown on the drawings.

The Contractor shall propose to the Project Manager for approval a bus shelter type and manufacture.

Plastering and painting works should be performed at minimum 10ºC.

SECTION 7; RETAINING STRUCTURES

7.01 Gabions

7.01.1 Description

The works consists of provision of provision and installation of gabion retaining walls, including preparation of surface, assembling, filling, compaction and bracing and wiring lids.

7.01.2 Materials

Gabions shall be type 'Maccaferri' boxes and/or 'Reno' mattresses, or similar, both with diaphragms at 1 metrecentres, or similar approved. The maximum mesh size shall be 100 mm x 120 mm for boxes and 60 mm x 80 mm for mattresses. The wire used for the construction of gabions shall be either of appropriate hard plastic material or plastic coated and unless otherwise instructed by the Project Manager and comply with the requirements shown below

Wire for Gabion Construction

Description		Diameter (mm)	Galvanising (g/m²)
Mesh	Box	3.4	275
	Mattress	2.7	260
Binder	Box	2.2	240
	Mattress	2.2	240
Selvedge	Box	3.9	290
	Mattress	3.4	275

7.01.3 Construction Requirements

The alignment of the gabion shall be correct within a tolerance of 100 mm of the instructed alignment and the level of any course of gabion shall be correct to within a tolerance of 50 mm of the instructed level. In addition adjacent gabions shall not vary by more than 25 mm in line and/or level from each other.

The pre-packed elements of gabions shall be of dimension and arranged as shown on the standard drawings.

The surface upon which gabions are to be laid shall be compacted to a minimum dry density of 90 % MDD (AASHTO T180) and trimmed to the instructed level or shape.

Joints in gabions shall be stitched together with 600 mm minimum lengths of binder wire, with at least one stitch per 50 mm, and each end of the wire shall be fixed with at least two turns upon itself.

Adjacent gabions shall be stitched together with binder wire along all touching edges.

Gabion boxes shall be laid with broken bond and throughout to avoid continuous joints both horizontally and vertically.

All wire shall be to BS 1052 having a tensile strength of not less than 40 kg/mm² and plastic coated or appropriate plastic material produced by a reputable manufacturer, subject to the approval of the Project Manager. Galvanising shall comply with the requirements of BS 443.

Gabions shall be constructed to the shapes and dimensions as shown on the Drawings or given in the Special Specification or as directed by the Project Manager. Gabions, as constructed shall be within a tolerance of ± 5 % on the height or width instructed and ± 3 % on the length instructed.

Gabions shall be hand-packed with broken rock of 150 mm minimum dimensions and 300 mm maximum dimension. The sides shall be packed first in the form of a wall, using the largest pieces, with the majority placed as headers with broken joints to present a neat outside face. The interior of the gabion shall be hand packed with smaller pieces and the top layers shall be finished off with larger pieces. The whole interior and top layers shall be packed tight and hammered into place.

Where shown on the drawings or where instructed by the Project Manager the Contractor shall place filter fabric ('Terram' or similar approved) behind gabion faces or below mattresses in contact with existing or backfilled ground. The Contractor shall ensure that the filter fabric is not damaged during the construction or backfilling around the gabion works and any damaged or torn fabric shall be replaced.

At the back face and ends of completed gabion work or where shown on the Drawings or instructed by the Project Manager the existing soil shall be backfilled, thoroughly compacted against the sides of the gabions and finished flush with the top surface of the gabion.

7.02 Reinforced Concrete Retaining Walls

7.02.1 Description

The works under this chapter include: construction of the retaining walls made of reinforced concrete cast in-situ, and the provision of drainage material and/or pipe drains behind such walls or other structures.

7.01.2 Materials

- Concrete for the walls shall be according to GOST 26633-85
- Reinforcement shall comply with GOST 5781-82 and
- Reinforcing mesh shall comply with GOST 23279-85
- Filter surround materials for the drain - GOST 8267-93.

Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water and admixtures as specified, all well mixed and brought to the proper consistency.

Storage of aggregates: After washing, fine aggregate shall be stored in stockpiles with a free draining base for at least 72 hours and shall be subsequently handled to ensure that sand delivered to the batching plant has a uniform and stable moisture content.

Storage of Cement: Cement that has not been used within three (3) months from the date of initial sampling shall not be used in the Works unless it has been retested and is shown to conform to the specified requirements.

7.01.3 Construction Requirements

Walls will be provided with expansion joints where directed or instructed by the Project Manager (Engineer). The expansion joints will be made of soft wood boards treated with preservatives.

The drainage surround will be made of crushed granite gravels and shall conform to the outlines shown on the Drawings.

Walls and drains shall be constructed in conformity with the approved detail design drawings.

Formworks

This work includes constructing and removing of all scaffolding and formwork as well as work platforms and safety railings. Design is included in the work, respectively. The Contractor shall submit the design documents for Employer's Project Manager approval at least one week before planned starting date for construction of the temporary supports, formwork and scaffolding.

Formworks should be done in according to SNiP 3.01.01-85, III-15-76, III-43-75 and the description below.

On the Site, the material in the form shall be wooden material, either formwork timber or plywood. Aluminum ties should be used for bracing of the formwork, if possible.

Temporary supports shall be designed, constructed and removed according to SNiP 3.06.04-91.

The formwork shall be well moistened before casting the concrete so that it will not leak or take up water from the fresh concrete. The surface shall be well oiled to prevent the formwork to get stuck to the concrete.

The tolerances of the formwork should be ± 5mm of the measures shown at the drawings

The Contractor will not be allowed to remove the formwork until 70% of the concrete compression strength has been achieved. Formwork removal shall be carried out without any damage to structures.

Reinforcement

Reinforcing works are to be carried out according to SNiP 3.06.04-91. No reinforcement shall be brought on to the site or used without a manufacture certificate certifying that it complies with requirements.

Before use, all reinforcement must be cleaned of rust, mud, dust and grease, Lap joints of reinforcing bars are to be executed by overlapping by a length of at least 30 bar diameters and in compliance with requirements of the Technical Specification.

Where the welding of reinforcement and built-in elements is unavoidable the work shall be executed in accordance with the requirements of GOST 14098-95. Welding of reinforcement shall be avoided wherever possible and shall not be carried out without the explicit permission of the Project Manager.

The concrete cover thickness should correspond to the drawings and minimal thikness of cover layer cannot be less than values shown in the Table 44 and points 3.119, 3.120 of SNiP 2.05.03-84. The cover shall be achieved by placing distance blocks between the reinforcement and the

formwork with c/c 1.0 meter. These blocks shall be manufactured of the same sort of cement as the structural concrete.

The minimal distance between bars should satisfy the requirements of points 3.121-3.123 and Table 45 of SNiP 2.05.03-84.

Concrete Works

Concrete mixing, transportation and casting, as well as concrete curing works are to be carried out in accordance with the requirements of this Specification, GOST 26633-91 and SNiP 3.06.04-91.

Before commencement of concrete works Trial Mixes shold be prepared. All the components and aggregates used in the concrete mix must be laboratory tested according to GOST standards and the test report should specify:

- Place of origin of components and aggregates
- Petrography analysis and chemical composition of all components, including water
- Quality and compressive strength of the aggregates
- Water absorption capabilities of all fractions used (<1% weight percent)

The Contractor shall, where necessary, employ effective means such as pre-cooling the aggregates, refrigerating the mixing water, adding chipped or flaked ice into the mixing water, placing at night or a combination of these, to ensure that the concrete does not exceed the temperature of 35^0 C or is less than 5^0 C during curing.

Under no circumstances will concrete be accepted if the temperature of the concrete, as deposited into the formwork, is not within these limits**.**

The Contractor shall provide for the cooling of mixing water and for the efficient insulation of any storage tanks and pipelines for mixing water.

Aggregate bins, batching and mixing equipment shall be painted white and protected from sunshine as far as practicable.

Appropriate measures shall be taken with respect to transporting and placing the concrete to control the temperature of concrete. Pipelines for conveying concrete shall be shaded and insulated or painted white; the elapsed time from mixing to placing shall be minimized. Concrete shall be placed promptly when delivered and finishing operations shall not be delayed. Concrete surfaces shall be protected from wind and sun, during placing, finishing or curing operations.

No concrete mixture, which has lost its required workability, shall be used. It is not permissable to improve the concrete workability by adding additional water into the mixed concrete.

Immediately before placing concrete, all surfaces upon or against which the concrete is to be placed shall be free from standing water, mud, debris, oil, objectionable coatings and loose, semi-detached fragments.

The surfaces of construction joints shall be clean when covered with fresh concrete or mortar. Cleaning shall consist of the removal of all laitance, loose or defective concrete, coatings, sand, curing compound if used, and other foreign material to the satisfaction of the Employer’s Project Manager.

Construction joints shall be wet usually for 12-14 hours before casting, so that moisture will not be drawn from the freshly placed concrete. Wooden forms shall be wet few days before casting and tightened just before casting.

At every place where concreting is in progress, one of the Contractor's supervisors, well experienced in concrete works, shall be present and responsible for the work. All concreting shall be carried out by skilled workmen under the supervision of a foreman with sound technical knowledge and experience. During concreting, a sufficient number of workmen shall be present to handle the concrete and an adequate number of steel fixers and carpenters shall keep the steel reinforcement and form work under surveillance.

If and when concreting is carried out in the dark, ample lighting shall be provided at the mixing station and at every place where concrete is being deposited.

The concrete shall be handled and placed in such a manner that it will have an approximately horizontal, plastic surface throughout the casting. The rise of concrete in the formwork shall not be less than 100 mm per hour. The maximum permitted rise of concrete in formwork shall not exceed 750 mm per hour.

When casting the concrete, it must be vibrated so that homogenous construction is obtained. Concrete shall be vibrated in layers of 250-300 mm in thickness. At the same time previously placed layer shall be vibrated. Vertical structures shall be vibrated with vibrators with D=25-48 mm. Vibrator should be kept as vertical as possible. Vibrating time is at least 10 minutes per cubic meter.

Concrete shall be protected against damage from sunshine and rainfall. Concrete may not be placed in water, unless specifically approved by the Employer's Project Manager. The Contractor shall deal with all water encountered during concreting operations in such a manner that the water is prevented from flowing over or exerting pressure against the concrete.

While the concrete is at an early age, the surface of the joint shall be prepared for the subsequent deposition of fresh concrete by the application of high velocity water jet with a pressure of at least 3 atmospheres at the nozzle. The jet shall be applied so that laitance and foreign matters are removed and the clean aggregate exposed, but not so that the edges of the larger particles of the aggregate are undercut.

Sprinkling of the surfaces with dry cement or any other material during finishing operations for drying off the concrete, to facilitate towelling or for any other purpose will not be permitted.

Any defects on exposed surfaces after removing formwork will be made good by smoothing with sand cement mortar if the Project Manger (Engineer) approves. If the defect is too serious for such approval the Contractor shall remove the defective work and replace it at his own cost.

At least fourteen (14) days before placing concrete in any structure to be water cured, the Contractor shall submit to the Employer's Project Manager details of the equipment and methods he proposes to use for water curing. Water used for curing shall meet the requirements of this Specification for water used in concrete, but with the additional requirement that the water shall not contain any chemicals or other substances that will cause staining of concrete surfaces.

Concrete cured with water shall be kept continuously wet for at least fourteen (14) days immediately following placement of the concrete, or until covered with fresh concrete.

In case of sunshine or windy weather concrete shall be covered with plastic sheeting. Immediately after curing period surfaces will be checked for cracks. Maximum acceptable width of crack is 0,2 mm.

Waterproofing of Retaining Walls

The isolation of surfaces, which covered by backfill should be down by waterproofing with hot bitumen mastic. Before the mastic implementation the waterproofed surface should be cleaned from dust, mud and forms remainders. If it is necessary the surface should be leveled. The cleaning works shall be down by dry air or bymechanical ways, by brush. The concrete of structure must be dry before the waterproofing implementation. The waterproofing should be executed in two layers in accordance with the SN 301-65 and SNiP 2.05.03-84 (points 3.182-3.186) requirements.

SECTION 8, BRIDGE WORKS

8.01 Removal of Concrete Elements

8.01.1 Description

The works comprises the removal of existing concrete bridge elements, including saw cut limits of removal, cutting through reinforcement, protection of permanent elements to remain, and transport and disposal of material.

8.01.2 Construction Requirement

Remove the shown parts of the old bridge according to the drawings carefully. If the bridge crosses water, no material should be allowed to fall into the water.

Removal method of asphalt concrete shall be approved by the Project Manager.

The Project Manager shall approve the concrete chiseling equipment. When dismantling concrete, marked straight cutting lines shall be used, which do not damage the reinforcement. Damaged concrete shall be chiseled behind the steel bars to a depth of at least 20 mm or equal to bar diameter.

All cutting concrete surfaces and reinforcing bars shall be abrasive-blasted or high-pressure water-blasted to remove all debris, loose concrete and rust. Concrete surfaces shall be blasted to produce a clean rough surface.

If the whole construction, including foundation down to 1 meter beneath ground level or according to drawings, will be removed, check the required lifting capacity of the crane beforehand.

8.02 StructuralExcavation and Backfill

8.02.1 Description

The works consist of structural excavation and backfill, including loosening or breaking up material before or in the process of excavation, and provision and compaction of backfill.

8.02.2 Material and Construction Requirements

Excavation shall be done to the extent that makes it possible for the Contractor to work with the supports according to the drawings. The slopes of the excavation should not be steeper than 1:1.5 for excavation deepness less than 2 m and not steeper than 1:1.7 for deeper excavations or according to drawings.

The bottom of all foundation excavations shall be inspected by the Project Manager and rectified, compacted or covered with lean concrete as instructed before formed to the lines and levels shown on the Drawings. Pockets of soft soil or loose rock shall be removed and the resulting voids and any natural voids shall be filled with lean mix concrete.

Material used for backfill and for erosion protection shall be in according to SNiP 2.05.02-85

Where fill to structures is required to the same level on more than one side of a structural element or buried structure it shall be maintained at heights not differing by more than 250 mm after compaction on opposing sides of the structural element as filling proceeds.

The Contractor shall restrict compaction plant used on fill to structures, within 2 m of a structure, to the following items:

(i) vibratory roller having a mass per meter width of roll not exceeding 1,300 kg with a total mass not exceeding 1,000 kg;
(ii) vibrating plate compactor having a mass not exceeding 1,000 kg;
(iii) vibro-tamper having a mass not exceeding 75 kg.

The soil compaction degree of working layer behind the abutments, defined by compaction ratio, should meet the requirements of SNiP 2.05.02-82 table 22. (Ratio 0.95)

8.03 Scaffolding and Formworks

8.03.1 Description

This work includes constructing and removing of all scaffolding and formwork as well as work platforms and safety railings. Design is included in the work, respectively. The Contractor shall submit the design documents for Project Manager's approval at least one week before planned starting date for construction of the temporary supports, formwork and scaffolding.

8.03.2 Material

On the Site, the material in the form shall be wooden material, either formwork timber or plywood. Aluminum ties should be used for bracing of the formwork, if possible. The Project Manager shall approve all materials and equipment.

8.03.3 Construction Requirements

Formworks should be done in according to SNiP 3.01.01-85, III-15-76, III-43-75 and the description below.

Temporary supports shall be designed, constructed and removed according to SNiP 3.06.04-91. Maximum acceptable form deformation is L/300, for beams L/500.

The formwork shall be well moistened before casting the concrete so that it will not leak or take up water from the fresh concrete. The surface shall be well oiled to prevent the formwork to get stuck to the concrete.

Tolerances

The tolerances of the formwork should be ± 5mm of the measures shown at the drawings

Removal of the formworks

The Contractor will not be allowed to remove the formwork until 70% of the concrete compression strength has been achieved. Formwork removal shall be carried out without any damage to structures.

8.04 Reinforcement

8.04.1 Description

The works consist of provision, placing and transport of reinforcement for concrete elements.

8.04.2 Material and Construction Requirements

Material shall comply with the requirements of SNiP 2.05.03-84, GOST 5781-82 and GOST 380-88. The Project Manager shall approve all materials and equipment. Works shall be carried out in accordance with the requirements of SNiP 3.06.04-91 and SNiP 2.05.03-84. TheContractor shall prepare and deliver reinforcement plans for Project Manager's approval at least one week before starting date of the reinforcement works.

Concrete cover

At surfaces subjected to rapid flow of water or placed directly against the ground, steel reinforcement shall have a minimum cover of 75 mm of concrete. At other surfaces exposed to water or weathering conditions, or situated below ground level, the cover for steel reinforcement shall be not less than 45 mm for bars over 16 mm in diameter and not less than 40 mm for bars 16 mm or less in diameter, unless otherwise shown on the Drawings. The tolerance is ± 5 mm.

The cover shall be achieved by placing distance blocks between the reinforcement and the formwork with c/c 1.0 meter. These blocks shall be manufactured of the same sort of cement as the structural concrete.

8.05 Concrete Works

8.05.1 Description

The works includes provision of concrete, concrete casting with forms, transport, manufacturing and installation of pre-cast elements.

8.05.2 Materials and Construction Requirements

Materials shall comply with the SNiP 2.05.03-84, SNiP 3.06.04-91, Russian Standard Drawings and VSN 24-88.

In the following are additions to some of the standards. The additions precede what is written above:

- Concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, water and admixtures as specified, all well mixed and brought to the proper consistency.

- Storage of aggregates: After washing, fine aggregate shall be stored in stockpiles with a free draining base for at least 72 hours and shall be subsequently handled to ensure that sand delivered to the batching plant has a uniform and stable moisture content.
- Storage of Cement: Cement that has not been used within three (3) months from the date of initial sampling shall not be used in the Works unless it has been retested and is shown to conform to the specified requirements.

The following requirements shall apply to the storage and handling of cement at the Site or at any intermediate Take-Over or storage point:

- All methods for transporting, handling and storing bulk and bagged cement shall be designed beforehand.

- All storage bins and silos shall be drawn down (so as to be substantially empty) at least once every three (3) months.

- All bagged cement shall be stored at all times, up to its use in the Works, in completely weatherproof structures, which shall include a raised floor and be adequately ventilated to prevent the accumulation of moisture. Cement of different types shall be stored separately.

- Do not use cement that: **a)** has become partially set **b)** contains lumps or caked cement **c)** is salvaged from discarded or previously opened bags.

Addition of water to overcome stiffening of the concrete before placing will not be permitted.

Aggregate shall not be batched for concrete or mortar when free water is dripping from the aggregate.

Cement shall be sampled at the source and tested by the manufacturer and certified as conforming to the requirements of this Specification before being dispatched from the factory of the cement manufacturer. All costs associated with the sampling and testing shall be included in the rates for furnishing and handling cement.

The concrete mixture

The maximum ballast size shall be 32 mm. No aggregates that can cause alkali reactions can be used. The grading scale of the aggregates can be as follows:

- 38 % 0 mm – 4 mm sand (i.e washed quarts)
- 60 % 5 mm - 32 mm (i.e basalt or granite).

All the components and aggregates used in the concrete mix must be laboratory tested according to GOST standards. Moreover, the contractor must specify:

- Place of origin of components and aggregates
- Petrography analysis and chemical composition of all components, including water
- Quality and compressive strength of the aggregates
- Water absorption capabilities of all fractions used (<1 % weight percent)

All reinforced concrete tests, certifications, verifications and documents required by GOST for bridge construction must be complied with.

Requirements for the composite parts of concrete

The composite parts of the structural concrete mass, including filler, sand, rock, additives or plastifiers must have known documented origin and documented properties. The composite parts may not contain any items that can endanger or diminish the structural concrete's or reinforcement's properties and function.

The chloride content of the composite materials must be so low that the total free chloride content (Cl^-) of the structural concrete not exceeds 0,1% of the binder weight. An independent laboratory must test this criterion.

Cement

The cement must be Standard Portland 400 and comply with the GOST standards and quality requirements.

The chemical composition of the Portland cement 400 must convey to GOST standard. However, the cement type used must be low alkali and high sulphate resistance, LA/SR. The upper C_3A limit must be 5%. The requirements of the Tables 1 and 2 must be fulfilled, too.

Table1: Maximum values for certain chemical components in the cement.

Chemical composition	Weight percentage
Cl	0,1
Gravimetric SO_3,	4,0
Inorganic correction materials	5,0
MgO	5,0

Table 2: Complying values for certain properties of the cement.

Cement qualities		
Cementation	3 hours	8 hours
Heat development	Maximum 210 J/g days 1-3	Maximum 250 J/g days 1-7
Compressive strength	Minimum 16 MPa day 7	Minimum 29 MPa day 28
Bend / Shear	Minimum 3 MPa day 7	Minimum 5 MPa day 28

Mineral additives

If mineral additives are used in the concrete, the Contractor must present a special report containing the physical properties of the mineral additives and their chemical composition together with their variation. This report must include:

- Specific Area
- Combined Aggregate Grading
- Production Certificate

Fly ash is not permitted as mineral additive. Other mineral additives will only be allowed in factory-produced concrete. In-situ use of mineral additives is only permitted after the written permission of the Project Manager. Before the use in the structural concrete, the mineral additives have to be tested and analysed and the results presented to the Project Manager. The test results may not exceed the values shown in Table 3.

Table 3: The maximum content values for some products accepted in mineral additives. (Values expressed in weight percentage of dry material).

	Silica	Slag
Cl	0,2	0,1
SO_3,	4,0	4,0
CaO	2,0	
MgO	5,0	
Equivalent alkali content (Calculated as $Na_2O + 0,66K_2O$)	0,6	0,6
Glow, loss	5,0	

Concrete casting

TheContractor shall make a work plan for the concrete casting. When necessary, the work plan shall be revised before each casting.Work Plan shall include at least the following items:

- General description of structures
- Special requirements for concrete, e.g. frost resistance
- Requirements for work conditions, e.g. readiness for hot weather conditions
- Available equipment
- Management of works and personnel
- Preparations for concrete casting
- Arrangements to avoid cracks formation
- Mixing
- Casting
- Vibration
- Construction joints
- Temperature measurements during concrete hardening
- Strength measurements
- Repair and finishing

The Contractor shall, where necessary, employ effective means such as pre-cooling the aggregates, refrigerating the mixing water, adding chipped or flaked ice into the mixing water, placing at night or a combination of these, to ensure that the concrete does not exceed the temperature of 35^0 C or is less than 5^0 C during curing.

Under no circumstances will concrete be accepted if the temperature of the concrete, as deposited into the formwork, is not within these limits**.**

The Contractor shall provide for the cooling of mixing water and for the efficient insulation of any storage tanks and pipelines for mixing water.

Aggregate bins, batching and mixing equipment shall be painted white and protected from sunshine as far as practicable.

Appropriate measures shall be taken with respect to transporting and placing the concrete to control the temperature of concrete. Pipelines for conveying concrete shall be shaded and insulated or painted white; the elapsed time from mixing to placing shall be minimised. Concrete shall be placed promptly when delivered and finishing operations shall not be delayed. Concrete surfaces shall be protected from wind and sun, if directed by the Project Manager, during placing, finishing or curing operations.

Immediately before placing concrete, all surfaces upon or against which the concrete is to be placed shall be free from standing water, mud, debris, oil, objectionable coatings and loose, semi-detached fragments. Where directed by the Project Manager, the surfaces shall be cleaned with water jet.

The surfaces of construction joints shall be clean when covered with fresh concrete or mortar. Cleaning shall consist of the removal of all laitance, loose or defective concrete, coatings, sand, curing compound if used, and other foreign material to the satisfaction of the Project Manager.

Construction joints shall be wet usually for 12-14 hours before casting, so that moisture will not be drawn from the freshly placed concrete. Wooden forms shall be wet few days before casting and tightened just before casting.

The Contractor shall place all concrete in structures as shown on the Drawings, or as directed by the Project Manager, in accordance with this Specification, or as approved by the Project Manager. Concrete shall be deposited continuously and at a rate, which will give the prescribed rise of the fresh concrete in the formwork, while a block of concrete is being completed.

At every place where concreting is in progress, one of the Contractor’s supervisors, well experienced in concrete works, shall be present and responsible for the work. All concreting shall be carried out by skilled workmen under the supervision of a foreman with sound technical knowledge and experience. During concreting, a sufficient number of workmen shall be present to handle the concrete and an adequate number of steel fixers and carpenters shall keep the steel reinforcement and form work under surveillance.

If and when concreting is carried out in the dark, ample lighting shall be provided at the mixing station and at every place where concrete is being deposited.

The concrete shall be handled and placed in such a manner that it will have an approximately horizontal, plastic surface throughout the casting. The rise of concrete in the formwork shall not be less than 100 mm per hour. The maximum permitted rise of concrete in formwork shall not exceed 750 mm per hour, unless otherwise approved by the Project Manager.

When casting the concrete, it must be vibrated so that homogenous construction is obtained. Concrete shall be vibrated in layers 250...300 mm in thickness. At the same time previously placed layer shall be vibrated. Vertical structures shall be vibrated with vibrators with D=25...48 mm.

Vibrator should be kept as vertical as possible. Vibrating time is at least 10 minutes per cubic meter. The Project Manager shall approve vibrators.

Concrete shall be protected against damage from sunshine and rainfall. Concrete may not be placed in water, unless specifically indicated on the Drawings or approved by the Project Manager. The Contractor shall deal with all water encountered during concreting operations in such a manner that the water is prevented from flowing over or exerting pressure against the concrete, until such time after depositing as approved by the Project Manager.

While the concrete is at an early age, the surface of the joint shall be prepared for the subsequent deposition of fresh concrete by the application of high velocity water jet with a pressure of at least 3 atmospheres at the nozzle. The jet shall be applied so that laitance and foreign matters are removed and the clean aggregate exposed, but not so that the edges of the larger particles of the aggregate are undercut.

The Contractor shall inform the Project Manager when concrete will be placed.

Sprinkling of the surfaces with dry cement or any other material during finishing operations for drying off the concrete, to facilitate towelling or for any other purpose will not be permitted.

Curing, protection and finishing the surfaces

At least fourteen (14) days before placing concrete in any structure to be water cured, the Contractor shall submit to the Project Manager details of the equipment and methods he proposes to use for water curing. Water used for curing shall meet the requirements of this Specification for water used in concrete, but with the additional requirement that the water shall not contain any chemicals or other substances that will cause staining of concrete surfaces.

Concrete cured with water shall be kept continuously wet for at least fourteen (14) days immediately following placement of the concrete, or until covered with fresh concrete.

In case of sunshine or windy weather concrete shall be covered with plastic sheeting. Immediately after curing period surfaces will be checked for cracks. Maximum acceptable width of crack is 0.2 mm. In parapets and sidewalk areas cracks 0.1 mm or more in width shall be injected or grouted.

Prefabricated beams

A certificate that states their conformity with the requirements according to Standard drawings and Russian Standards shall accompany the beams**.** The required concrete quality shall be at least B30.

The support for the beams shall be well prepared and approved by the Project Manager before placement of the beams as described in the drawings. The joints between the beams shall be cast according to the drawings with concrete of at least quality B30.

Tolerances

Dimensions shall conform to design documentation. Tolerance for bridge span clearances shall be ± 30 mm. Falls on concrete surfaces shall be ± 0.5 %. Bridge span surface acceptable evenness is

20 mm measured by a straight-line 4 m in length. Concrete cover shall not be less than 5 mm under minimum acceptable.

8.06 Repair of Small Concrete Damages without Forms

8.06.1 Description

This work consists of repair of small concrete damages caused by faulty pours and other poorly compacted places and local deterioration or breaks.

8.06.2 Materials

Following or equal cement based patch mortars should be used:

1) Polymer cement mortar (Russia):
   Portland cement M 400-500; GOST 10178-85
   Sand M 0.4-0.8; GOST 8736-85
   44% emulsion divinyl styrene latex SKS–65 GP mark TU 38.103111-83
   Water; GOST 23732-79
   The ratio of the above mentioned mass parts in the polymer cement mixture is the following: 100:100:41:17.

2) Structurite 300 Thoro N.V. (Belgium)
3) Sika Top 122 Sika AG (Switzerland)
4) Vandex CRS 05 Vandex GmbH (Germany)

Materials shall be approved by the Project Manager.

8.06.3 Construction Requirements

Patching works shall be made according to the instructions of the manufacturer.

Damaged concrete shall be chiseled. The boundaries of the concrete to be removed shall be saw cut to a depth just missing the reinforcing bars. Concrete within the marked boundaries shall be removed by high pressure water jet blasting equipment or light pneumatic hammer.

Concrete shall be removed to a depth of at least 20 mm behind the reinforcing bars. The bars shall be cleaned with steel brush and compressed air. Recommended temperature during works is +10...+15 °C. Air temperature must be at least +5 °C.

The work will be accepted for payment providing that it has been done in conformance to the drawings and specifications and is accepted by the Project Manager.

8.07 Painting of Steel Structures

8.07.1 Description

This work consists of cleaning, sand blasting and painting of steel structures. Works include construction and removal of scaffoldings and working platforms.

8.07.2 Materials and Construction Requirements

Paintwork materials shall comply with the SNiP 2.03.11-85 requirements. Touch-up painting should be done with the same paint material as was used before.

Surface treatment shall consist of at least three paint layers in total thickness not less than 160 μm.

Works shall be carried out in accordance to requirements of SNiP 3.06.04-91. Works shall be carried out in dry weather at the temperature +10 C°…+30 C°. Relative air humidity shall not exceed 80% and the metal surface shall be clean and dry.

Final cleaning shall be done by sand blasting just before painting. Dry quartz sand of 0,6…1,5 mm in grain size shall be used for sandblasting.

The Contractor shall submit the work plan of surface treatment and painting and description of proposed materials to the Project Manager for approval at least two weeks before planned procurement of paint materials. Design of necessary scaffoldings must be submitted within work plan.

8.08 Down Pipes

8.08.2 Description

This work consists of repair of the existing down pipes and construction of new down pipes.

8.08.3 Materials

Stainless steel should be used for down pipes, if possible. The Project Managermay accept also the following materials:

Cast iron pipe,TCK, GOST 69423-80–150-200
Cast iron funnel, GOST 1412-85 C415
Cast iron webbing, GOST 14122-85 C415

Polymer cement mortar shall be made according to GOST 28013-89 and SNiP 3.06.04-91

8.08.4 Construction Requirements

Down pipes installation works shall be executed according to the requirements of SNiP 3.06.04-91.

The rehabilitation of existing down pipes includes installation of new down pipes, funnels and webbings on the designed levels.

New down pipes will be constructed, where distance between the existing down pipes exceeds 10 m.

The location of new down pipes shall be approved by the Project Manager.

Down pipes shall be glued with stiff epoxy glue.

8.09 Bridge Railings

8.09.1 Description

This work comprises dismantling of railing sections, their re-installation, straightening or replacement of damaged railing elements including fixing details, sand blasting of existing railings and painting as well as manufacturing, installation and painting new railing sections.

8.09.2 Materials and Construction Requirements

Railing material, fixings and technical requirements shall comply with SNiP 3.503.1-81 and SNiP 3.06.04-91 under GOST 380.88. Paintwork materials shall comply with the SNiP 2.03.11-85 requirements. Cleaning of railings from corrosion and the old paint are done according to the VSN 24-88 requirements. Railing elements surface under lacquer coating shall be cleaned till I grade purification efficiency under GOST 9.402-80. Cleaning shall be done by sand blasting.

Surface treatment materials shall consist of two paint layers on two primer layers in total thickness not less than 160 μm.

The quality of the paintwork layer shall correspond to the VI class under GOST 9.032-74.

The Contractor shall submit the work plan of surface treatment and painting and description of proposed materials to the Project Managerfor approval at least two weeks before planned procurement of paint materials.

8.10 Bearings

8.10.1 Description

The reinforced elastomer bearing is one of the most universally used types and should be given preference on account of its easy applicability and reliability. Due to the elastomer layer on the contact surface, it adjusts smoothly to minor irregularities of the bed of adjoining structural members, ensuring uniform force Take-Over . Therefore, reinforced elastomer bearings should be used, where possible. They are composed of elastomer layers hot vulcanised to steel plates between them (type Elastoplast or similar).

8.10.2 Calculation Assumption

Appropriate bearings should be selected on the basis of the following data.

Permissible stress for standard size bearings may be taken from the table below: (DIN 4141, part 14)

Bearing Area A^{σ} m 10^2 mm^2	Permissible Stress N/ mm^2
< 500	10.0
< 1200	12.5
≧1200	15.0

The permissible stress is determined as the average bearing stress as follows:

$$\sigma_m = \frac{F}{A}$$

where

$^{\sigma}_{m}$= average bearing stress
F= maximum load
A= ground area for bearing

Prior to installation of the bearings, bearing design calculations and shop/execution drawings shall be submitted to the Project Managerfor approval.

8.10.3 Installation

Bridge bearings shall be installed according to the instructions of the bearing manufactory.

DIN 4141, part 14, section 7 contains very detailed guide lines for the installation of reinforced elastomeric bearings with an emphasis on the roughness of the area into which the bearings are to be placed. In order to prevent slipping of bearings under the action of force referred to above, it is indispensable that the seating of the structures shows this certain roughness. As a rule, cement bound concrete provides this roughness, whereas caution is to be exercised when plastic bound concrete is used. In order to achieve the required roughness of the seating, it may be advisable to cover surfaces with a 1-2 mm layer of sand mixed with corundum or quartz prior to setting.

8.11 Expansion Joints

8.11.1 Description

The work consists of removal of existing expansion joints, supply and installation of new expansion joints, including provision of data and drawings, adhesives and the like, and protective system.

8.11.2 Materials

Expansion joints structures shall be manufactured at plant conditions meeting SNiP 3.03.01-87, SNiP III-18-75 and SNiP 3.06.04-91 requirements. The joints constructions shall be manufactured with the control erection of all elements at the plant. Packages are completed with all the necessary elements including catch drains.

Storage and installation of joints, jointing materials, sealants and other associated items shall be in accordance with the manufacturer's recommendations.

The same joint system, seal or sealant shall continue across the full width of the deck including footway, verge, hard strip, hard shoulder and central reserve. Different joint systems shall not be combined at one end of a deck unless otherwise approved by the Project Manager.

8.11.3 Construction Requirements

Expansion joints are discontinuities in concrete designed to allow for thermal or other movements in the concrete. Expansion joints shall be formed in the positions and in accordance with the details shown on the Drawings or elsewhere in the Specifications.

Installation

The existing expansion joints shall be removed without damaging the adjacent concrete parts. Before installation of the joint, the concrete surfaces shall be free from laitance, sound, clean and comply with the manufacturer's requirements.

The expansion joint and the bridge deck waterproofing shall be formed so that a watertight seal is provided. Where prefabricated units are used, the seal between each unit shall be made watertight and in addition a secondary waterproofing system in the form of a continuous membrane shall be installed.

Expansion joints shall be of uniform width and straight alignment and shall be accurately set and finished and aligned with the finished surface.

During the placing and hardening of the bedding and bonding materials, movement between the joint and the substrate shall be prevented.

Installation works and welding erection joints shall be executed according to the SNiP 3.03.01-87, SNiP 3.06.04-91 requirements and “Expansion joints construction recommendations”.

Before vehicles traffic the joints, temporary covers capable of withstanding vehicular loading shall be provided over expansion joints during and after their installation as appropriate for protection.

Corrosion Protection

Expansion joints shall be protected from corrosion in accordance to the requirements of SNIP2.03.11-85.

8.12 Waterproofing and Protective Layer

8.12.1 Description

This work consists of preparation of concrete surface for applying sheet membrane waterproofing and construction of protective layer on the carriageway.

8.12.2 Materials

The bridge deck shall be waterproofed by two watertight layers to ensure protection against damage caused by moisture, frost action and de-icing salts. The waterproofing shall be protected by a protection course. The waterproofing shall conform to the following requirements:

Thickness of layer	≥ 6 mm
Water pressure resistance	300 kPa
Temporary heat resistance	200 °C

Tensile strength, longitudinal direction at 23 °C 10 kN/m and in cross direction 8 kN/m

Concrete B 30 shall be applied for leveling and protection layer. Protection layer shall be reinforced in accordance to the Typical Design 3.503.1-101.

All materials shall be approved by the Project Manager and conform to the requirements of SNiP 3.06.04-91, SNiP 2.05.03-85, VSN 32-81. The Contractor shall submit to the approval of the Project Manager at least 2 weeks prior to the commencement of the works technical details and specifications, together with the working drawings of the waterproofing and protective layers. Materials shall be stored according to the manufactures recommendations.

8.12.3 Construction Requirements

The works shall be carried out according to the requirements of SNIP 3.06.04-91.

Concrete surface

The surface that is to be waterproofed must be blasted in order to obtain a thoroughly roughened and clean surface. Cracks wider than 0.2 mm shall be sealed by a method approved by the Project Manager. The work shall be carried out so that no particles over 1.5 mm protrude from the concrete surface. Prior to the waterproofing, the entire surface of the concrete shall be cleaned with compressed air. No vehicle traffic is allowed on the cleaned parts. Only personal that are involved in the waterproofing works are permitted on the cleaned parts of the bridge deck. It is important that no execution works that can generate dust or dirt are to be carried out in the vicinity of the waterproofing area.

The surface of the drain outlet must be sanded slightly in such a way that a mat surface is obtained.

Working conditions

All the waterproofing work shall be done on dry and clean surface, at least 21 days after the concreting work. No stains of oil, petrol or other fluids are allowed on the surface of the concrete.

The protective and binder course are to be applied within 12 hours after the waterproofing has been placed on the concrete surface. No vehicles, tools or other personal are allowed to stand on the waterproofing.

Texture of waterproofing

The bridge deck will be waterproofed with two layers of waterproofing mat.The clean concrete surface will be at first primed with bitumen solution, 0.3 kg/m^2.

The first waterproofing mat can be either welded or glued to the deck with bitumen. In both cases great care should be taken in the amount of heat applied.

The execution must start at the lowest point of the structure. The mat is to be rolled out in such a manner that there is a wave of melted bitumen in front of it.

The waterproofing mat must withstand the minimum bond strength. This will be verified by cutting a rectangle of the waterproofing mat with the dimensions 0.1 x 0.3 m. The waterproofing mat and the underlying layer must have the same temperature. The rectangle will be cut into 3 parts with the length of 0.3 m. Thereafter, the short ends will by pulled evenly. The minimum bond strength of 0.5 MPa must be achieved.

Extent of waterproofing and sealing

The waterproofing mat will be rolled out in such a way that the longitudinal overlapping will be 100 mm and the transversal overlapping of 120 mm. Waterproofing at deck joints shall be fully sealed.

Weather limitations

Primers and waterproofing shall not be laid during rain and snowfall. It is desirable to apply temporary covers when working. No waterproofing, seal or protective course works are allowed if the temperature of the underlying concrete surface, waterproofing material or outside air temperature is below +5 C^0. During isolation works the relative humidity of the air shall not exceed 85 %.

9. Rockfall Protection

9.01 Wire Mesh and Cable Net Drapery

9.01.1 Description

Rock-fall protection (wire mesh and cable net drapery) shall consist of furnishing and constructing a wire mesh and cable net drapery as shown on the drawings or as specified, or as instructed by the manufacturer.

The drapery shall not allow rocks greater than 120 mm in minimum dimension to pass through the wire mesh. The wire mesh and cable net drapery shall have demonstrated satisfactory performance in similar applications and capacities. Results of said performances shall be made available to the Project Manager.

The wire mesh and cable net drapery design shall have the structural strength to retain the load imposed by the rocks in the configuration shown in the plans with no distress of connecting elements. Engineering calculations demonstrating such shall be made available to the Project Manager 10 days prior to the installation at each location. The wire mesh and cable net drapery shall be comprised of standard components to the extent practical and shall require minimal maintenance when subjected to the design parameters. The wire mesh and cable net drapery shall be resistant to corrosion, UV degradation, and thermal deterioration. The wire mesh and cable net drapery shall be capable of being pulled on/out at the bottom for rock removal.

9.01.2 Slopes and foundation conditions

The Contractor should expect to encounter a broad range of foundation materials, from very hard rock to soil, when installing drapery anchor.

9.01.3 Material

The wire mesh and cable net drapery and all hardware shall be protected from corrosion by galvanization. All structural steel components, including anchors and clamps, shall conform to the requirements in ASTM Designation: A36. All bolts, nuts, and washers shall conform to the requirements in ASTM Designation: A 325. The wire ropes, cable net, and support ropes shall be galvanized in conformance with the requirements BS EN 10244-2.

All miscellaneous hardware shall be supplied by the manufacturer with the system and shall be galvanized. All materials shall be labelled by the manufacturer in order for the Contractor to identify the materials on the manufacturer's working drawings.

Wire mesh

Wire mesh fabric shall be double twisted, 12 gage and zinc coated (244g per square meter). Individual wires of mesh shall meet the following minimum requirements:

Property	Test Method	Test Value
Tensile Strength (MPa)	ASTM A 370	414 Min.

Tensile area includes galvanization.

The mesh shall form a uniform hexagonal pattern and shall be formed with a nonraveling twist. The major axis of any opening shall not exceed 120 mm. The area of hexagonal opening, 82.6 mm by 114 mm, shall not exceed 73.5 square cm.

The wire mesh shall be securely fastened to each cable net panel and to the cable infrastructure. Spacing of the tie wires or connectors shall be every 300 mm. The wire mesh and cable net shall be flush with no gaps to exceed 100 mm. There shall be no discontinuity in the wire mesh. Tie wires or connectors used to fasten the wire mesh to cable net or adjacent panels shall have a connection strength equal to or greater than the strength of the mesh. The wire mesh and cable net shall be connected prior to placing the drapery on the slope. The wire mesh shall be placed between the slope and the cable net.

Cable net

Cable net shall be comprised of square or rectangular cable mesh panels joined at the panel boundaries to form a continuous drapery.

Each cable mesh panel shall incorporate a uniform grid pattern of square openings approximately 300 mm by 300 mm formed by the woven crossing of nearly continuous cable strands. The major axis of any opening shall not exceed 300 mm and the area of any opening shall not exceed 930 square cm. Each perpendicular cable crossing shall be securely fastened at an angle of approximately 90 degrees using a crossing clip of sufficient strength to resist slippage or breakage of the crossing connection when subject to the loads generated by the controlled rock fall. Cable mesh fabric shall have a minimum diameter of 8 mm and have a minimum breaking strength of 1.95 kN. Connection of the cable mesh panels shall be made with 8 mm lacing cable. The wire mesh and cable net drapery shall be placed on the slope in a manner that will follow the contours of the slope and minimize gaps and large spaces between the drapery and the ground surface as determined by during the detaled design.

The top of the wire mesh and cable net drapery shall be secured to a top support cable. The top support cable shall be wire rope with a minimum diameter of 18 mm and shall be positioned a minimum of 1.5 meters above the top of the cut slope. The tag line cable used to connect the perimeter cable to the anchors shall be wire rope having a minimum diameter of 18 mm.

Anchors

The Contractor shall submit working drawings for the anchor based on the geological conditions at the site, as shown on the drawings and as provided in these special provisions. Anchors shall be placed at the spacing and locations proposed by the Contractor or as directed by the Project Managerbut not to exceed 15 m apart. The anchors shall be composed of a bonded and an unbonded length. The unbonded length of the anchors shall penetrate the thickness of the weak material and shall extend at least 1.8 m below the ground surface. The bonded length shall be determined by the pullout test as specified in these special provisions. All anchors shall be installed in drilled or hand dug holes using centralizers. Centralizers shall adequately support the anchor in the center of the drilled hole and shall be spaced at a maximum of 600 mm. The drill hole diameter shall be a minimum of 55 mm. Hand dug hole diameters shall be a minimum of 175 mm. The anchor holes in soil may encounter running/caving conditions. The Contractor shall have casing available on site for use in such conditions. Anchor holes may also encounter very hard rock. The Contractor shall have heavy on site drilling equipment capable of installing the anchors

in very hard rock, under the access limitations as later provided under "Installation" of these specifications.

The full length of the anchors below ground shall be encased in concrete or grout. All anchors shall be galvanized. Prior to pouring the concrete in the drilled hole, the Contractor shall moisten the subgrade to a minimum depth of 50 mm from the soil concrete interface and remove all loose soil or rocks from the hole. The Contractor shall cure the concrete at a minimum temperature of 10 degrees C for a period of 72 hours and at a minimum temperature of 0 degrees C for an additional period of 72 hours.

For grouting,fine aggregate may be added to the grout mixture of Portland cement and water for use in drilled holes 100 mm in diameter or greater, but only to the extent that the cement content of the grout is not less than 502 kilograms per cubic meter of grout.

Selected anchors shall be tested by the Contractor at 1.5 times the allowable design load in accordance with the testing section in these special provisions. The allowable design load shall be as shown on the working drawings. The minimum allowable design load shall be 98 kN. A minimum of 20 percent of the total number of anchors shall be tested and the Project Manager shall select the location of each test anchor. If more than 20 percent of the anchors tested fail, 50 percent of the total number of anchors shall be tested. All failed anchors shall be replaced and retested at the Contractor’s expense. The shear force acting on the anchor bar shall be limited to 80 percent of the allowable design load (pullout load).

Miscellaneous metal

All miscellaneous hardware such as bolts, nuts, connectors, clamps, tie wires, and appurtenances shall be galvanized.

9.01.4 Testing

Testing shall be performed against a temporary yoke or load frame. No part of the yoke or load frame shall bear within 0.9 m of the anchor.

Anchor assemblies selected for testing shall be pullout tested by the Contractor in the presence of the Project Manager. A pullout test consists of incrementally loading the anchor assembly to the maximum test load or failure point, whichever occurs first. Failure point shall be the point where the movement of the anchor continues without an increase in the load or when the anchor has displaced 50 mm. The failure load corresponding to the failure point shall be recorded as part of the test data.

During the load test, the Contractor shall monitor and record displacement of the anchors relative to a stable reference point which is founded a minimum distance of 0.9 m from the anchor and test load reaction points. The pullout test shall be conducted by measuring the test load applied to the anchor and the anchor end movement at each load.

Applied test loads shall be measured by the Contractor with either a calibrated pressure gage or a load cell. Movements of the end of the anchor shall be measured and recorded during the load tests.

The pressure gage shall have an accurately reading dial at least 150 mm in diameter and each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force, and shall be accompanied by a certified calibration chart. The gauge shall have been calibrated within one year prior to use on the project. The anchor shall be unloaded only after completion of the test.

9.01.5 Installation

The wire mesh and cable net drapery shall be installed in accordance with the requirements of the manufacturer, as shown on the drawings, as specified in these special provisions, and as directed by the Project Manager.

Vegetation encountered on slopes on which the wire mesh and cable net drapery is to be placed shall be preserved whenever possible. Vegetation shall be removed or pruned only when anchoring is required, the effectiveness of the wire mesh and cable net drapery is compromised, or as directed by the Project Manager. Vegetation from the hinge point of the slope to 10 m upslope from the hinge point shall be removed or pruned only as required or as directed by the Project Manager. Root systems shall be left in-place. Vegetation shall not be removed beyond this limit unless directed by the Project Manager. Access to the top of the cut slope and to the anchor installation area shall be limited to 10 m upslope of the wire mesh and cable net drapery limits. The Contractor shall not conduct operations that disturb vegetation beyond the area required for installation.

The Contractor shall scatter excess excavated anchor material around the vicinity of the wire mesh and cable net drapery and dress it out to match the existing ground surface to prevent unwanted jumping ramps for falling rocks.

Section IX. Summary Bill of Quantities

Khidistavi – Ateni - Boshuri Road Section Rehabilitation

Summary Bill of Quantities

Item No.	Activity	Quantity	Unit	Unit Price (GEL)	Write in Full	Total Price (GEL)
1	Rehabilitation of Road (all inclusive, including design costs, except of items below)	10.01	Km	429,864.75		4,302,946.15
2	Road Signage, Marking and Furniture	10.01	Km	54,878.32		549,331.98
3	Bridge no. 1 Rehabilitation at km 7+596	1	Unit	44,520.90		44,520.90
4	Bridge no. 2 Rehabilitation at km 7+912	1	Unit	47,058.73		47,058.73
5	Bridge no. 3 Rehabilitation at km 8+253	1	Unit	38,500.81		38,500.81
6	Bridge no. 4 Rehabilitation at km 9+600	1	Unit	42,338.06		42,338.06
7	Emergency (Physical Contingency) Works	1	Lump Sum*	65,000.00		65,000.00
8	Provisional Sum for Unforeseen Conditions	1	Lump Sum	150,000	One hundred fifty thousand GEL	150,000
A. BID PRICE FOR REHABILITATION AND EMERGENCY WORKS (items 1-7);						5,089,696.63
B. Add 18 % for VAT on Bid Price for Rehabilitation and Emergency Works (items 1-7);						916,145.39
Total Price for Rehabilitation Works incl. VAT to be carried to Letter of Bid = A+B + item #8 (Provisional Sum for Unforeseen Conditions)						**6,155,842.02**

* Emergency Works –Please refer to GCC Clause #29

Bill of Quantities for Rehabilitation Works

Bill of Quantities for Rehabilitation Works						
Item No.	**Activity**	**Quantity**	**Unit**	**Unit Price**	**Write in Full**	**Total Price**
1	Rehabilitation of Road (all inclusive, including design costs, except of items below)	10.01	Km	429,864.75		4,302,946.15
2	Road Signage, Marking and Furniture	10.01	Km	54,878.32		549,331.98
3	Bridge no. 1 Rehabilitation at km 7+596	1	Unit	44,520.90		44,520.90
4	Bridge no. 2 Rehabilitation at km 7+912	1	Unit	47,058.73		47,058.73
5	Bridge no. 3 Rehabilitation at km 8+253	1	Unit	38,500.81		38,500.81
6	Bridge no. 4 Rehabilitation at km 9+600	1	Unit	42,338.06		42,338.06
BID PRICE FOR REHABILITATION WORKS						5,024,696.63
Add 18 % for VAT on Bid Price for Rehabilitation Works						904,445.39
Total Price for Rehabilitation Works incl. VAT						**5,929,142.02**

Note:

1. The cost of design shall not be indicated separately and shall be included in the items above.

2. The length for road rehabilitation works includes also length of all bridges, but the price should be submitted for road rehabilitation only (excluding the price of bridge rehabilitation) because the bridges should be priced separately (individually) and will be paid accordingly during execution of the Contract.

Bill of Quantities for Emergency (Physical Contingencies) Works

Bill of Quantities for Emergency (Physical Contingencies) Works					
Item no.	**Description**	**Unit**	**Quantity**	**Rate**	**Amount**
100	**Work**				
101	Excavate landslide material from, or adjacent to the road and stockpile for reuse or dispose of as directed.	m^3	5,000	1.65	8,250.00
102	Excavate in water courses to reinstate or redirect flows and dispose of material.	m^3	1,000	1.65	1,650.00
103	Excavate to clear side drains and restore free flow.	m^3	500	1.65	825.00
104	Construct new reinforced concrete retaining walls	m^3	200	55	11,000.00
105	Construct new gabions	m^3	100	35	3,500.00
106	Construct new culvert barrel using approved concrete pipe with concrete surround	m^3	50	55	2,750.00
107	Construct new pavement comprising subgrade prep., sub base, base and asphalt layers in conformance with original approved design	m^2	2,000	4	8,000.00
108	Construct new road safety guardrails	m	100	15	1,500.00
109	Construct new New Jersey Barriers	m^3	100	55	5,500.00
110	Reinforced concrete works	m^3	100	55	5,500.00
200	**Supply of Labor, Equipment & Material**				
201	Skilled Labor	hrs	500	1	500.00
202	Operator	hrs	1000	1	1,000.00
203	Tipper truck	hrs	800	1.5	1,200.00
204	Loader	hrs	300	2.5	750.00
205	Excavator	hrs	300	2.5	750.00
206	Concrete mixer	hrs	100	1.65	165.00
207	Cement Concrete	m^3	100	40	4,000.00
208	Asphalt Concrete	tn.	100	75	7,500.00
209	Grader	hrs	100	2.5	250.00
210	Crane	hrs	50	2.5	125.00
211	Dozer	hrs	100	2.85	285.00
BID PRICE FOR EMERGENCY WORKS					65,000.00
Add 18 % for VAT on Bid Price for Emergency Works					11,700.00
Total Bid Price for Emergency Works incl. VAT					76,700.00

Section X. Construction Schedule