



TRACECA - Project  
Trade and Transport Sectors  
Implementation of Pavement  
Management Systems  
Turkmenistan  
Tedjen - Mary Road  
Improvement  
Tender Document  
August 1997

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Volume I  
Volume II  
Volume III

The Tender  
The Contract  
The Works

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# **Turkmenistan**

## **Improvement of Tedjen - Mary Road Section**

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### **Volume I**

### **The Tender**

# TURKMENISTAN

## Improvement of Tedjen - Mary Road Section

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# INVITATION FOR TENDERS

## Turkmenistan: Improvement of Tedjen - Mary Road Section

This Invitation for Tenders follows the General Procurement Notice for this project which was published in *Procurement Opportunities*, [ state issue and date ].

TURKMENAUTOELLARI (Turkmen Highways State Department) intends using part of the proceeds of a loan from the European Bank for Reconstruction and Development (the Bank) towards the cost of improvement of Tedjen - Mary Road.

TURKMENAUTOELLARI invites you and other prequalified contractors to submit sealed tenders for the execution and completion of the cited contract:

The Tedjen - Mary Road project is a 142,527 km long section of the M 37 from Ashgabat to Mary. The project comprises the following improvements and approximate quantities:

Improvement Type	Total Length (m)	Quantities (m <sup>2</sup> )
• Bituminous overlay, 40 mm thickness	25,000	220,000
• Bituminous overlay, 75 mm thickness	5,500	45,000
• Bituminous overlay, 120 mm thickness	5,000	4,010
• Reconstruction	110,000	995,000
• New alignment	1,400	14,000
• Widening of road	900	1,500
• Rehabilitation of shoulders	142,500	860,000

The period of performance of improvement works is estimated at 30 months.

Tendering for contracts to be financed with the proceeds of a loan from the Bank is open to firms from any country.

Tender documents may be obtained from the office at the address below upon payment of a non-refundable fee of USD 300.00 (threehundred only) or equivalent in a convertible currency. The payment for the documents includes payment for dispatch by courier, but no liability can be accepted for loss or late delivery.

Kocks Consult GmbH  
Consulting Engineers  
Stegemannstr. 32 - 38  
56068 Koblenz  
Germany

Phone switchboard: .. 49 261 - 1 30 20

Phone direct: ..49 261 - 13 02-143

Fax: ..49 261 - 13 02 -152

Payment has to be received by cheque on the account no. 0 240 101 at Deutsche Bank AG, Koblenz, Germany, Swift: Deut De 5 M 570 (BLZ 570 700 45), before the documents can be dispatched.

All tenders must be accompanied by a tender security of 250,000 (twohundredfiftythousand) US Dollars or its equivalent in a convertible currency.



Tenders must be delivered to the office at the address below on or before [ *specify time and date of deadline for submission* ], at which time they will be opened in the presence of those tenderers' representatives who choose to attend.

Nurmurad Kulmuradov  
Minister of the Turkmen Highways State Department  
TURKMENAUTOELLARI  
Pöwrüze Yöly 1. km P/B No: 3  
744000 Ashgabat  
Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78

A register of potential tenderers who have purchased the tender documents, may be inspected at the address below.

Prospective tenderers may obtain further information from, and inspect and acquire the tender documents at, the following office:

Kocks Consult GmbH  
Consulting Engineers  
Stegemannstr. 32 - 38  
56068 Koblenz  
Germany  
Phone direct: ..49 261 - 13 02-143  
Fax: ..49 261 - 13 02 -152

Kindly confirm receipt of this letter immediately in writing by cable or fax. If you do not intend to bid, we would appreciate being so notified also in writing at your earliest opportunity.



**VOLUME I.i**  
**INSTRUCTIONS TO TENDERERS**

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VOLUME I.i

# INSTRUCTIONS TO TENDERS

## General

### 1. Scope

- 1.1 The Employer, as defined in the **Tender Data**, invites tenders for the construction of the Works, described in these tender documents and summarised in the **Tender Data**, in accordance with the procedures, conditions and contract terms prescribed in the tender documents.
- 1.2 The successful tenderer will be expected to complete the Works within the period stated in the **Tender Data** from the date of the commencement of the works.
- 1.3 Throughout these tender documents the definitions in the Conditions of Contract shall apply.
- 1.4 Throughout these tender documents Schedule of Works refers to:
  - (i) the Bill of Quantities, if the Contract is a unit price (rate) contract,
  - (ii) the Activity Schedule, if the Contract is a lump sum contract.

### 2. Source of funds

- 2.1 The Employer intends using part of the proceeds of a loan from the European Bank for Reconstruction and Development (the Bank) for eligible payments under the Contract(s) for which this invitation for tenders is issued. Payment by the Bank will be made only at the request of the Employer and upon approval by the Bank in accordance with the terms and conditions of the loan agreement and will be subject in all respects to the terms and conditions of that agreement. The proceeds of the Bank's loan will not be used for payments to persons or entities or for any import of goods if such payment or import is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations.

### 3. Eligibility and qualifications

- 3.1 Subject to paragraph 2.1 above, this Invitation for Tenders is open to contractors from any country unless specified otherwise in the **Tender Data**.
- 3.2 No affiliate of the Employer shall be eligible to tender or participate in a tender in any capacity whatsoever unless it can be demonstrated that there is not a significant degree of common ownership, influence or control amongst the Employer and the affiliate.
- 3.3 Where a firm, its affiliates or parent company, in addition to consulting also has the capability to manufacture or supply goods or to construct works, that firm, its affiliates or parent company normally cannot be a supplier of goods or works on a project for which it provides consulting services, unless it can be demonstrated that there is not a significant degree of common ownership, influence or control.
- 3.4 A tenderer may submit or participate in any capacity whatsoever in only one tender for each contract. Submission or participation by a tenderer in more than one tender for a contract (other than alternatives which have been permitted or requested) will result in

the disqualification of all tenders for that contract in which the party is involved. However, this does not limit the inclusion of the same subcontractor in more than one tender.

- 3.5 In the event that prequalification of potential tenderers has been undertaken, only tenders from prequalified tenderers will be considered for award of the Contract. A prequalified tenderer should submit with its tender any information updating its original prequalification application and confirm in its tender that the other original prequalification information submitted, remains essentially correct as of the date of tender submission.
- 3.6 If the Employer has not undertaken prequalification of potential tenderers, to qualify for award of the Contract, the tenderer shall meet the qualifying criteria specified in the **Tender Data**.
- 3.7 The tenderer shall submit the documentary evidence specified in the **Tender Data**, establishing that it satisfies the qualifying criteria referred to in paragraphs 3.5 or 3.6 above.

#### **4. Cost of tendering**

- 4.1 The tenderer shall bear all costs associated with the preparation and submission of its tender, and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

#### **5. Pre-tender meeting or site visit**

- 5.1 The tenderer is advised to attend any pre-tender meeting or site visit schedule in the **Tender Data**.
- 5.2 The tenderer is advised to visit and examine the site of works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the tender and entering into a contract for construction of the works. The cost of visiting the site shall be at the tenderer's expense.
- 5.3 The tenderer and any of its personnel or agents will be granted permission by the employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the tenderer, its personnel and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other losses damage, costs, and expenses incurred as a result of the inspection.

## Tender Documents

### 6. Contents of tender documents

6.1 The tender documents comprise the documents listed below, other documentation or drawings specified in the **Tender Data** and addenda issued in accordance with paragraph 8.

Vol.I		Invitation for Tenders
	.i	Instruction to Tenderers
	.ii	Tender Data
	.iii	Tender Form
		• Attachment to Tender
	.v	Tender Security Form
Vol.II	.i	Standard Form: Agreement
	.ii	General Conditions of Contract
	.iii	Contract Data/Special Conditions of Contract
	.iv	Performance Security Form
	.v	Advance Payment Security Form
Vol.III	.i	Schedule of Works, Bill of Quantities
	.ii	Technical Specifications
	.iii	Drawings and Other Documentation

6.2 The tenderer is expected to examine the tender documents, including all instructions, forms, contract terms and specifications. Failure to furnish all information required by the tender documents, or submission of a tender not substantially responsive to the documents in every respect, will be at the tenderer's risk and may result in the rejection of its tender.

### 7. Clarification of tender documents

7.1 A prospective tenderer requiring any clarification of the tender documents may notify the Employer in writing or by fax (hereinafter "fax" includes cable and telex) at the Employer's mailing address indicated in the **Tender Data**. All requests for clarification must be received by the Employer no later than twenty-eight (28) days prior to the deadline for the submission of tenders. The Employer will respond in writing to such requests for clarification of the tender documents which it receives. Copies of the Employer's response (including a description of the enquiry but without identifying its source) will be sent to all prospective tenderers that have received the tender documents.

### 8. Amendment of tender documents

- 8.1 At any time prior to the deadline for submission of tenders, the Employer may amend the tender documents by issuing addenda.
- 8.2 Any addendum thus issued shall be part of the tender documents and shall be communicated in writing or by fax to all prospective tenderers that have received the tender documents. Prospective tenderers shall promptly acknowledge receipt of each addendum by fax to the Employer.
- 8.3 To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer may, at its discretion, extend the deadline for submission of tenders, in accordance with paragraph 17.2.

## Preparation of Tenders

### 9. Language of tender

- 9.1 The tender and all documents and correspondence relating to the tender exchanged by the tenderer and the Employer shall be written in the language of the tender specified in the **Tender Data**. Supporting documents and printed literature furnished by the tenderer may be in another language provided they are accompanied by an accurate translation of its pertinent passages in the language of the tender, in which case, for purposes of interpretation of the tender, the translation shall govern.

### 10. Documents comprising the tender

- 10.1 The tender submitted by the tenderer shall comprise the following:

- (a) a Tender Form [in the format indicated in Vol. I(iii)] completed in the manner and detail indicated therein and signed by the tenderer;
- (b) a Power of Attorney, duly authorised by a Notary Public, indicating that the person(s) signing the tender have the authority to sign the tender and thus the tender is binding upon the tenderer;
- (c) a Tender Security furnished in accordance with paragraph 14.
- (d) Price Schedules [in the format indicated in Vol. III] completed in the manner and detail indicated therein and in accordance with paragraphs 11 and 12.;
- (e) documentary evidence in accordance with paragraph 3.7 establishing that the tenderer is qualified to perform the Contract if its tender is accepted; and
- (f) any information or other materials required to be completed and submitted by the tenderers in accordance with these tender documents and specified in the **Tender Data**.

- 10.2 The tenderer shall submit offers which comply with the requirements of the tender documents, including the basic technical requirements as indicated in the drawings and specifications. The attention of tenderers is drawn to the provision of paragraph 6.2 regarding the rejection of tenders which are not substantially responsive to the requirements of the tender documents. Alternatives will not be considered unless permitted in paragraph 10.3 below.

- 10.3 When alternatives are explicitly invited or permitted, a statement to that effect will be included in the **Tender Data** as will the submission requirements and the methods for evaluating such alternatives.

### 11. Tender prices

- 11.1 Unless specified otherwise in the **Tender Data**, the Contract shall be for the whole Works referred to in paragraph 1.1, based on the Price Schedules submitted by the tenderer.

- 11.2 The tenderer shall fill in prices for all items of the Works described in the drawings and specifications and listed in the Schedule of Works. Items against which no price is entered by the tenderer will not be paid for by the employer when executed and shall be deemed covered by the prices for other items in the Schedule of Works.
- 11.3 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date twenty-eight (28) days prior to the deadline for submission of tenders, shall be included in the prices and the total tender price submitted by the tenderer.
- 11.4 Unless specified otherwise in the **Tender Data**, the prices quoted by the tenderer are subject to adjustment during the performance of the contract in accordance with the relevant provision of the Conditions of Contract specified in the **Tender Data**. The tenderer shall submit with its tender all the information required under the relevant provision of the Conditions of Contract and specified in the **Tender Data**.
- 11.5 If so indicated in the **Tender Data**, a tenderer tendering for this contract, together with other contracts to form a package, will so indicate in the tender, together with any discounts offered for the award of more than one contract.

## 12. Currencies of tender and payments

- 12.1 The prices shall be quoted by the tenderer entirely in the currency specified in the **Tender Data**. A tenderer expecting to incur expenditures in other currencies for inputs to the Works, supplied from outside the Employer's country (referred to as "the foreign currency requirements") shall indicate its expected foreign currency requirements (excluding provisional sums) in the Tender Form and Price Schedules, in the manner and detail indicated therein. Foreign currency requirements can be quoted in any convertible currency or currencies (including ECU) or combination of these.
- 12.2 The rates of exchange to be used by the tenderer in arriving at the tender currency equivalent and the percentage(s) mentioned in paragraph 12.1 above shall be the selling rates for similar transactions established by the authority specified in the **Tender Data** prevailing on the date twenty-eight (28) days prior to the latest deadline for submission of tenders. These rates shall be listed by the tenderer in the Price Schedules and shall apply for all payments under the Contract so that no exchange risk will be borne by the successful tenderer. If the tenderer uses other rates of exchange, the provision of paragraph 24.1 shall apply for the purpose of evaluation of tenders. However, payments under the Contract will be computed, using the rates of exchange quoted in the tender.
- 12.3 A tenderer may be required by the Employer to clarify its foreign currency requirements and to substantiate that the amounts included in the prices, and shown in the Price Schedules, are reasonable and responsive to paragraph 12.1, in which case, a detailed breakdown of its foreign currency requirements shall be provided by the tenderer.

## 13. Tender validity

- 13.1 Tenders shall remain valid for the period specified in the **Tender Data**. A tender valid for a shorter period shall be rejected by the Employer as non-responsive.
- 13.2 In exceptional circumstances, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing or by fax. A tenderer may refuse the request without forfeiting the tender security. A tenderer agreeing to the request will not be required or



permitted to modify its tender, except as provided in paragraph 13.3 below. The Tender Security provided under paragraph 14 shall also be suitably extended.

- 13.3 Where the tender is for a fixed price contract (not subject to price adjustment), if the period of tender validity is so extended, the tender price of the successful tenderer will be adjusted up to the date of award of the contract, as provided for in the **Tender Data**, to arrive at the contract price. Tender evaluation will be based on the tender prices without taking into consideration the above adjustment.

#### **14. Tender Security**

- 14.1 If required in the **Tender Data**, the tenderer shall furnish, as part of its tender, a Tender Security in the amount specified therein.

- 14.2 The Tender Security is required to protect the Employer against the risk of the tenderer's conduct which would warrant the forfeiture of the security, pursuant to paragraph 14.7.

- 14.3 The Tender Security shall be denominated in the currency of the tender or other freely convertible currency and shall be, at the tenderer's option, in the form of a cashier's or certified cheque, bank draft, stand-by letter of credit, or bank guarantee issued by a reputable bank located abroad or is in the country of the Employer. The format of the bank guarantee shall be in accordance with the sample form of Tender Security included in Volume I.iv or in another form acceptable to the Employer. The Tender Security shall be valid for twenty-eight (28) days beyond the validity of the tender.

- 14.4 Any tender not accompanied by an acceptable Tender Security shall be rejected by the Employer as non-responsive pursuant to paragraph 23.4.

- 14.5 The Tender Security of unsuccessful tenderers will be return within twenty-eight (28) days of the expiration of the tender validity period.

- 14.6 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the Agreement and furnished the Performance Security, pursuant to paragraph 31.

- 14.7 The Tender Security may be forfeited:

(a) if a tenderer:

- (i) withdraws its tender during the period of tender validity, or
- (ii) invalidates its tender pursuant to paragraph 21.3 or paragraph 23.6;

(b) in the case of a successful tenderer, if the tenderer fails to:

- (i) sign the Agreement pursuant to paragraph 30, or
- (ii) furnish the required Performance Security within the time limits specified in paragraph 31.

#### **15. Format and signing of tender**

- 15.1 The tenderer shall prepare one original of the documents comprising the tender as described in paragraph 10 of these Instructions to Tenderers, bound with the section containing the Form of Tender, and clearly marked "ORIGINAL". In addition, the tenderer shall submit copies of the tender, in the number specified in the **Tender Data**,

and clearly marked "COPIES" In the event of a discrepancy between them, the original shall prevail.

- 15.2 The original and all copies of the tender shall be typed or written in indelible ink (in the case of copies, photocopies are also acceptable) and shall be signed by a person or persons duly authorised to sign on behalf of the tenderer, pursuant to paragraph 10.1(b), as the case may be. All pages of the tender where entries or amendments have been made shall be initialled by the person or persons signing the tender.
- 15.3 The tender shall contain no alternations, omissions, or additions, except those to comply with instructions issued by the Employer or, as necessary, to correct errors made by the tenderer. Any such correction shall be valid only if it is initialled by the person or persons signing the tender.

### **Submission of tenders**

#### **16. Sealing and marking of tenders**

- 16.1 The tenderer shall seal the original and each copy of the tender in separate envelopes, duly marking the envelopes as "ORIGINAL" and "COPIES". The envelopes shall then be sealed in an outer envelope.
- 16.2 The inner and outer envelopes shall:
- (a) be addressed to the Employer at the address provided in the **Tender Data**;
  - (b) bear the name and identification of the contract as defined in the **Tender Data**; and
  - (c) provide a warning not to open before the specified time and date for tender opening.
- 16.3 In addition to the identification required above, the inner envelopes shall indicate the name and address of the tenderer to enable the tender to be returned unopened in case it is declared "late" pursuant to paragraph 18, and for matching purposes under paragraph 19.
- 16.4 If the outer envelope is not sealed and marked as required above, the Employer will assume no responsibility for the misplacement or premature opening of the tender. If the outer envelope discloses the tenderer's identity, the Employer will not guarantee the anonymity of the tender submission, but this shall not constitute grounds for rejection of the tender

#### **17. Deadline for submission of tenders**

- 17.1 Tenders must be received by the Employer at the address specified in paragraph 16.2(a) no later than the time and date specified in the **Tender Data**.
- 17.2 The Employer may extend the deadline for submission of tenders by amending the tender documents in accordance with paragraph 8, in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline will thereafter be subject to the deadline as extended.

**18. Late tenders**

18.1 Any tender received by the Employer after the deadline prescribed in paragraph 17 will be returned unopened to the tenderer.

**19. Modification and withdrawal of tenders**

19.1 The tenderer may modify, substitute, or withdraw its tender by giving notice in writing to the Employer before the deadline prescribed in paragraph 17.

19.2 The tenderer's modification, substitution, or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with paragraph 16, with the outer and inner envelopes additionally marked "MODIFICATION", "SUBSTITUTION" or "WITHDRAWAL", as appropriate.

19.3 No tender may be modified by the tenderer after the deadline for submission of tenders.

19.4 Withdrawal of a tender between the deadline for submission of tenders and the expiration of the period of tender validity may result in the forfeiture of the tender security pursuant to paragraph 14.7.

**Tender opening and evaluation**

**20. Opening of tenders**

20.1 The Employer will open the tenders, including withdrawals, substitutions and modifications submitted pursuant to paragraph 19, in the presence of the tenderers' representatives who choose to attend, at the time and in the place specified in the **Tender Data**. The tenderer's representatives who are present shall sign a register evidencing their attendance.

20.2 No tender shall be rejected at tender opening, except for late tenders, which shall be returned unopened to the tenderer pursuant to paragraph 18.

20.3 Withdrawal, substitution and modification notices shall be opened and announced first. Tenders for which a notice of withdrawal has been submitted pursuant to paragraph 19 shall not be opened, but will be returned to the tenderers.

20.4 The tenderers' names, the tender prices, the prices of any alternative (if alternatives have been requested or permitted) any discounts, tender deviations, the presence or absence of tender security and any such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. Subsequently, all modifications shall be opened and the submission therein read out in appropriate detail. Tenders (and modification submitted pursuant to paragraph 19) that are not opened and read out at tender opening will not be considered further for evaluation, irrespective of the circumstances.

20.5 The Employer shall prepare minutes of the tender opening, including the information disclosed to those present, in accordance with paragraph 20.4.

## **21. Process to be confidential**

- 21.1 The tender evaluation process up to the award of a contract is confidential.
- 21.2 Information relating to the examination, clarification, evaluation and comparison of tenders, and recommendation for the award of a contract, shall not be disclosed to tenderers or any other persons not officially concerned with such process until the award to the successful tenderer has been announced.
- 21.3 Any effort by a tenderer or its agents to influence the Employer's evaluation of tenders or award decision, including the offering or giving of bribes, gifts, or other inducement, may result in the invalidation of its tender and the forfeiture of its tender security, pursuant to paragraph 14.7.

## **22. Clarification of tenders**

- 22.1 To assist in the examination, evaluation, and comparison of tenders, the Employer may, at its discretion, ask any tenderer for clarification of its tender, including breakdowns of its prices. Such clarification may be requested at any stage up to the contract award decision. Requests for clarification and the responses shall be in writing or by fax and no change in the price or substance of the tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the tenders in accordance with paragraph 23.

## **23. Examination of Tenders**

- 23.1 Prior to the detailed evaluation of tenders, the Employer will examine the tenders to determine for each tenderer whether:
- (a) it is complete;
  - (b) the documents have been properly signed;
  - (c) it is accompanied by the required tender securities; and
  - (d) it is substantially responsive to the requirements of the tender documents.

The Employer may require the tenderer to provide any clarification and/or substantiation to determine responsiveness pursuant to paragraph 23.2

- 23.2 A substantially responsive tender is one which conforms to all the terms, conditions, and specifications of the tender documents without material deviation or reservation. A material deviation or reservation is one:
- (a) which affects in any substantial way the scope, quality, or performance of the works;
  - (b) which limits in any substantial way, inconsistent with the tender documents, the Employer's rights or the tenderers' obligations under the contract; or
  - (c) the rectification of which would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.
- 23.3 The Employer may waive any minor informality, non-conformity or irregularity in a tender which does not constitute a material deviation, provided that such waiver does not prejudice or affect the relative ranking of any tenderer. Wherever practicable and appropriate, the tender price will be adjusted for such deviations in accordance with paragraph 25.2(d) for evaluation purposes only.

- 23.4 If a tender is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconformity.
- 23.5 Tenders determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:
- (a) where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and
  - (b) other arithmetic errors will be dealt with in the manner specified in the **Tender Data**.
- 23.6 The amount stated in the tender will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, with the concurrence of the tenderer shall be considered as binding upon the tenderer. If the tenderer does not accept the correct amount, the tenders will be rejected, and the Tender Security may be forfeited, in accordance with paragraph 14.7.

#### **24. Currency for tender evaluation**

- 24.1 Unless specified otherwise in the **Tender Data**, tenders will be evaluated as quoted in the currency of the tender specified in paragraph 12.1. If a tenderer has used different exchange rates from those prescribed in paragraph 12.2, the tender will be first converted into the amounts payable in different currencies, using the rates quoted in the tender, and then reconverted to the currency of the tender using the exchange rates prescribed in paragraph 12.2.

#### **25. Evaluation and comparison of tenders**

- 25.1 The Employer will evaluate and compare only the tenders determined to be substantially responsive in accordance with paragraph 23.
- 25.2 In evaluating the tenders, the Employer will determine for each tender, the evaluated tender price by adjusting the tender price as follows:
- (a) making any correction for errors pursuant to paragraph 23;
  - (b) excluding provisional sums and the provision, if any, for contingencies in the Price Schedules, but including Daywork, where priced competitively;
  - (c) converting the amount resulting from applying (a) and (b) above to a single currency in accordance with paragraph 24;
  - (d) making an appropriate adjustment for any other acceptable variations, deviations or alternative offers submitted in accordance with paragraph 10.3;
  - (e) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with paragraph 19; and
  - (f) making appropriate adjustments to reflect additional factors in the manner and to the extent indicated in the **Tender Data**.

- 25.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer which are not submitted in accordance with the tender documents. Variations, deviations, alternative offers, and other factors that are in excess of the requirements of the tender documents or which otherwise result in unsolicited benefits for the Employer, shall not be taken into account in tender evaluation.
- 25.4 The estimated effect of any price adjustment provisions under the Conditions of Contract, applied over the period of execution of the contract, shall not be taken into account in tender evaluation.
- 25.5 If the tender, which results in the lowest evaluated tender price, is seriously unbalanced or front loaded in relation to the Employer's estimate of the items of work to be performed under the contract, the Employer may require the tenderer to produce detailed price analyses for any or all items of the Schedule of Works, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into considering the schedule of estimated contract payments, the Employer may require that the amount of the performance security set forth in paragraph 31, be increased at the expense of the tenderer to a level sufficient to protect the Employer against financial loss in the event of default of the successful tenderer under the Contract.

## **26. Postqualification**

- 26.1 The Employer will determine to its satisfaction whether the tenderer selected as having submitted the lowest evaluated responsive tender meets the minimum qualifying criteria specified in paragraph 3.6 and on the basis of the tender submitted has demonstrated that it is capable of performing the contract satisfactorily.
- 26.2 The determination will be based upon an examination of the documentary evidence of the tenderer's qualifications submitted by the tenderer in its tender, as well as other information such as the tenderer's work methods, schedule, plant, etc., as the Employer deems necessary and appropriate.
- 26.3 An affirmative determination will be a prerequisite for award of the contract to the tenderer. A negative determination will result in rejection of the tenderer's tender, in which event, the Employer will proceed to the next lowest evaluated tender to make a similar determination of that tenderer's capabilities to perform satisfactorily.
- 26.4 The capabilities of the subcontractors proposed in the tender to be used by the lowest evaluated tenderer will also be evaluated for acceptability. Their participation should be confirmed with a letter of intent, as needed. Should a subcontractor be determined to be unacceptable, the tender will not be rejected, but the tenderer will be required to substitute an acceptable subcontractor without any change to the tender price.

## **27. Employer's right to accept any tender and to reject any or all tenders**

- 27.1 Notwithstanding paragraph 28, the Employer reserves the right to accept or reject any tender, and to cancel the tender process and reject all tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected tenderer or tenderers, or any obligation to inform the affected tenderer or tenderers of the grounds for the Employer's action.

## **Award of Contract**

### **28. Award criteria**

- 28.1 Subject to paragraph 27, the Employer will award the Contract to the tenderer whose tender has been determined to be substantially responsive to the tender documents and who has offered the lowest evaluated tender price, provided that such tenderer has been determined to be qualified to perform the contract satisfactorily in accordance with the provisions in paragraph 26.

### **29. Notification of award**

- 29.1 Prior to expiration of the period of tender validity, the Employer will notify the successful tenderer by fax, confirmed by registered letter, that its tender has been accepted. The notification of award shall specify the sum which the Employer will pay the Contractor in consideration of the execution and completion of the works and the remedying of any defects therein by the Contractor as prescribed in the Contract (hereinafter and in the Conditions of Contract called "the Contract Price").
- 29.2 The notification of award (hereinafter and in the Conditions of Contract called "the Letter of Acceptance") will constitute the formation of the Contract.

### **30. Signing of contract agreement**

- 30.1 At the same time that the Employer notifies the successful tenderer that its tender has been accepted, the Employer will send the tenderer the Agreement in the form provided in the tender documents, incorporating all understandings between the parties.
- 30.2 Within twenty-eight (28) days of receipt of the Agreement, the successful tenderer shall sign the Agreement and return it to the Employer, together with the required Performance Security.
- 30.3 Upon fulfilment of paragraph 30.2, the Employer will promptly notify the other tenderers that their tenders have been unsuccessful and their Tender Security will be returned as promptly as possible, in accordance with paragraph 14.5.

### **31. Performance security**

- 31.1 Within twenty-eight (28) days of receipt of the Letter of Acceptance from the Employer, the successful tenderer shall furnish to the employer a Performance Security in accordance with the Conditions of Contract and in the form stipulated in the tender documents, or in another form acceptable to the Employer.
- 31.2 Failure of the successful tenderer to comply with the requirements of paragraphs 30 or 31 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Tender Security, in which event the Employer may make the award to the next lowest evaluated tenderer or call for new tenders..

### **32. Alternative dispute resolution procedure**

- 32.1 The method of dispute resolution is as indicated in the **Tender Data** and the Conditions of Contract.





VOLUME I.ii

## TENDER DATA

The following tender-specific data for the Works to be procured shall amend and/or supplement the provisions in the Instructions to Tenderers (ITT). Whenever there is a conflict, the provisions herein shall prevail over those in the ITT.

*Instructions for completing the Tender Data sheet are provided, as needed, in the notes in italics mentioned for the relevant ITT clauses.*

**Instructions to tenderers -**  
para. ref.

**para. 1.1: Name of Employer** TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km P/B No: 3  
744000 Ashgabat, Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78

**para. 1.1 Description of the Works**

The Tedjen - Mary Road project is a 142,527 km long section of the M 37 from Ashgabat to Mary. The project comprises the following improvements and approximate quantities:

Improvement Type	Total Length	Quantities (m <sup>2</sup> )
• Bituminous overlay, 40 mm thickness	25,000	220,000
• Bituminous overlay, 75 mm thickness	5,500	45,000
• Bituminous overlay, 120 mm thickness	5,000	4,010
• Reconstruction	110,000	995,000
• New alignment	1,400	14,000
• Widening of road	900	1,500
• Rehabilitation of shoulders	142,500	860,000

The period of performance of improvement works is estimated at 30 months.

**para. 1.2 Completion of the Works** 30 months

**para. 3.1: Eligibility** Only constructors which are prequalified are eligible to tender for the works.

**para. 3.6: Qualifying requirement** Prequalification of potential tenderers has been undertaken.

**para. 3.7 Documentary evidence**

The tenderer must submit any information updating its original prequalification application and must confirm in a written statement that any original prequalification information which is not updated, remains essentially correct as of the date of the tender submission.

**para. 5.1: Pre-tender meeting and site visit**

The pre-tender meeting shall be held on ..... at 10.00 h at the Employer's address. Tenderers are requested to inform the Employer about their participation at least 5 (five) working days in advance.

The address is:

TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km P/B No: 3  
744000 Ashgabat, Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78

Tenderers are advised to attend to the pre-tender meeting.

The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

The tenderer is requested to submit any questions in writing or by cable, to reach the Employer not later than three working days before the meeting.

Minutes of meeting, including copies of the questions raised and responses given, will be furnished expeditiously to all those attending the meeting (and subsequently to all purchasers of the tender documents). Any modification of the tender documents listed in subclause 7.1 which may become necessary as a result of the tenderer's meeting, shall be made by the Employer exclusively through the issuance of an Addendum pursuant to clause 8, and not through the minutes of the pre-tender meeting.

The site visit shall be conducted by the tenderers themselves, preferably before attending to the pre-tender meeting.

**para. 6.1: Other documents comprising the tender**

- (iv) Bill of Quantities
- (v) Supplementary Information
- (vi) Any Addendum issued under para 7.1

**para. 7.1: Employer's mailing address**

TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km P/B No: 3  
744000 Ashgabat, Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78

**para. 9.1: Language of tender**

The language of the tender is English.

- para. 10.3 Alternatives** Alternatives are not requested. Alternatives are permitted but the administrative solution must be fully priced and tendered firstly „The Employer is free to accept or reject any alternative.
- para. 11.1 Works by others** Not foreseen
- para. 11.4: Tender Prices**  
Prices quoted by the tenderer shall be subject to adjustment during the performance of the Contract to reflect changes in the cost of labour, material and transport, in accordance with the procedures specified in the Conditions of Contract. A tender submitted with a fixed price quotation will not be rejected, but the price adjustment will be treated as zero. The price adjustment provision will not be taken into consideration in tender evaluation. Tenderers are required to indicate the source of labour and material indices. The rates and prices quoted by the bidder are subject to adjustment during the performance of the contract in accordance with the provisions of Clause 70 of the Conditions of Contract. The basic prices for specified labour and materials shall be tendered by the Tenderer into the schedules provided in the Appendix A to Tender.
- para. 11.5 Packages with discounts** Tenders for a package of contracts with discounts are requested.
- para. 12.1: Tender currencies**  
Tenderers quote in local and foreign currency. The unit rates and prices shall be quoted by the tenderer separately in the following currencies:
- (a) for those inputs to the Works which the tenderer expects to supply from within the Employer's country, in the currency of the Employer's country specified in the Conditions of Particular Application; and
  - (b) for those inputs to the Works which the tenderer expects to supply from outside the Employer's country (referred to as „the foreign currency requirements“) in any convertible currency or currencies (including ECU) or combination of them;
- The rates of exchange to be used by the tenderer in arriving at the local currency equivalent shall be specified by the tenderer in the Appendix to Tender, and shall apply for all payments under the Contract so that no exchange risk will be borne by the successful tenderer.
- Tenderer shall indicate their expected foreign currency requirements in the Appendix to Tender.
- para. 13.1: Period of tender validity** The period of tender validity is 112 days.
- para. 14.1 Tender security** The amount of the tender security shall be 250,000 USD.
- para. 15.1: Number of copies of tender** Three copies of tender.

**para. 16.2(a): Address of Employer**  
TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km P/B No: 3  
744000 Ashgabat, Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78

**para. 16.2(b): Tender identification** Tender for Turkmenistan, Improvement of  
Tedjen - Mary Road Section.

**EXAMPLE:**

The tenderer shall enter the Employer's name and address, the tender identification and the words "DO NOT OPEN BEFORE.." [*the date and time prescribed for the opening of tenders in paragraph 21.1*].

**para. 17.1: Deadline for submission of tenders** [*specify time and date of tender submission*]

**para. 20.1: Opening of tenders by Employer** [*specify time, date and place of tender opening*]

***The opening of tenders should take place immediately after the deadline for submission.***

**para. 24.1: Currency for tender evaluation**  
To facilitate evaluation and comparison, the Employer will convert all tender prices expressed in the amounts in various currencies in which tender price is payable, into the local currency of the Employer's country, at the selling exchange rate established by the Central Bank in the Employer's country, for similar transactions, on the date for the deadline specified for the submission of tenders

**para. 25.2: Tender Evaluation Factors**  
The Employer's evaluation of a tender will take into account, in addition to the tender prices, the following costs and factors that will be added to each tenderer's prices in the evaluation, using pricing information available to the Employer, in the manner and to the extent indicated below:

- (a) the cost of all quantifiable deviations and omissions from the contractual and commercial conditions and the Technical Specifications as identified by the tenderer in its tender, and other deviations and omissions not so identified;
- (b) compliance with the time schedule called for in these Tender Documents and evidenced as needed in a milestone schedule provided in the tender;
- (c) the extra cost of work, services, works etc., required to be provided by the Employer or third parties.

Pursuant to the above, the following evaluation methods will be followed:

- (a) Contractual and commercial deviations
- (b) Work, services, etc., to be provided by the Employer

Where tenders include for the undertaking of work and/or the provision of services by the Employer in excess of the provisions allowed for in the tender documents, the Employer shall assess the costs of such additional work, and/or services during the duration of the contract.

**para. 32.1 Alternative dispute resolution procedure**  
The procedure for settlement of dispute shall be as under Clause 67 of FIDIC.



VOLUME I.iii

**TENDER FORM**

Name of Contract: Improvement of Tedjen - Mary Road Section in Turkmenistan

To: TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km B/P No: 3  
744000 Ashgabat, Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78

Gentlemen:

1. In accordance with the Conditions of Contract, Specification, Drawings, and Bill of Quantities and Addenda Nos. for the execution of the above-named Works we, the undersigned, offer to construct and install such Works and remedy any defects therein in conformity with the Conditions of Contract, Specifications, Drawings, Bill of Quantities, and Addenda for the sum of *[insert amounts in numbers and words]* *[as specified in the Appendix to Tender or such other sums as may be ascertained in accordance with the conditions]*.
2. We acknowledge that the Appendix forms part of our Tender.
3. We undertake, if our Tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Tender.
4. We agree to abide by this Tender until *[insert date]*, and it shall remain binding upon us and may be accepted at any time before that date.
5. Unless and until a formal Agreement is prepared and executed this Tender, together with your written acceptance thereof, shall constitute a binding Contract between us.
6. We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_\_

Signature \_\_\_\_\_ in the capacity of \_\_\_\_\_  
duly authorised to sign bids for and on behalf of \_\_\_\_\_

*[in block capitals or typed]*

Address: \_\_\_\_\_

Witness: \_\_\_\_\_

Address: \_\_\_\_\_

Occupation \_\_\_\_\_

Volume I.iii

## ATTACHMENT TO TENDER

***Tenderers should fill in all the appropriate blank spaces. Tenderers are required to sign each page of the Appendix to Tender.***

### Conditions of Contract Sub-Clause

Definitions	1.1 (a), 69.6	The "Bank" means European Bank for Reconstruction and Development (EBRD)
	1.1 (a)(i)	The Employer is TURKMENAUTOELLARI Turkmen Highways State Department Pöwrüze Yöly 1. km B/P No: 3 744000 Ashgabat, Turkmenistan Phone:(9-9312) 24 54 43 Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78
	1.1 (a)(iv)	The Engineer is Kocks Consult GmbH Consulting Engineers Stegemannstr. 32 - 38 56068 Koblenz Germany Phone direct: ..49 261 - 13 02-143 Fax: ..49 261 - 13 02 -152
Engineer's Authority to Issue Variations	2.1 (d)(ii)	0.5 percent of the Contract Price.
	5.1 (a)	The language is the English language.
	5.1 (b)	The law in force is that of Turkmenistan.
Performance Security	10.1	The performance security will be in the form of a unconditional bank guarantee in the amount of 10 percent of the Contract Price.
Inspection of Site	11.2	Data made available by the Employer under Sub-Clause 11.1 is open for inspection at the Employers and at the Engineers offices, addresses see under 1.1 above.
Program to Be Submitted	14.1	28 days.
Cash Flow Estimate	14.3	28 days.



Country of the Employer	16.4	The country of the Employer is Turkmenistan.
Minimum Amount of Third Party Insurance	23.2	Five millions USD per occurrence, with the number of occurrences unlimited.
Time for Issue of the Notice to Commence	41.1	28 days
Time for Completion	43.1	900 days
Amount of Liquidated Damages	47.1	3,000.00 USD per day
Limit of Liquidated Damages	47.1	5 percent of the final Contract Price
Amount of Bonus for Early Completion	47.3	Not applicable per day
Limit of Bonus	47.3	Not applicable
Defects Liability Period	49.1	364 days
Minimum Amount of Interim Payment Certificates	60.2	300,000 USD
Retention Money	60.5	10 percent of Interim Payment Certificates
Maximum Amount of Advance Payment	60.7	10 percent of the Contract Price
Start Repayment of Advance Payment	60.7	After certification of 20 percent of the Contract Price
Monthly Recovery of Advance Payment	60.7	10 percent of the amount of monthly Interim Payment Certificates
Number of Copies of Statement of Completion and Final Statement	60.1 60.10 60.11	6 number

Procedure for Settlement of Disputes 67 The procedure for Settlement of Disputes is as stated in Clause 67 of *FIDIC General Conditions*.

Notice to Employer and Engineer 68.2 The Employer's address is:  
TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km B/P No: 3  
744000 Ashgabat, Turkmenistan  
Phone:(9-9312) 24 54 43  
Fax:(9-9312) 25 53 79 or (9-9312) 51 16 78

The Engineer's address is:  
Kocks Consult GmbH, Consulting Engineers  
Stegemannstr. 32 - 38  
56068 Koblenz  
Phone: (49-261) 1302-143  
Fax: (49-261) 1302-152

**The items on the following pages and the schedules of supplementary information are to be filled in by the tenderer as part of its tender.**



Price Adjustment 70.1

Specified Materials					
Material	Unit	Price and Location	Transport to Site	Price delivered to Site	Remarks
Bitumen					
Diesel					
Petrol					
Lubricants					
Cement					
Reinforcing Steel					
Gravels,					
Crushed Aggregates					
Sands					

NOTES

1. The Contractor shall provide copies of quotations to substantiate all prices included in the above table.
2. All subsequent price substantiation shall be from the same source as original unless otherwise agreed by the Engineer.
3. The Contractor shall submit full explanation and provide substantiating documentation for the mode of transport to Site he proposes. Only the proposed documented mode of transport shall qualify for price adjustment.

**SCHEDULES OF SUPPLEMENTARY INFORMATION**

**Schedule of Subcontractors<sup>1</sup>**

<i>Item</i>	<i>Element of work</i>	<i>Approximate value</i>	<i>Name and address of subcontractor</i>	<i>Statement of similar works executed</i>

<sup>1</sup>The Bidder shall enter in this schedule a list of the major sections and appropriate value of the work for which he proposes to use subcontractors, together with the names and addresses of the proposed subcontractors.

## **SCHEDULES OF SUPPLEMENTARY INFORMATION**

### **Time Schedule Proposed by Tenderer**

The Tenderer shall submit a time and works schedule together with the tender documents, showing important items and the sequence of work and time proposed. A statement of working method addressing all major work components shall be attached.

Particular explanation shall be given to the procurement and availability of materials on site, with regard to the period of time available for procurement, transport, etc.

**SCHEDULES OF SUPPLEMENTARY INFORMATION**

**Construction Plant and Equipment Proposed by Tenderer**

The following is a list of construction plant which the Tenderer would supply and maintain at the site for the purpose of carrying out the works, although we understand and agree that the provision of this list does not relieve us of any of our responsibilities to provide all plant and equipment necessary for the timely execution and completion of the works.

Particular reference shall be given to the asphalt mixing plant and paver, including compaction equipment.

No.	Description of Plant (Including Markers Name)	Size or Capacity	Whether new or used and when made

**SCHEDULES OF SUPPLEMENTARY INFORMATION**

**Tenderer's Proposed Site Staff**

Designation	Name	Age	Experience and Qualification





VOLUME I.iv

**TENDER SECURITY FORM (BANK GUARANTEE)**

WHEREAS, [name of Tenderer] (hereinafter called "the Tenderer") has submitted his Tender dated [date] for the execution of [name of Contract] (hereinafter called "the Tender").

KNOW ALL PEOPLE by these presents that We [name of Bank] of [name of country] having our registered office at [address] (hereinafter called "the Bank") are bound unto [name of Employer] (hereinafter called "the Employer") in the sum of 250,000 USD for which payment well and truly to be made to the said Employer the Bank binds himself, his successors, and assigns by these presents.

SEALED with the Common Seal of the said Bank this \_\_\_\_\_ day of \_\_\_\_\_ 19\_\_\_\_.

THE CONDITIONS of this obligation are:

- (1) if the Tenderer withdraws his Tender during the period of Tender validity specified in the Form of Tender; or
- (2) if the Tenderer refuses to accept the correction of errors in his Tender; or
- (3) if the Tenderer, having been notified of the acceptance of his Tender by the Employer during the period of Tender validity;
  - (a) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Tenderer, if required; or
  - (b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to Tenderer;

we undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date 28 days after the date of expiration of the Tender Validity, as stated in the Instructions to Tenderer, or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE \_\_\_\_\_ SIGNATURE OF THE BANK \_\_\_\_\_

WITNESS \_\_\_\_\_ SEAL \_\_\_\_\_

\_\_\_\_\_  
[signature, name, and address]

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# **Turkmenistan**

## **Improvement of Tedjen - Mary Road Section**

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### **Volume II**

### **The Contract**

# TURKMENISTAN

## Improvement of Tedjen - Mary Road Section

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VOLUME II.i

**STANDARD FORM: AGREEMENT**

AGREEMENT

THIS AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ 19 \_\_\_\_\_  
between \_\_\_\_\_ of \_\_\_\_\_  
(hereinafter called "the Employer") of the one part and \_\_\_\_\_  
of \_\_\_\_\_ (hereinafter called "the Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works should be executed by the Contractor, viz., \_\_\_\_\_, and has accepted a Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
  - (a) the Agreement
  - (b) the Letter of Acceptance;
  - (c) the said Tender and Appendix to Tender;
  - (d) the Conditions of Contract (Part II);
  - (e) the Conditions of Contract (Part I);
  - (f) the Specifications;
  - (g) the Drawings;
  - (h) the Priced Bill of Quantities;
  - (i) the Addenda;
  - (j) the correspondence for clarification;
  - (h) other documents, as listed in the Attachment to Tender
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works 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 the day and year first before written.

The Common Seal of \_\_\_\_\_ was hereunto affixed in the presence of:  
\_\_\_\_\_ or \_\_\_\_\_

Signed, sealed, and delivered by the said \_\_\_\_\_  
in the presence of: \_\_\_\_\_

Binding Signature of Employer \_\_\_\_\_

Binding Signature of Contractor \_\_\_\_\_



VOLUME II.ii

**PART 1. GENERAL CONDITIONS OF CONTRACT**

**Notes on the Conditions of Contract**

The Conditions of Contract comprise two parts:

- (a) Part 1: General Conditions of Contract, and**
- (b) Part 2: Conditions of Particular Application.**

The Conditions of Particular Application take precedence over the General Conditions of Contract—see Sub-Clause 5.2, Priority of Contract Documents, in the FIDIC General Conditions of Contract.

The FIDIC Conditions of Contract are copyrighted and may not be copied, faxed, or reproduced.



## Part 1: General Conditions of Contract

TURKMENAUTOELLARI  
Turkmen Highways State Department  
Pöwrüze Yöly 1. km B/P No: 3  
744000 Ashgabat, Turkmenistan  
Phone: (9-9312) 24 54 43  
Fax: (9-9312) 25 53 79 or (9-9312) 51 16 78  
[name of Employer]

Improvement of Tedjen - Mary Road Section in Turkmenistan  
[name of contract]

### CONDITIONS OF CONTRACT

#### PART 1: GENERAL CONDITIONS

The Conditions of Contract, Part 1: General Conditions, shall be those forming Part 1 of the "Conditions of Contract for Works of Civil Engineering Construction," fourth edition 1987, reprinted in 1992 with further amendments, prepared by the *Fédération Internationale des Ingénieurs-Conseils* (FIDIC). These Conditions are subject to the variations and additions set out in Part 2 hereof entitled "Conditions of Particular Application."

Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat  
P.O. Box 86  
1000 Lausanne 12  
Switzerland  
Facsimile: 41 21 653 5432  
Telephone: 41 21 653 5003



## Part 2: Conditions of Particular Application

### A. Clauses 1-10

#### Sub-Clause 1.1 Definitions

- (a) The "Bank" means the European Bank for Reconstruction and Development (EBRD).
- (a) (i) The Employer is the party stipulated in the Attachment to Tender.
- (a) (iv) The Engineer is the party stipulated in the Attachment to Tender.

Amend subpara. (a) (iv) also by adding the following words after the word "Conditions":

"or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Engineer."

Amend subpara. (b) (v) of Sub-Clause 1.1 by adding the following words at the end:

"The word 'tender' is synonymous with 'bid,' and the words 'Appendix to Tender' with 'Appendix to Bid,' and the words 'tender documents' with 'bidding documents'."

#### Sub-Clause 2.1 Engineer's Duties and Authority

With reference to Sub-Clause 2.1 (b), the following provision shall also apply:

The Engineer shall obtain the specific approval of the Employer before taking any of the following actions specified in Part I:

- (a) consenting to the subletting of any part of the Works under Clause 4;
- (b) certifying additional cost determined under Clause 12;
- (c) determining an extension of time under Clause 44;
- (d) issuing a variation under Clause 51, except:
  - (i) in an emergency situation, as reasonably determined by the Engineer; or
  - (ii) if such variation would increase the Contract Price by less than the amount stated in the Appendix to Bid; or
- (e) fixing rates or prices under Clause 52.

**Sub-Clause 5.1**  
Language and  
Law

- (a) The language is stipulated in the Appendix to Bid.
- (b) The law is that in force in the country stipulated in the Appendix to Bid.

**Sub-Clause 5.2**  
Priority of  
Contract  
Documents

Delete the documents listed 1-6 and substitute:

- (1) the Contract Agreement (if completed);
- (2) the Letter of Acceptance;
- (3) the Tender and the Attachment to Tender;
- (4) the Conditions of Contract, Part II;
- (5) the Conditions of Contract, Part I;
- (6) the Specifications;
- (7) the Drawings;
- (8) the priced Bill of Quantities; and
- (9) the Addenda
- (10) the correspondence for clarification
- (11) the schedules of supplementary information
- (12) other documents, as listed in the Appendix to Tender.

**Sub-Clause 10.1**  
Performance  
Security

Replace the text of Sub-Clause 10.1 with the following:

“The Contractor shall provide security for his proper performance of the Contract to the Employer within 28 days after the receipt of the Letter of Acceptance. The performance security shall be in the form of a bank guarantee or performance bond, as stipulated by the Employer in the Appendix to Bid. The performance security shall be denominated in the types and proportions of currencies in which the Contract Price is payable. The Contractor shall notify the Engineer when providing the performance security to the Employer.”

“If the performance security is a bank guarantee, it shall be issued either (a) by a bank located in the country of the Employer or a foreign bank through a correspondent bank located in the country of the Employer, or (b) directly by a foreign bank which has been determined in advance to be acceptable to the Employer.”

“If the performance security is a performance bond, it shall be issued by a bonding or insurance company acceptable to the Employer.”

“Without limitation to the provisions of the preceding paragraph, whenever the Engineer determines an addition to the Contract Price as a result of a change in cost and/or legislation or as a result of a variation amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor, at the Engineer’s written request, shall promptly increase the value of the performance security in that currency by an equal percentage. The performance security of a joint venture shall be in the name of the joint venture.”

**Sub-Clause 10.2**  
Validity of the  
Performance  
Security

The performance security shall be valid until a date 28 days from the date of issue of the Taking-Over Certificate in the case of a bank guarantee, and one year from such date of issue in the case of a performance bond. The security shall be returned to the Contractor within 14 days of expiration.

**Sub-Clause 10.3**  
Claims under  
Performance  
Security

Sub-Clause 10.3 is deleted.

**Sub-Clause 10.4**  
Cost of  
Performance  
Security

The cost of complying with the requirements of this clause shall be borne by the Contractor.

**B. Clauses 11-20**

**Sub-Clause 11.2**  
Access to Data

Add new Sub-Clause 11.2:

“Data made available by the Employer in accordance with Sub-Clause 11.1 shall be deemed to include data listed elsewhere in the Contract as open for inspection at the address stipulated in the Appendix to Tender.”

**Sub-Clause 14.1**  
Program to Be  
Submitted

“The time within which the program shall be submitted shall be the number of days stipulated in the Appendix to Tender.”

**Sub-Clause 14.3**  
Cash Flow  
Estimate to Be  
Submitted

“The time within which the detailed cash flow estimate shall be submitted shall be the number of days specified in the Appendix to Tender.”

**Sub-Clause 15.2**  
Language  
Ability of  
Contractor's  
Representative

Add the following Sub-Clause 15.2:

“If the Contractor's authorised representative is not, in the opinion of the Engineer, fluent in the language specified in the Appendix to Tender, the Contractor shall have available on site at all times a competent interpreter to ensure the proper transmission of instructions and information.”

**Sub-Clause 16.3**  
Language  
Ability of  
Superintending  
Staff

Add the following Sub-Clause 16.3:

“A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the language specified in the Appendix to Bid, or the Contractor shall have available on site at all times a sufficient number of competent interpreters to ensure the proper transmission of instructions and information.”

**Sub-Clause 16.4**  
Employment of  
Local Personnel

“The Contractor is encouraged, to the extent practicable and reasonable, to employ staff and labour with appropriate qualifications and experience from sources within the country of the Employer stipulated in the Appendix to Tender.”

**Sub-Clause 20.4**  
Employer’s Risks

Amend Sub-Clause 20.4 to read as follows:

The Employer’s risks are

- (a) insofar as they directly affect the execution of the Works in the country where the Permanent Works are to be executed:
  - (i) war and hostilities (whether war be declared or not), invasion, act of foreign enemies;
  - (ii) rebellion, revolution, insurrection, or military or usurped power, or civil war;
  - (iii) ionising radiations, or contamination by radioactivity from any nuclear fuel, or from 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;
  - (iv) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds;
  - (v) riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works;
- (b) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract;
- (c) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible; and
- (d) any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:
  - (i) could not have reasonably foreseen, or
  - (ii) could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:
    - (A) prevent loss or damage to physical property from occurring by taking

appropriate measures, or

(B) insure against such loss or damage.

### C. Clauses 21-30

**Sub-Clause 21.1**

Insurance of  
Works and  
Contractor's  
Equipment

Add the following words at the end of subparas. (a) and immediately before the last word of subpara. (b) of Sub-Clause 21.1:

"it being understood that such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred,"

**Sub-Clause 21.2**

Scope of Cover

Amend subpara. (a) of Sub-Clause 21.2 by deleting the words "from the start of work at the Site" and by substituting therefore the words "from the first working day after the Commencement Date."

**Sub-Clause 21.2**

Scope of Cover

Add the following as Sub-Clause (c) under Sub-Clause 21.2:

(c) It shall be the responsibility of the Contractor to notify the insurance company of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the period of the Contract.

**Sub-Clause 21.4**

Exclusions

Amend Sub-Clause 21.4 to read as follows:

"There shall be no obligation for the insurances in Sub-Clause 21.1 to include loss or damage caused by the risks listed under Sub-Clause 20.4 subparas. (a) (i) to (iv) of the Conditions of Particular Application."

**Sub-Clause 25.1**

Evidence and  
Terms of  
Insurances

Amend Sub-Clause 25.1 by inserting the words "as soon as practicable after the respective insurances have been taken out but in any case" before the words "prior to the start of work at the Site."

**Sub-Clause 25.5**

Source of  
Insurance

Add the following Sub-Clause 25.5:

"The Contractor shall be entitled to place all insurance relating to the Contract (including, but not limited to, the insurance referred to in Clauses 21, 23, and 24) with insurers from any eligible country, which have been determined to be acceptable to the Employer."

## **D. Clauses 31-40**

### **Clause 34**

#### **Sub-Clause 34.2** Rates of Wages and Conditions of Labour

The Contractor shall pay rates of wages and observe conditions of labour not less favourable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labour so established, the Contractor shall pay rates of wages and observe conditions of labour which are not less favourable than the general level of wages and conditions observed by other employers whose general circumstances in the trade or industry in which the Contractor is engaged are similar.

#### **Sub-Clause 34.3** Employment of Persons in the Service of Others

The Contractor shall not recruit or attempt to recruit his staff and labour from among persons in the service of the Employer or the Engineer.

#### **Sub-Clause 34.4** Repatriation of Labour

The Contractor shall be responsible for the return to the place where they were recruited or to their domicile of all such persons as he recruited and employed for the purposes of or in connection with the Contract and shall maintain such persons as are to be so returned in a suitable manner until they shall have left the site or, in the case of persons who are not nationals of and have been recruited outside Turkmenistan shall have left Turkmenistan.

#### **Sub-Clause 34.5** Housing for Labour

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such accommodation and amenities as he may consider necessary for all his staff and labour, employed for the purposes of or in connection with the Contract, including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, cookhouses, fire prevention and firefighting equipment, air conditioning, cookers, refrigerators, furniture, and other requirements in connection with such accommodation or amenities. On completion of the Contract, unless otherwise agreed with the Employer, the temporary camps or housing provided by the Contractor shall be removed and the site reinstated to its original condition, all to the approval of the Engineer.

#### **Sub-Clause 34.6** Accident Prevention Officer; Accidents

The Contractor shall have on his staff on Site an officer dealing only with questions regarding the safety and protection against accidents of all staff and labour. This officer shall be qualified for this work and shall have the authority to issue instructions and shall take protective measures to prevent accidents.



**Sub-Clause 34.7**  
Health and  
Safety

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labour and, in collaboration with and to the requirements of the local health authorities, to ensure that medical staff, first aid equipment and stores, sick bay and suitable ambulance service are available at the camps, housing, and on the Site at all times throughout the period of the Contract and that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements.

**Sub-Clause 34.8**  
Measures  
against Insect  
and Pest  
Nuisance

The Contractor shall at all times take the necessary precautions to protect all staff and labour employed on the Site from insect nuisance, rats, and other pests and reduce the dangers to health and the general nuisance caused by the same. The Contractor shall comply with all the regulations of the local health authorities in these respects.

**Sub-Clause 34.9**  
Epidemics

In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders, and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

**Sub-Clause 34.10**  
Burial of the  
Dead

The Contractor shall make any necessary arrangements for the transport, to any place as required for burial, of any of his expatriate employees or members of their families who may die in Turkmenistan

**Sub-Clause 34.11**  
Supply of Water

The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of his staff and labour.

**Sub-Clause 34.12**  
Arms and  
Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

**Sub-Clause 34.13**  
Festivals and  
Religious  
Customs

The Contractor shall, in all dealings with his staff and labour, have due regard to all recognised festivals, days of rest, and religious and other customs.

**Sub-Clause 34.14**  
Disorderly  
Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous, or disorderly conduct by or among his staff and labour and take all reasonable precautions for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.

**Sub-Clause 36.1**  
Quality of  
Materials, Plant,  
Supplies, and  
Workmanship

Add the following paragraph at the end of Sub-Clause 36.1:

The Contractor is encouraged, to the extent practicable and reasonable, to use materials, Contractor's Equipment, Plant, and supplies from sources within the country of the Employer, as stipulated in the Appendix to Tender.

**E. Clauses 41-50**

**- No amendment -**

**F. Clauses 51-59**

**Sub-Clause 52.1**  
Valuation of  
Variations

Add final sentences as follows:

"Where the Contract provides for the payment of the Contract Price in more than one currency, and varied work is valued at, or on the basis of, the rates and prices set out in the Contract, payment for such varied work shall be made in the proportions of various currencies specified in the Appendix to Bid for payment of the Contract Price. Where the Contract provides for payment of the Contract Price in more than one currency, and new rates or prices are agreed, fixed, or determined as stated above, the amount or proportion payable in each of the applicable currencies shall be specified when the rates or prices are agreed, fixed, or determined, it being understood that in specifying these amounts or proportions the Contractor and the Engineer (or, failing agreement, the Engineer) shall take into account the actual or expected currencies of cost (and the proportions thereof) of the inputs of the varied work without regard to the proportions of various currencies specified in the Appendix to Tender for payment of the Contract Price."

**Sub-Clause 52.2**  
Power of  
Engineer to Fix  
Rates

Add a final sentence to the first paragraph, as follows:

"Where the Contract provides for the payment of the Contract Price in more than one currency, the amount or proportion payable in each of the applicable currencies shall be specified when the rates or prices are agreed, fixed, or determined as stated above, it being understood that in specifying these amounts or proportions the Contractor and the Engineer (or, failing agreement, the Engineer) shall take into account the actual or expected currencies of cost (and the proportions thereof) of the inputs of the varied work without regard to the proportions of various currencies specified in the Appendix to Tender for payment of the Contract Price."

**Sub-Clause 52.2**

Add as a third paragraph:

Power of Engineer to Fix Rates		<p>“Provided further that no change in the rate or price for any item contained in the Contract shall be considered unless such item accounts for an amount more than 2 percent of the Contract Price, and the actual quantity of work executed under the item exceeds or falls short of the quantity set out in the Bill of Quantities by more than 25 percent.”</p>
<b>Sub-Clause 52.3</b> Variations Exceeding 15 Percent		<p>Add a final sentence, as follows:</p> <p>“Where the Contract provides for the payment of the Contract Price in more than one currency, the amount or proportion payable in each of the applicable currencies shall be specified when such further sum is agreed or determined, it being understood that in specifying these amounts or proportions the Contractor and the Engineer (or, failing agreement, the Engineer) shall take into account the currencies (and the proportions thereof) in which the Contractor’s Site and general overhead cost of the Contract were incurred without being bound by the proportions of various currencies specified in the Appendix to Bid for payment of the Contract Price.</p>
<b>Sub-Clause 55.2</b> Omissions of Quantities		<p>Items of the Works described in the Bill of Quantities for which no rate or price has been entered in the Contract shall be considered as included in other rates and prices in the Contract and will not be paid for separately by the Employer.</p>
<b>Clause 60</b> Certificates and Payment	(WB-R)	<p>Clause 60 of the General Conditions is deleted and the following Sub-Clauses 60.1-60.14 are substituted therefore:</p>
<b>Sub-Clause 60.1</b> Monthly Statements	(WB-R)	<p>The Contractor shall submit a statement in the number of copies stipulated in the Appendix to Bid to the Engineer at the end of each month, in a tabulated form approved by the Engineer, showing the amounts to which the Contractor considers himself to be entitled. The statement shall include the following items, as applicable, which shall be taken into account in the sequence listed:</p> <ul style="list-style-type: none"><li>(a) the estimated contract value of the Temporary and Permanent Works executed up to the end of the month in question, determined in accordance with Sub-Clause 56.1, at the unit rates and prices included in the Contract, in the various currencies of the Contract Price;</li><li>(b) the actual value certified for payment for the Temporary and Permanent Works executed up to the end of the previous month, at the unit rates and prices included in the Contract, in the various currencies of the Contract Price;</li><li>(c) the estimated contract value at the unit rates and prices included in the Contract of the Temporary and Permanent Works for the month in question, in the</li></ul>

various currencies of the Contract Price, obtained by deducting (b) from (a);

- (d) the value of any variations executed up to the end of the month in question, less the amount certified in the previous Interim Payment Certificate, expressed in the relevant amounts of foreign and local currencies, pursuant to Clause 52;
- (e) amounts approved in respect of Daywork executed up to the end of the month in question, less the amount for Daywork certified in the previous Interim Payment Certificate, indicating the amounts of foreign and local currencies as determined from the Daywork Schedule of the Bill of Quantities;
- (f) amounts reflecting changes in cost and legislation, pursuant to Clause 70, expressed in the relevant amounts of foreign and local currencies;
- (g) any credit or debit for the month in question in respect of materials and Plant for the Permanent Works, in the relevant amounts in foreign and local currencies, and under the conditions set forth in Sub-Clause 60.3;
- (h) any amount to be withheld under the provisions of Sub-Clause 60.5, determined by applying the percentage set forth in Sub-Clause 60.5 to the amounts in foreign and local currencies due under paragraphs 60.1 (c), (d), (e), and (f);
- (i) any amounts to be deducted as repayment of the Advance under the provisions of Sub-Clause 60.8; and
- (j) any other sum, expressed in the applicable currency or currencies, to which the Contractor may be entitled under the Contract or otherwise.

**Sub-Clause 60.2**  
Monthly  
Payments

The said statement shall be approved or amended by the Engineer in such a way that, in his opinion, it reflects the amounts in various currencies due to the Contractor in accordance with the Contract, after deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer. In cases where there is a difference of opinion as to the value of any item, the Engineer's view shall prevail. **Within 14 days of receipt of the monthly statement referred to in Sub-Clause 60.1**, the Engineer shall determine the amounts due to the Contractor and shall deliver to the Employer and the Contractor an Interim Payment Certificate, certifying the amounts due to the Contractor.

Provided that the Engineer shall not be bound to certify

any payment under this sub-clause if the net amount thereof, after all retentions and deductions, would be less than the Minimum Amount of Interim Payment Certificates stated in the Appendix to Tender. However, in such case, the unpaid certified amount will be added to the next interim payment, and the cumulative unpaid certified amount will be compared to the minimum amount of interim payment.

Notwithstanding the terms of this clause or any other clause of the Contract, no amount will be certified by the Engineer for payment until the performance security has been provided by the Contractor and approved by the Employer.

**Sub-Clause 60.3**  
Materials and  
Plant for the  
Permanent  
Works

With respect to materials and Plant brought by the Contractor to the Site for incorporation in the Permanent Works, the Contractor shall (a) receive a credit in the month in which these materials and Plant are brought to the Site and (b) be charged a debit in the month in which they are incorporated in the Permanent Works, both such credit and debit to be determined by the Engineer in accordance with the following provisions:

- (a) no credit shall be given unless the following conditions shall have been met to the Engineer's satisfaction:
  - (i) the materials and Plant are in accordance with the specifications for the Works;
  - (ii) the materials and Plant have been delivered to the Site and are properly stored and protected against loss, damage, or deterioration;
  - (iii) the Contractor's records of the requirements, orders, receipts, and use of materials and Plant are kept in a form approved by the Engineer, and such records are available for inspection by the Engineer;
  - (iv) the Contractor has submitted a statement of his cost of acquiring and delivering the materials and Plant to the Site, together with such documents as may be required for the purpose of evidencing such cost;
  - (v) the origin of the materials and Plant and the currencies of payment therefor are those indicated in the Appendix to Bid; and
  - (vi) the materials are to be used within a reasonable time.
- (b) the amount to be credited to the Contractor shall be the equivalent of 75 percent of the Contractor's reasonable cost of the materials and Plant delivered to the Site, as determined by the Engineer after review of the documents listed in subpara. (a) (iv)

above;

- (c) the amount to be debited to the Contractor for any materials and Plant incorporated into the Permanent Works shall be equivalent to the credit previously granted to the Contractor for such materials and Plant pursuant to Sub-Clause (b) above, as determined by the Engineer; and
- (d) the currencies in which the respective amounts shall be credited or debited as set forth above shall be determined by the Engineer.

**Sub-Clause 60.4**  
Place of  
Payment

Payments to the Contractor by the Employer shall be made in the currencies in which the Contract Price is payable into a bank account or accounts nominated by the Contractor.

**Sub-Clause 60.5**  
Retention  
Money

A retention amounting to the percentage stipulated in the Appendix to Bid of the amounts due in each currency, determined in accordance with the procedure set out in Sub-Clause 60.1 (h) shall be made by the Engineer in the first and following Interim Payment Certificates.

**Sub-Clause 60.6**  
Payment of  
Retention  
Money

Upon the issue of the Taking-Over Certificate with respect to the whole of the Works, one half of the Retention Money, or upon the issue of a Taking-Over Certificate with respect to a Section or part of the Permanent Works only such proportion thereof as the Engineer determines having regard to the relative value of such Section or part of the Permanent Works, shall be certified by the Engineer for payment to the Contractor. The Contractor may substitute the remaining retention money with an on-demand bank guarantee in a form, and from a source, acceptable to the Employer.

Upon the expiration of the Defects Liability Period for the Works, the other half of the Retention Money shall be certified by the Engineer for payment to the Contractor (or return of the remaining security, which replaced the Retention Money). Provided that, in the event of different Defects Liability Periods being applicable to different Sections or parts of the Permanent Works pursuant to Clause 48, the expression "expiration of the Defects Liability Period" shall, for the purposes of this sub-clause, be deemed to mean the expiration of the latest of such periods.

Provided also that if at such time, there shall remain to be executed by the Contractor any work instructed, pursuant to Clauses 49 and 50, in respect of the Works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention Money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

**Sub-Clause 60.7**  
Advance  
Payment

The Employer will make an interest-free advance payment to the Contractor exclusively for the costs of mobilisation in respect of the Works in an amount named in the Letter of Acceptance, payable in the proportions of foreign and local currencies of the Contract Price, but in no event exceeding the amount stated in the Appendix to Bid. Payment of such advance amount will be due under separate certification by the Engineer after (a) execution of the Form of Agreement by the parties hereto; (b) provision by the Contractor of the performance security in accordance with Sub-Clause 10.1; and (c) 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. Such bank guarantee shall remain effective until the advance payment has been repaid pursuant to the paragraph below, but the amount thereof shall be progressively reduced by the amount repaid by the Contractor as indicated in Interim Payment Certificates issued in accordance with this Clause.

The advance payment shall be repaid through percentage deductions from the interim payments certified by the Engineer in accordance with this Clause. Deductions shall commence in the next Interim Payment Certificate following that in which the total of all interim payments certified to the Contractor has reached the percentage of the Contract Price stipulated in the Appendix to Bid less Provisional Sums, and shall be made at the rate stated in the Appendix to Bid of the amount of all Interim Payment Certificates in the types and proportionate amounts of currencies of the advance payment until such time as the advance payment has been repaid; always provided that the advance payment shall be completely repaid prior to the time when 80 percent of the Contract Price has been certified for payment.

**Sub-Clause 60.8**  
Time of  
Payment and  
Interest

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall, subject to Clause 47, be paid by the Employer to the Contractor within 42 days after the Contractor's monthly statement has been submitted to the Engineer for certification or, in the case of the Final Payment Certificate pursuant to Sub-Clause 60.13, within 84 days after the Final Statement and written discharge have been submitted to the Engineer for certification. In the event of the failure of the Employer to make payment within the times stated, the Employer shall pay to the Contractor interest compounded monthly at the rate(s) stated in the Appendix to Bid upon all sums unpaid from the date upon which the same should have been paid, in the currencies in which the payments are due. The provisions of this Sub-Clause are without prejudice to the Contractor's entitlement under Clause 69 or otherwise.

**Sub-Clause 60.9**  
Correction of  
Certificates

The Engineer may by any Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate which has been issued by him, and shall have authority, if any work is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

**Sub-Clause 60.10**  
Statement at  
Completion

Not later than 84 days after the issue of the Taking-Over Certificate in respect of the whole of the Works, the Contractor shall submit to the Engineer a Statement at Completion in the number of copies specified in the Appendix to Bid with supporting documents showing in detail, in the form approved by the Engineer,

- (a) the final value of all work done in accordance with the Contract up to the date stated in such Taking-Over Certificate;
- (b) any further sums which the Contractor considers to be due; and
- (c) an estimate of amounts which the Contractor considers will become due to him under the Contract.

Estimated amounts shall be shown separately in such Statement at Completion. The Engineer shall certify payment in accordance with Sub-Clause 60.2.

**Sub-Clause 60.11**  
Final Statement

Not later than 56 days after the issue of the Defects Liability Certificate pursuant to Sub-Clause 62.1, the Contractor shall submit to the Engineer for consideration a draft final statement in the number of copies stipulated in the Appendix to Bid with supporting documents showing in detail, in the form approved by the Engineer,

- (a) the value of all work done in accordance with the Contract; and
- (b) any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed (for the purposes of these Conditions referred to as the "Final Statement").

If, following discussions between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer an Interim Payment Certificate for those parts of



the draft final statement, if any, which are not in dispute. The dispute shall then be settled in accordance with Clause 67. The Final Statement shall be the agreed upon settlement of the dispute.

**Sub-Clause 60.12**  
Discharge

Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, 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 60.13 has been made and the performance security referred to in Sub-Clause 10.1 has been returned to the Contractor.

**Sub-Clause 60.13**  
Final Payment  
Certificate

Within 28 days after receipt of the Final Statement, and the written discharge, the Engineer shall deliver to the Employer (with a copy to the Contractor) a Final Payment Certificate stating

- (a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and
- (b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, other than under Clause 47, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

**Sub-Clause 60.14**  
Cessation of  
Employer's  
Liability

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the Works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters or things arising after the issue of the Taking-Over Certificate in respect of the whole of the Works) in the Statement at Completion referred to in Sub-Clause 60.10.

**H. Clauses 61-70**

**Sub-Clause 63.1**  
Default of  
Contractor

Delete the last paragraph of this sub-clause and substitute:

“then the Employer may, after giving 14 days’ notice to the Contractor, enter upon the Site and expel the Contractor therefrom without thereby voiding the Contract, or releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and powers conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may employ any other contractor to complete the Works. The Employer or such other contractor may use for such completion so much of the Contractor’s Equipment, Plant,

Temporary Works, and materials, which have been deemed to be reserved exclusively for the execution of the Works, under the provisions of the Contract, as he or they may think proper, and the Employer may, at any time, sell any of the said Contractor's Equipment, Temporary Works, and unused Plant and materials, and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to him from the Contractor under the Contract."

**Sub-Clause 63.2**  
Valuation at  
Date of  
Expulsion

Modify the heading of Sub-Clause 63.2 by substituting "Valuation at Date of Expulsion" for "Valuation at Date of Termination." In Sub-Clause 63.2, delete the word "termination" on the second and fifth lines and substitute "expulsion".

**Sub-Clause 63.3**  
Payment after  
Expulsion

Modify the heading of Sub-Clause 63.3 by substituting "Payment after Expulsion" for "Payment after Termination." In Sub-Clause 63.3, delete the words "terminates the Contractor's employment" on the first line, and substitute "shall enter and expel the Contractor".

**Sub-Clause 63.4**  
Assignment of  
Benefit of  
Agreement

In Sub-Clause 63.4, delete the word "termination" on the second line, and substitute "expulsion".

**Sub-Clause 65.2**  
Special Risks

Amend Sub-Clause 65.2 to read as follows: "The Special Risks are the risks defined under para. (a), subparas. (i) to (v) of Sub-Clause 20.4."

**Sub-Clause 68.2**  
Notice to  
Employer and  
Engineer

For the purposes of this Sub-Clause, the addresses are those specified in the Appendix to Bid.

**Clause 69**  
Default of  
Employer

In Sub-Clauses 69.1, 69.4, and 69.5, substitute "Sub-Clause 60.8" for "Sub-Clause 60.10".

**Sub-Clause 69.1**  
**(d)**  
Economic  
Dislocation

Sub-Clause 69.1 (d) is deleted.

**Sub-Clause 69.3**  
Payment on  
Termination

Delete from ", but in addition to the payments specified..." to the end of the sub-clause.

**Sub-Clause 69.4**  
Contractor's  
Entitlement to  
Suspend Work

Add this paragraph:

Without prejudice to the Contractor's entitlement to interest under Sub-Clause 60.10 and to terminate under Sub-Clause 69.1, the Contractor may suspend work or reduce the rate of work within 56 days after notification by the Bank to the Employer's government that the Bank has

suspended disbursements from its loan, which finances in whole or in part the execution of the Works.

**Sub-Clause 69.6**  
Suspension of  
World Bank  
Loan or Credit

In the event the Bank suspends the loan or credit to the Employer from which part of the payments to the Contractor are being made:

- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the suspension notice from the World Bank.
- (b) If the Contractor has not received sums due to him upon the expiration of the 42 days for payment provided for in Sub-Clause 60.8, the Contractor may immediately issue a 14-day termination notice.

Delete Clause 70 in its entirety, and substitute:

**Sub-Clause 70.1**  
Price  
Adjustment

The amounts payable to the Contractor, in various currencies pursuant to Sub-Clause 60.1, shall be adjusted in respect of the rise or fall in the cost of labour, fuels, lubricants, materials, to the Works, by applying to such amounts the procedure prescribed in this clause.

To the extent that full compensation for any rise or fall in costs to the Contractor is not covered by the provisions of this or other Clauses in the Contract, the unit rates and prices included in the Contract shall be deemed to include amounts to cover the contingency of such other rise or fall of costs.

Adjustments to the Contract Price shall be made in respect of rise or fall in the cost of local labour and specified materials as set out in the Sub-Clause.

a) Local Workmen

(i) For the purpose of this Sub-Clause:  
„Local Workmen“ means skilled, semi-skilled and unskilled workmen of all trades engaged by the Contractor on the Site for the purpose of or in connection with the Contract or engaged full time by the Contractor off the Site for the purpose of or in connection with the Contract (by way of illustration but not limitation: workmen engaged full time in any office, store, workshop or quarry).

„Basic Rate“ means the applicable basic minimum wage rate prevailing on the date 28 days prior to the latest date for submission of tenders by reason of any National or State Statute, Ordinance, Decree or other Law or any regulations or bye-law of any local or other duly constituted authority, or in order to conform with practice amongst good employers generally in the area where the Works are to be carried out.

„Current Rate“ means the applicable basic minimum wage rate for Local Workmen prevailing on any date subsequent to the date 28 days prior to the latest date set for submission of tenders by reason of any National or State Statute, Ordinance, Decree or other Law or any regulation or bye-law of any local or other duly constituted authority, or in order to conform with practice amongst good employers generally in the area where the works are to be carried out.

(ii) The adjustment to the Contract Price under the terms of this Sub-Clause shall be calculated by multiplying the difference between the Basic and Current Rates for Local Workmen by:

- (a) the number of all hours actually worked, and also
- (b) in respect of those hours worked at overtime rates, by the product of the number of said hours and the percentage addition required by the law to be paid by the Contractor for overtime.

Such adjustment may be either an addition to or a deduction from the Contract Price.

(iii) No other adjustment of the Contract Price on account of fluctuation in the remuneration of Local Workmen shall be made.

b) Specified Materials

(i) For the purpose of this Sub-Clause:

„Specified Materials“ means the materials stated in Appendix to Tender required on the Site for the execution and completion of the Works.

„Basic Prices“ means the current prices for the

specified materials prevailing on the date 28 days prior to the latest date for submission of tenders.

„Current Prices“ means the current prices for the specified materials prevailing at any date subsequent to the date 28 days prior to the latest date for submission of tenders.

(ii) The adjustment to the Contract Price under the terms of this Sub-Clause shall be calculated by applying the difference between the Basic and Current Prices to the quantity of the appropriate Specified Material which is delivered to the Site during the period for which the particular Current Price is effective. Such adjustment may be either an addition to or a deduction from the Contract Price.

(iii) The Contractor shall use due diligence to ensure that excessive wastage of the Specified Materials shall no occur. Any Specified Materials removed from the Site shall be clearly identified in the records required under paragraph (d) of this Sub-Clause.

(iv) The provisions of this Sub-Clause shall apply to fuels used in Contractor's Equipment engaged on the Site for the purposes of executing the Works, including vehicles owned by the Contractor (or hired by him under long term arrangements under which the Contractor is obliged to supply fuel) engaged in transporting any staff, labour, Contractor's Equipment, Temporary Works, Plant or materials to and from the Site. Such fuels shall be clearly identified in the records required under paragraph (d) of this Sub-Clause. The provisions of this Sub-Clause shall not apply to any fuels sold or supplied to any employee of the Contractor or to any person for use in any motor vehicle not being used for the purposes of the Contract.

(v) The Contractor shall at all times have regard to suitable markets and shall, whenever buying materials a variation in the cost of which would give rise to an adjustment of the Contract Price under this Sub-Clause, be diligent to buy or procure the same at the most economical prices as are consistent with the due performance by the Contractor of his obligations under the Contract.

If at any time there shall have been any lack of diligence, default or negligence on the part of the Contractor, whether in observing the above requirements or otherwise, then, for the purposes of adjusting the Contract Price pursuant hereto, no account shall be taken of any increase in cost which may be attributable to such lack of diligence, default

or negligence and the amount by which any cost would have been decreased but for such lack of diligence, default or negligence shall be deducted from the Contract Price.

(vi) No other adjustment to the Contract Price on account of fluctuation in the cost of materials shall be made.

c) Overheads and Profits Excluded

In determining the amount of any adjustment to the Contract Price pursuant to this Sub-Clause no account shall be taken of any overheads or profits.

d) Notices and Records

The Contractor shall forthwith, upon the happening of any event which may or may be likely to give rise to adjustment of the Contract Price pursuant to this Sub-Clause, give notice thereof to the Engineer and the Contractor shall keep such books, accounts and other documents and records as are necessary to enable adjustment under this Sub-Clause to be made and shall, at the request of the Engineer, furnish any invoices, accounts, documents or records so kept and such other information as the Engineer may require.

e) Adjustment after Date of Completion

If the Contractor fails to complete the Works within the time for completion prescribed under Clause 43, adjustment of prices hereafter until the date of completion of the Works shall be made using either prices relating to the prescribed time for completion, or the current prices, whichever is more favourable to the Employer, provided that if an extension of time is granted pursuant to Clause 44, the above provision shall apply only to adjustments made after the expiry of such extension of time.

f) Under the procedures used in Turkmenistan a local concern or producer/supplier may only provide reliable quotations for materials at the time of placing a firm order, or at the time of concluding a contract. It has been advised that administrative guidance is necessary for establishing a firm and reliable basis for supplies of materials to the Site. The administration may therefore issue the basic prices for materials as the basis for calculation of the tender price by the bidders in the Appendix to Tender. If no such information is issued by Addendum to the Tender, the Tenderers shall fill in the schedule of basic prices.

Payments shall be made in the currencies stated in the Attachment to Tender.

In the event of variation in prices the administration will check and confirm varied priced to the Resident Engineer. The Contractor shall pay varied prices only after having obtained 'no objection' from the Resident Engineer.

The Contractor will be paid for varied prices of labour and materials listed above for the net increase/decrease in prices only.

- g) The Contractor is fully responsible for the provision of the quality of materials as specified. He shall provide everything necessary to improve any material to the specified quality. The costs for such improvement shall be included in the rates and prices mentioned by the Tenderer in the Tender.

**Sub-Clause 70.2**  
Subsequent  
Legislation

If, after the date 28 days prior to the latest date for submission of bids for the Contract, there occur in the country in which the Works are being or are to be executed changes to any National or State Statute, Ordinance, Decree, or other Law or any regulation or by-law of any local or other duly constituted authority, or the introduction of any such State Statute, Ordinance, Decree, Law, regulation or by-law which causes additional or reduced cost to the Contractor, other than under the preceding sub-clauses of this clause, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same shall already have taken into account in the Adjustment of Prices.

## I. Clauses 71-80

### **Sub-Clause 72.2** Currency Proportions

Delete entirely.

### **Sub-Clause 72.4** Substantial Changes in Currency Requirements

The foreign and local currency portions of the balance of the Contract Price shall be amended by agreement between the Employer and the Contractor to reflect any substantial changes in the expected foreign and local currency requirements of the Contractor during the execution of the Works, provided that

- (a) the Contractor shall inform the Employer and the Engineer whenever any such substantial change may occur; or
- (b) the Engineer may recommend a review of such expected requirements if in his judgement there is evidence of a change in the country of origin of materials, Plant, or services to be provided under the Contract which should result in any substantial change of such expected requirements.

### **Sub-Clause 73.1** Local Taxation

Contractors undertaking works, service or supply contracts and not having their permanent place of business in Turkmenistan and personnel of such Contractors who are not citizens or permanent residents of Turkmenistan shall be exempt from tax on profits and/or earnings from the performance of the contract independent of the duration of their performance.

They shall not be subject to the system of social security contribution in force in Turkmenistan.

Personal and household effects, furniture and vehicles imported for the exclusive use by natural persons forming part of the staff of the Contractor and not being citizens or permanent residents of Turkmenistan shall be exempt from import duties and all other taxes of said persons starting work in Turkmenistan.

### **Sub-Clause 73.2** Duties on Contractor's Equipment

Contractor's Equipment, including essential spare parts therefor, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon importation. Equipment imported under the system of temporary admission may be re-exported or sold in Turkmenistan. In the latter case the seller shall be required to comply with the relevant customs and tax regulations.

Exemptions from import duties and all other taxes shall be granted on production of certificates signed by the Contracting Authority.

However, the Contractor shall bear all expenses for services of customs brokers and shipping agents which



may be required to facilitate the customs clearance and passage of any of the items for which exemptions from customs duties is granted. He shall also pay all charges that may be imposed for passage of such items through the point of entry.

Where customs duties, tax, etc. are collected in error they shall be refunded to the Contractor.

**Sub-Clause 74.1**  
Illegal  
Payments

If the Contractor, or any of his Subcontractors, agents or servants gives or offers to give to any person any payment, gift, gratuity or commission as an inducement or reward for doing or forbearing to do any action in relation to the Contract or any other contract with the Employer, or for showing or forbearing to show favour or disfavour to any person in relation to the Contract or to any other contract with the Employer, then the Employer may enter upon the Site and the Works and expel the Contractor and the provisions of Clause 63 hereof shall apply as if such entry and expulsion had been made pursuant to that clause.

**Sub-Clause 75.1**  
Termination of  
Contract for  
Employer's  
Convenience

The Employer shall be entitled to terminate this Contract at any time for the Employer's convenience after giving 56 days' prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor

- (a) shall proceed as provided in Sub-Clause 65.7; and
- (b) shall be paid by the Employer as provided in Sub-Clause 65.8.

**Sub-Clause 76.1**  
Joint and  
Several Liability

If the Contractor is a joint venture of two or more persons, all such persons shall be joint and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

**Sub-Clause 78.1**  
Details to Be  
Confidential

The Contractor shall treat the details of the Contract as private and confidential, save insofar as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the previous consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract the same shall be referred to the Employer whose determination shall be final.



VOLUME II.iv

**PERFORMANCE SECURITY FORM (BANK GUARANTEE,  
UNCONDITIONAL)**

To: *[name and address of Employer]*

WHEREAS *[name and address of Employer]* (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. \_\_\_\_\_ dated \_\_\_\_\_ to execute *[name of Contract and brief description of Works]* (hereinafter called "the Contract.");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognised bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of *[10 % of the contract price]*, *[amount in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of *[amount of Guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until a date 28 days from the date of issue of the Taking-Over Certificate.

SIGNATURE AND SEAL OF THE GUARANTOR

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Name of Bank: \_\_\_\_\_  
Address: \_\_\_\_\_  
Date: \_\_\_\_\_



VOLUME II.v

## Advance Payment Security Form (Bank Guarantee)

To: *[name and address of Employer]*

*[name of Contract]*

Gentlemen:

In accordance with the provisions of the Conditions of Contract, Subclause 60.7 ("Advance Payment") of the above-mentioned Contract, *[name and address of Contractor]* (hereinafter called "the Contractor") shall deposit with *[name of Employer]* a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of *[amount in words]*, not exceeding 10 % of Contract Price, denominated in the currency(ies) as specified in the Contract.

We, the *[bank or financial institution]*, as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to *[name of Employer]* on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding *[amount of Guarantee]*, *[amount in words]*, such amount to be reduced periodically by the amounts recovered by you from the proceeds of the Contract.

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between *[name of Employer]* and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition, or modification.

No drawing may be made by you under this guarantee until we have received notice in writing from you that an advance payment of the amount listed above has been paid to the Contractor pursuant to the Contract.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until *[name of Employer]* receives full repayment of the same amount from the Contractor.

Yours truly,

SIGNATURE AND SEAL:

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Name of Bank or Financial Institution: \_\_\_\_\_  
Address: \_\_\_\_\_  
Date: \_\_\_\_\_

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# **Turkmenistan**

## **Improvement of Tedjen - Mary Road Section**

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**Volume III**

**The Works**

# TURKMENISTAN

## Improvement of Tedjen - Mary Road Section

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VOLUME III.i

**SCHEDULE OF WORKS**

**BILL OF QUANTITIES**

- A. Preamble
1. The Bill of Quantities shall be read in conjunction with the instructions to Bidders, General and Special Conditions of Contract, Technical Specifications and Drawings.
  2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
  3. The rates and prices tendered in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.
  4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.
  5. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
  6. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
  7. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with the Conditions of Contract.
  8. All items of work indicated in the Bill of Quantities shall be valued by measuring net, in the units of the Bill of Quantities such actual quantities of the Permanent Works as have been executed strictly in accordance with the Tender Documents or further instructions issued in writing by the Engineer. No works shall be valued which have been executed in excess of the dimensions shown on the Drawings or ordered by the Engineer. In particular, no allowance shall be made in the measurement of any excavation for working space, temporary works or the operation of construction plant and such allowance shall be deemed to be included in the Tender Price.

9. Errors will be corrected by the Employer for any arithmetic errors in computation or summation as follows:
  - (a) where there is a discrepancy between amounts in figures and in words, the amount in words will govern; and
  - (b) where there is a discrepancy between the unit rate and the total amount derived from the multiplication of the unit price and the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer, there is an obviously gross misplacement of the decimal point in the unit price, in which event the total amount as quoted will govern and the unit rate will be corrected.
10. The cost of haulage shall be paid for as set out in the Bill of Quantities.
11. In general, excavation shall be measured net. The Contractor is to allow for bulking, intermediate storage, double handling and backfill with compaction to lines and levels given on the drawings, and disposal of excess material. The rates for excavation shall also be deemed to include for all working space, space for timbering or other measures to maintain the stability of the excavations and for keeping excavations free of water.
12. Proper drainage on the site must be maintained during construction and the Contractor shall be held responsible for any flood damage to life and properties due to his work in this Contract. The Contractor shall allow in his rate, inter alia, for all costs to maintain or divert flow in drains, ditches, open channels and water courses during construction and other drainage work. No claims for additional payment will be considered in this regard.
13. All rates shall be deemed to include for protection of the environment from harmful discharge of wastes and silting other than unavoidable.
14. Rates for installation, supplies, equipment of mechanical and electrical type forming part of the permanent works shall include for everything necessary for shop drawings, supply, transport to the site, handling, storing, installation, fixing, connecting, testing and commissioning maintenance, spare parts as specified for proper function of the airport.
15. The Contractor shall be deemed to have allowed in his rates, inter alia, for the following:
  - (a) Starting and completing works in areas of traffic and operation for each working shift,
  - (b) Cleaning and preparing craft pavement before the end of each working shift for use by vehicles,
  - (c) Maintaining the road signs in areas of works for times other than designated working periods,
  - (d) Construction and maintenance of any diversion or access roads and all costs incurred in the passing of traffic through or around the site,
  - (e) All charges and/or transport costs relating to extraction, preparation and haulage of materials,
  - (f) The eventual removal of the Contractor's site establishments and the reinstatement of such areas on completion of the contract,
  - (g) Protection of the works from water from any source,
  - (h) Setting out and verification of all survey data and dimensions,
  - (i) Provision and preservation of survey beacons,
  - (j) Provision of all samples and test certificates,
  - (k) Provision of all water supply, sanitation and services including electricity,
  - (l) Providing and mixing water to earthwork and pavement operations in dry weather to achieve the optimum moisture content,

- (m) Scarification of surfaces and drying the earthworks and pavements to reduce the moisture content to the optimum and compaction or recompaction subsequently, and repeating any such operation whenever necessary,
- (n) All contractual requirements not itemized are deemed to be included in the other item rates,
- (o) Costs of materials sampling and testing and retesting where required, and test certificates,
- (p) Marking, signalling as appropriate of all equipment and facilities on sea to provide safety in accordance with rules and regulations.

## **Daywork Schedule**

### General

1. Reference should be made to the Conditions of Contract. Work shall not be executed on a daywork basis except by written order of the Engineer. Bidders shall enter basic rates for daywork items in the Schedules, which rates shall apply to any quantity of daywork ordered by the Engineer. Nominal quantities have been indicated against each item of daywork, and the extended total for daywork shall be carried forward as a Provisional Sum to the Summary Total Bid Amount.

### Daywork Labour

2. In calculating payment due to the Contractor for the execution of dayworks, the hours for labour will be reckoned from the time of arrival of the labour at the job site to execute the particular item of daywork to the time of return to the original place of departure, but excluding meal breaks and rest periods. Only the time of classes of labour directly doing work ordered by the Engineer and for which they are competent to perform will be measured. The time of gangers (charge hands) actually doing work with the gangs will also be measured but not the time of foremen or other supervisory personnel.
3. The Contractor shall be entitled to payment in respect of the total time that labour is employed on daywork, calculated at the basic rates entered by him in the "SCHEDULE OF DAYWORK RATES: 1. LABOUR," together with an additional percentage payment on basic rates representing the Contractor's profit, overheads, etc., as described below:
  - (a) the basic rates for labour shall cover all direct costs to the Contractor, including (but not limited to) the amount of wages paid to such labour, transportation time, overtime, subsistence allowances, and any sums paid to or on behalf of such labour for social benefits in accordance with the Turkmen law.
  - (b) the addition percentage payment to be quoted by the bidder and applied to costs incurred under (a) above shall be deemed to cover the Contractor's profit, overheads, superintendence, liabilities and insurances and allowances to labour, timekeeping and clerical and office work, the use of consumable stores, water, lighting and power; the use and repair of stagings, scaffolding, workshops and stores, portable power tools, manual plant and tools; supervision by the Contractor's staff, foremen and other supervisory personnel; and charges incidental to the foregoing.

### Daywork Materials

4. The Contractor shall be entitled to payment in respect of materials used for daywork (except for materials for which the cost is included in the percentage addition to labour costs as detailed heretofore), at the basic rates entered by him in the "SCHEDULE OF DAYWORK RATES: 2. MATERIALS," together with an additional percentage payment on the basic rates to cover overhead charges and profit, as follows:
  - (a) the basic rates for materials shall be calculated on the basis of the invoiced price, freight, insurance, handling expenses, damage, losses, etc., and shall provide for delivery to store for stockpiling at the Site.
  - (b) the additional percentage payment shall be quoted by the bidder and applied to the equivalent payments made under (a) above.

- (c) the cost of hauling materials for use on work ordered to be carried out as daywork from the store or stockpile on the Site to the place where it is to be used will be paid in accordance with the terms for Labour and Construction Plant in this Schedule.

Daywork Constructional Plant

- 5. The Contractor shall be entitled to payments in respect of Construction Plant already on Site and employed on daywork at the basic rental rates entered by him in the "SCHEDULE OF DAYWORK RATES: 3. CONSTRUCTIONAL PLANT." The said rates shall be deemed to include due and complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricants, and other consumables, and all overhead, profit and administrative costs related to the use of such equipment. The cost of drivers, operators and assistants will be paid for separately as described under the section on Daywork Labour.
- 6. In calculating the payment due to the Contractor for Constructional Plant employed on daywork, only the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Engineer, the travelling time from the part of the Site where the Constructional Plant was located when ordered by the Engineer to be employed on daywork and the time for return journey thereto shall be included for payment.

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Amount National Currency	Amount Foreign Currency
1	General Item		
2	Repair and 40 mm overlay		
3	Repair and 75 mm overlay		
4	Repair and 120 mm overlay		
5	Pavement reconstruction		
6	New Road		
7	Drainage		
8	Signalisation and miscellaneous roadworks		
9	Dayworks		
10	Provisional Sum		
	<b>Total</b>		

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
100	<b>General Items</b>						
101	Performance bond/guarantee	I.S	--				
102	Insurance of the works	I.S	--				
103	Insurance of constructional plant	I.S.	--				
104	Third party insurance	I.S.	--				
105	Safety measures and precautions concerning works under traffic	I.S.	--				
106	Mobilisation of contractor's machinery, equipment, tools, shelters, facilities	I.S.	--				
107	Contractor's site installation and temporary works for carrying out the works	I.S.	--				
108	Maintenance of site installation during the construction period	I.S.	--				
109	Office and operatives for engineer	I.S.	--				
110	Removal of contractor's site installation, equipment, shelters, facilities and clearing of the area used on completion	I.S.					
<b>Total bill no. 1</b>							

**Road Improvement Project  
Section Tedjen - Mary of the Ashgabat - Mary Road  
Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>200</b>	<b><u>Repair and 40 mm overlay</u></b>						
201	Cleaning of cracks, incl. removal of joint sealant, foreign matter, and treating against grass growth, filling of cracks with a sand bitumen mixture	m	4,225.00				
202	Milling 60 mm deep to spot damages, deformations and rutting, apply tack coat and fill with bituminous material	m <sup>2</sup>	N/A				
203	Milling of elevated parts of the asphalt 0 - 40 mm	m <sup>2</sup>	12,100.00				
204	Levelling by filling of depressions with bituminous surface course incl. cleaning of surface and tack coat	m <sup>2</sup>	100.00				
205	Cleaning of surface to receive tack coat	m <sup>2</sup>	221,767.00				
206	Tack coat 0.5 l/m <sup>2</sup>	m <sup>2</sup>	221,767.00				
207	Alteration rate for adjustment in tack coat application for each 0.1 l/m <sup>2</sup>	rate only					
208	Bituminous surface course 40 mm nominal, thickness, laid in 60 mm average thickness for levelling of undulations	m <sup>2</sup>	221,767.00				
209	Alteration rate in adjustment in bitumen contents for each 0.1 %	rate only					
	<b>Carry forward</b>						



**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

<b>Bill No.</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>National Rate</b>	<b>Amount National Currency</b>	<b>Foreign Rate</b>	<b>Amount Foreign Currency</b>
	<b>Brought forward</b>						
210	Scarifying existing shoulders	m <sup>2</sup>	162,603.00				
211	Place selected material for shoulders, spread and compact at OMC to line and levels	m <sup>3</sup>	13,015.00				
212	<u>Provisional Item: Benching in Shoulders</u> Remove material in shoulders, construct at OMC the shoulder in benchings with selected material to widen the existing road/shoulder to line and levels	-	-				
	<b>Total bill no. 2</b>						

**Road Improvement Project  
Section Tedjen - Mary of the Ashgabat - Mary Road  
Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
300	<u>Repair and 75 mm overlay</u>						
301	Cleaning of cracks, incl. removal of joint sealant, foreign matter, and treating against grass growth, filling of cracks with a sand bitumen mixture	m	7,000.00				
302	Milling 60 mm deep to spot damages, deformations and rutting, apply tack coat and fill with bituminous material	m <sup>2</sup>	700.00				
303	Milling of elevated parts of the asphalt 0 - 40 mm	m <sup>2</sup>	1,900.00				
304	Levelling by filling of depressions with bituminous surface course, incl. cleaning of surface and tack coat	m <sup>2</sup>	1,000.00				
305	Cleaning of surface to receive tack coat	m <sup>2</sup>	45,045.00				
306	Tack coat 0.5 l/m <sup>2</sup>	m <sup>2</sup>	90,090.00				
307	Alteration rate for adjustment in tack coat application for each 0.1 l/m <sup>2</sup>	rate only					
308	Bituminous binder course 0/16 40 mm nominal thickness, laid in 60 mm average thickness for levelling of undulations	m <sup>2</sup>	45,045.00				
309	Alteration rate in adjustment in bitumen contents for each 0.1 %	rate only					
	<b>Carry forward</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
	<b>Brought forward</b>						
310	Bituminous surface course 0/11 mm 40 mm thick	m <sup>2</sup>	45,045.00				
311	Alteration rate in adjustment in binder contents for each 0.1 %	rate only					
312	Scarifying existing shoulders	m <sup>2</sup>	33,120.00				
313	Place selected material for shoulders, spread and compact at OMC to line and levels	m <sup>3</sup>	3,630.00				
314	<u>Provisional item: Benching in Shoulders</u> Remove material in shoulders, construct at OMC the shoulder in benchings with selected material to widen the existing road/shoulder to line and levels						
	<b>Total bill no. 3</b>						

**Road Improvement Project  
Section Tedjen - Mary of the Ashgabat - Mary Road  
Volume III Schedule of Works - Bill of Quantities -**

<b>Bill No.</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>National Rate</b>	<b>Amount National Currency</b>	<b>Foreign Rate</b>	<b>Amount Foreign Currency</b>
<b>400</b>	<b><u>Repair and 120 mm overlay</u></b>						
401	Cleaning of cracks, incl. removal of joint sealant, foreign matter, and treating against grass growth, filling of cracks with a sand bitumen mixture	m	2,300.00				
402	Milling 60 mm deep to spot damages, deformations and rutting, applying tack coat and fill with bituminous material	m <sup>2</sup>	800.00				
403	Milling of elevated parts of the asphalt 0 - 40 mm	m <sup>2</sup>	800.00				
404	Levelling by filling of depressions with bituminous surface course, incl. cleaning of surface and tack coat	m <sup>2</sup>	N/A				
405	Cleaning of surface to receive tack coat	m <sup>2</sup>	4,095.00				
406	Tack coat 0.5 l/m <sup>2</sup>	m <sup>2</sup>	9,190.00				
407	Alteration rate for adjustment in tack coat application for each 0.1 l/m <sup>2</sup>	rate only					
408	Bituminous binder 0/16 B65 80 mm thick	m <sup>2</sup>	4,095.00				
409	Alteration rate in adjustment in bitumen contents for each 0.1 %	rate only					
410	Bituminous surface course 0/11 B65 40 mm thick	m <sup>2</sup>	4,095.00				
	<b>Carry forward</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
	<b>Brought forward</b>						
411	Scarifying existing shoulders	m <sup>2</sup>	2,790.00				
412	Place selected material for shoulders, spread and compact at OMC to line and levels	m <sup>3</sup>	600.00				
413	<u>Provisional Item: Benching in Shoulders</u> Remove material in shoulders, construct at OMC the shoulder in benchings with selected material to widen the existing road/shoulder to line and levels						
	<b>Total bill no. 4</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>500</b>	<b><u>Pavement Reconstruction</u></b>						
501	Remove existing shoulder material to the underside of the existing asphalt	m <sup>2</sup>	658,721.00				
502	Milling of existing asphalt, and sieving to the gradations for subbase material	m <sup>3</sup>	114,682.00				
503	Scarify existing base course material, compact to line and levels at OMC as subbase (CBR > 30)	m <sup>2</sup>	1,652,591.00				
504	Provide sub-base material (CBR > 30) fill and compact at OMC to line and levels	m <sup>3</sup>	110,595.00				
505	Subbase material from recycled asphalt by adding gradation as required and built required thickness	m <sup>3</sup>	225,277.00				
506	Prime coat RC 30 at 0.8 l/m <sup>2</sup>	m <sup>2</sup>	993,870.00				
507	Alteration rate for adjustment in application rate of each 0.1 l	rate only					
508	Rolled asphalt roadbase 0/22 B 65 160 mm thick	m <sup>2</sup>	993,870.00				
509	Tack coat at 0.5 l/m <sup>2</sup>	m <sup>2</sup>	993,870.00				
510	Alteration rate for adjustment in tack coat application for each 0.1 l/m <sup>2</sup>	rate only					
	<b>Carry forward</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

<b>Bill No.</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>National Rate</b>	<b>Amount National Currency</b>	<b>Foreign Rate</b>	<b>Amount Foreign Currency</b>
	<b>Brought forward</b>						
511	Bituminous surface course 0/11, B 65 - 40 mm thick	m <sup>2</sup>	993,870.00				
512	Selected material built in at OMC to line and levels to shoulders	m <sup>3</sup>	169,885.00				
	<b>Total bill no. 5</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>600</b>	<b><u>New Road</u></b>						
601	Remove existing shoulder material to the underside of the existing asphalt in connection areas	m <sup>2</sup>	1,580.00				
602	Milling of existing asphalt and sieving to the gradations for subbase material in connection areas	m <sup>3</sup>	240.00				
603	Scarify existing basecourse material, compact to line and levels at OMC as subbase (CBR > 30) in connection areas	m <sup>2</sup>	2,000.00				
604	Provide sub-base material (CBR > 30) fill and compact at OMC to line and levels in connection areas	m <sup>3</sup>	2,000.00				
605	Clearing of overgrowth and stripping of top soil 0 - 150 mm thick	m <sup>3</sup>	2,108.00				
606	Scarify and compact at OMC commencing ground	m <sup>2</sup>	26,350.00				
607	Fill to embankment at OMC	m <sup>3</sup>	17,918.00				
608	Provide sub-base material (CBR > 30) fill and compact at OMC to line and levels	m <sup>3</sup>	18,180.00				
609	Prime coat RC30 at 0.8 l/m <sup>2</sup>	m <sup>2</sup>	18,180.00				
	<b>Carry forward</b>						



**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
	<b>Brought forward</b>						
610	Alteration rate for adjustment in application rate of each 0.1 l	rate only					
611	Rolled asphalt roadbase 0/22 B 65/160 mm thick	m <sup>2</sup>	18,180.00				
612	Tack coat at 0.5 l/m <sup>2</sup>	m <sup>2</sup>	18,180.00				
613	Alteration rate for adjustment in tack coat application for each 0.1 l/m <sup>2</sup>						
614	Bituminous surface course 0/11 B 65 40 mm thick	m <sup>2</sup>	18,180.00				
615	Selected material built in at OMC to line and levels to shoulders	m <sup>3</sup>	2,471.00				
	<b>Total bill no. 6</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>700</b>	<b><u>Drainage</u></b>						
701	Clean and desilt existing pipe and box culverts	no.	13				
702	Clean/excavate outfall ditches	m <sup>3</sup>	780.00				
703	Provide, lay and join precast concrete pipe, incl. all necessary works - 1000 mm diameter	m	20.00				
704	Construct apron, head and wing wall, item 703, with reinforced in-situ concrete, incl. all necessary works	m <sup>3</sup>	5.00				
705	Demolish, clear away existing concrete box culvert, incl. apron, head and wing wall - Size 1000 mm	m	16				
706	Demolish, clear away existing concrete double box culvert, incl. apron, head and wing wall - Size 1000 mm	m	17				
707	Construct box culvert, incl. all necessary works - Size 1000 mm	m	16.00				
708	Construct double box culvert, incl. all necessary works - Size 1000 mm	m	17.00				
709	Construct apron, head and wing wall, items 707 and 708 with reinforced in-situ concrete, incl. all necessary works	m <sup>3</sup>	12.50				
	<b>Total bill no. 7</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>800</b>	<b><u>Signalisation and miscellaneous roadworks</u></b>						
801	Road marking - Line passed through, width 0.1m - Line passed through, width 0.4m - Broken line, width 0.1m, ratio 3:1 - Broken line, width 0.1m, ratio 1:3 - Traffic islands	km km km km no.	5.4 0.5 17.0 140.0 85				
802	Road signs - Small signs - Large signs	no. no.	295 267				
803	Roadside marking post	no.	6,260				
804	Km - post	no.	140				
805	Crash barrier	m					
	<b>Total bill no. 8</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>900</b>	<b><u>Dayworks -labour-</u></b>						
901	Unskilled labour	h	5,000.00				
902	Skilled labour	h	2,000.00				
903	Foreman	h	100.00				
	<b>Subtotal to Dayworks labour</b>						
	<b>Allow for .... per cent of subtotal for Contractor's overhead, profit</b>						
<b>900</b>	<b><u>Dayworks -materials-</u></b>						
904	Sand	m <sup>3</sup>	100.00				
905	Sulphate resisting Portland cement	t	100.00				
906	Crushed sand	m <sup>3</sup>	100.00				
907	Crushed course aggregate	m <sup>3</sup>	100.00				
908	Crushed fine aggregate	m <sup>3</sup>	100.00				
909	Bit. binder B 60 - 70	t	1.00				
910	Prime coat RC 30	m <sup>2</sup>	100.00				
	<b>Subtotal to Dayworks materials</b>						
	<b>Allow for .... per cent of subtotal for Contractor's overhead, profit</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
<b>900</b>	<b><u>Dayworks -equipment-</u></b>						
911	Pick-up car	h	1,000.00				
912	Truck 10 t capacity	h	1,000.00				
913	Hydraulic excavator back-hoe	h	1,000.00				
914	Grader 140 hp	h	500.00				
915	Air compressor incl. hoses, hammers, chisels 7 m <sup>3</sup> /minute	h	100.00				
916	Rubber tyre roller	h	100.00				
917	Vibrating roller steel drum	h	100.00				
918	Crane lifting capacity 10 t	h	100.00				
919	Bitumen sprayer	h	100.00				
920	Asphalt paver/finisher	h	100.00				
	<b>Subtotal to Dayworks equipment</b>						
	<b>Allow for .... per cent of subtotal for Contractor's overhead, profit</b>						
	<b>Total bill no. 9</b>						

**Road Improvement Project**  
**Section Tedjen - Mary of the Ashgabat - Mary Road**  
**Volume III Schedule of Works - Bill of Quantities -**

Bill No.	Description	Unit	Quantity	National Rate	Amount National Currency	Foreign Rate	Amount Foreign Currency
1000	<b><u>Provisional Sum</u></b>						
1001	For the relocation of supply lines	I.S.					
	<b>Subtotal to Provisional</b>						
	<b>Allow for .... per cent of Subtotal for Contractor's overhead, profit</b>						
	<b>Total bill no. 10</b>						



VOLUME III.ii

## TECHNICAL SPECIFICATIONS

### Preamble

The Tedjen - Mary road is a section of the M 37 (Magistrale), Turkmenistan's most important artery for long distance and international traffic. The more than 1,200 km long M 37 in Turkmenistan is linking Turkmenbashi (formerly Krasnovodsk) at the Caspian Sea with Ashgabat and via Tedjen - Mary with the Uzbekistan border, and ultimately, Buchara and Samarkand.

This road improvement project from Ashgabat to Mary is subdivided into three sections:

- (i) Ashgabat - Kahka (130 km)
- (ii) Kahka - Tedjen (80 km)
- (iii) Tedjen - Mary (143 km)

These specifications concern the third section, Tedjen - Mary. The first two sections are subject to different tenders.

The engineering surveys and designs of the current project for the improvement of the Tedjen - Mary road section are part of the European Union - TACIS sponsored TRACECA Project (Transport Corridor Europe - Caucasus - Asia).

After independence and due to the opening of the borders to the neighbouring countries in the South heavy load traffic has substantially increased.

### Brief Description of the Site

The road M 37 connects Ashgabat via Tedjen and Mary to Chardzou. It forms an important link from the east of the Caspian Sea to Uzbekistan and further east. Traffic from Iran and neighbouring countries use the road. The project road is located in the south-east Karakum region. The topography is generally flat. The land along the project road is irrigated and used for agriculture.

### *Climate*

The project region has a distinct continental climate with wide fluctuations of temperature during the day and the year. The temperature is often higher than 35°C during summertime and the maximum temperature in Tedjen - Mary dessert region reaches 46°C in the shade.

By contrast, in winter the temperature in Tedjen drops to below 0°C. Humidity is very low and rainfall sparse. The following tables are giving average temperature and rainfall for Tedjen.

Table: Average Temperature and Rainfall (Tedjen)

month	1	2	3	4	5	6	7	8	9	10	11	12	year
rainfall (mm)	21	16	32	27	12	2	0	0	1	5	11	10	137
temperature °C	1	4	11	17	23	27	30	28	23	16	9	4	16
max. temperature °C	26	30	34	38	44	44	46	46	42	39	36	28	46



### ***Hydrogeological Conditions***

Hydrogeological conditions of this area have been changed with irrigation and reclaiming works. Government improves the agriculture in this region. Predominantly there are cotton and wheat fields in this area. The improvement of the mono-culture and irrational use of water during a long period resulted in higher ground water levels.

Tedjen - Mary road crosses two rivers Tedjen and Murgab), large irrigation canals (Kara Kum, Haus-Khan) and drainage water collector (Kara Kel), as well as a lot of small drainage and irrigation canals. The hydrogeological conditions between Tedjen and Mary are varying.

### ***Geological Overview***

The area between Tedjen and Mary is situated in the western part of Murgab depression and crosses Elan region and Northern Badhyz geological structure. The sands, fine sands and clays of quaternary and neogen period are widespread.

In origin the deposits of this area are modern riverbeds of Tedjen and Murgab River, which determine the structure of soil and geotechnical conditions. In tectonic aspect the area in regard is stable and not seismic active.

### ***Road Alignment***

The road passes through a generally flat area which is largely irrigated. Larger canals cross the road or flow parallel, and several fixed points from irrigation and pipelines exist. The horizontal alignment consists of long straights, frequently followed by narrow curves. A shorter section of the road has problems with windblown sand. The horizontal alignment is generally flat, with many depressions and/or deformations on the road surface.

Field investigations and surveys show that the existing alignment requires some improvements towards the design criteria of road Category II. Wherever possible such improvements or widening of short narrow sections were included in the project as shown on the drawings.

### ***Road Conditions***

The width of the existing road varies between approx. 14.20 and 16.60 m, a width of pavement between 7.70 m and 9.20 m, and a shoulder width of 2.50 to 4.00 m.

The engineering investigations of the project road showed that most parts of the road are in fair to poor condition, very often the road surface shows severe deformations (rutting, corrugations) which together with the resulting failure of road surface drainage from considerable danger to road users especially for passenger cars. Immediate action is necessary to keep the M 37 passable.

### ***Drainage Structures***

The road section Tedjen - Mary is located in an area with very low precipitation of 137 mm annually. Only 41 drainage structures other than bridges exist. Drainage structures include pipe culverts (reinforced concrete, metal, asbestos concrete) and box culverts (reinforced concrete). Many culverts were blocked with sand or mud, and many were partly or completely under

water. Several culverts on the inventory list could not be located in the field, either because of wrong chainage, or of eolian sands, or because of earth movements along the embankment.

### ***Bridges***

A comprehensive inspection of the bridges of the project road was carried out and their present condition investigated. Two of the bridges are in very bad condition and immediate action was advised in the Consultant's Inception Report of January 1997:

- single lane traffic (at least for trucks)
- speed limit of 30 km/h

These bridges are bridge no. 19 at km 138.50 and bridge no. 17 at km 133.50.

### **Brief Description of the Works**

#### ***Typical Improvement Measures***

The pavement rehabilitation would consist in general of the following:

#### ***Patching***

This includes mainly surface patching and repair of surfacing distress. Included are patches of binder and seal on cracked or ravelled areas, the replacement of the surfacing in small severely-cracked areas, and the filling of potholes. Patching areas are shown in straight line diagrams.

#### ***Resealing***

It comprises two thin resurfacing operations which repair surface distress but cause little change to the roughness or structural strength of the pavement; these operations are surface treatment (i. e. chip seal) and slurry seal. Resealing usually implies also preparatory patching. Sealing areas are shown in straight line diagrams.

#### ***Overlay***

It consists of bituminous overlays placed by mechanical paver-finisher in a single-layer or double-layer. Overlay sections are detailed in straight line diagrams.

The overlay strengthens the pavement and seals the surface against ingress of water and resulting damages in the base course and subbase against ingress of water and resulting damages in the base course and subbase layers. Before overlaying, existing spot damages must be repaired, deformations and ruttings must be milled and refilled by bituminous mixes. Local settlements or undulations must be level-filled prior to overlaying. the existing surfaces are irregular and not to proposed lines and levels. A relatively thin overlay may either be laid carpetlike with undulations reoccurring at the surface, or a certain quantity of levelling material needs to be filled to restore line and levels before surfacing. For the levelling some 20 mm thickness in average are added for repair of localised damages and to restore the road to acceptable driving comfort.

#### ***Reconstruction***

It consists of all works that require re-specification of the surfacing and base types, and pavement thicknesses and strength parameters. It included scarification, stripping, base repair, recompaction and resurfacing. Reconstruction sections are detailed in drawings showing the existing and proposed horizontal and vertical alignments.

When the pavement has failed, and where the material for base course and for the subbase deviate substantially in quality or compaction from the specifications and have contributed to pavement failures or severe ruttings/deformations, and when the useful service life has come to its end, reconstruction is necessary. This may also apply to sections when the costs of the theoretical overlay thickness exceeds costs of pavement reconstruction. Reconstruction is also necessary where severe deformations have occurred, which extend down into the base course. The existing bitumen is often very soft, and overlaying of soft bitumen may lead to damages in an overlay. Reconstruction will re-use the existing bituminous material in the subbase after milling and sieving. Missing mineral gradations must be added before re-use as subbase/base material. Reconstruction sections are detailed in drawings showing the existing and proposed horizontal and vertical alignments.

### ***Paved Routine Maintenance***

This includes drainage maintenance, vegetation control, shoulder maintenance, safety installations, and other items which are not modelled as affecting the ride quality of the pavement.

### ***Road Widening***

Widening of the pavement and/or widening of shoulders by stripping of surface, excavation for widening, construction of embankment in benching by compacted layers, and construction of pavement widening or pavement reconstruction and shoulders.

### ***New Alignment***

New embankment and pavement to improve narrow curves.

### ***Road Cross Section***

The SNIP requires for road category II a  $2 \times 3.75 \text{ m} = 7.50 \text{ m}$  wide carriageway with shoulders  $0.75 \text{ m}$  (paved) +  $3.00 \text{ m} = 3.75 \text{ m}$  each. The total road width is  $15.00 \text{ m}$ . The width of the existing road varies between  $14.20$  and  $16.60 \text{ m}$  with a width of pavement between  $7.70$  and  $9.20 \text{ m}$  and shoulder width of  $2.50$  to  $4.00 \text{ m}$ . The road cross-section includes:

- (i) full width of carriageway with  $2 \times 3.75 \text{ m} = 7.50 \text{ m}$  and asphalt concrete surface
- (ii) according to existing road width the shoulder shall be
  - in sections where the pavement is rehabilitated (overlay or new pavement)
    - $2.50 \text{ m}$  with  $0.75 \text{ m}$  paved
    - or
    - $4.00 \text{ m}$  totally unpaved
  - in sections where the road alignment is improved (e. g.  $R = 800 \text{ m}$ )
    - $3.75 \text{ m}$  each with  $0.75 \text{ m}$  paved

The cross sections are shown in the drawings.

### ***Drainage Structures***

The drainage pipe and box culverts require in intense cleaning, maintenance and repair, as set out in the Drainage Structure List.

## TECHNICAL SPECIFICATIONS

### **100 General**

#### **101. Scope**

This Specification defines the standard and quality of materials and workmanship to be used in the Improvement of the Tedjen - Mary Road section.

#### **102. Specifications**

Specifications for this Contract are included in this Document except where stated otherwise.

#### **103. Standards and Codes**

For convenience and in order to establish the minimum standard of quality, reference has been made to certain British, American, German DIN, and other International Standards in this Specification. Subject to the approval of the Engineer any other national or international accepted Standard which maintains the standard of quality may be used.

The standards referred to shall be latest editions published at the time of Tender. all the conditions and particulars as to standard of materials, workmanship and tests contained in such Standards shall be compiled with for various items unless otherwise agreed by the Engineer. Copies, in English language, of any Standards used in connection with the Works shall be supplied to the Engineer within 14 days of the Engineer's written request stipulating the required standards.

Where such standards and codes are national in character, or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Engineer at least 15 days prior to the date when the Contractor desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure equal or higher quality, the Contractor shall comply with the standards set forth in the documents.

#### **104. Trade Names**

Where trade names or manufacturers catalogue reference numbers are mentioned in the Specifications or Bill of Quantity, they are intended only to serve as a guide to the type of article or material similar and equal to those specified subject to approval of the Engineer and shall give where stated in the Bill of Quantity the manufacturer and type of offered material.

#### **105. Materials and Manufactured Articles**

The Contractor shall before placing any order for materials and manufactured articles for incorporation in the Work submit to the Engineer 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 Engineer 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 Engineer with copies of all orders for the supply of materials and manufactured articles required in connection with the Works as the Engineer may require.

**106. Storage of Materials and Manufactured Articles**

All materials and manufactured articles shall be stored on Site in a manner acceptable to the Engineer and the Contractor shall carefully protect from weather and vermin all work, materials and manufactured articles which may be affected. Materials subject to deterioration from prolonged storage shall be used in the sequence of dates of delivery or dates of manufacture whichever is more applicable.

**107. Sources and Types of Material for Incorporation in the Works**

The Contractor shall be responsible for locating and selecting materials complying with the Specification and for ensuring that materials processed for incorporation into the Works comply with the Specifications. The location of the source, trial pit logs, results of tests required by the Specification, and representative samples of sufficient size for the Engineer to perform the same tests shall be submitted to the Engineer for acceptance of the source well in advance of transporting to the site and commencement of working with the material. No material shall be used which is not secured from a source accepted by the Engineer. Acceptance of a source does not mean that all material from the source will be accepted.

**108. Water and Power**

The Contractor shall

- (a) provide at his own risk and cost all water, lighting and electric power required for use in the works and shall pay all costs, fees and charges in connection therewith and allow all sub-contractors free use of the same. The Contractor shall make his own arrangement for his requirements of potable water, by
- (b) provide and maintain temporary water storage together with any distribution piping which may be necessary and subsequently remove all installations to the approval of the Engineer
- (c) provide, wire for, and connect lighting and power for the works.

**109. Method of Construction**

The Contractor shall submit to the Engineer not later than 28 days from the date of award of the Contract, a general description of his proposed arrangements and methods for the execution of the Works, including, inter alia, temporary offices, buildings, access roads, deviations, constructional plant and its intended production output, working shift arrangements, labour strength, skilled and unskilled and

supervision arrangements, power arrangements, supply of materials, stone crushing, aggregate production and storage, cement handling, concrete mixing and handling, methods of excavation, dealing with water, testing methods and facilities.

During the execution of the Works, the Contractor shall also submit to the Engineer full and detailed particulars of any proposed temporary works and amendments to the arrangements and methods submitted in accordance with the foregoing.

**110. Notice of Operation**

No important operation or change of operation shall be undertaken without the consent in writing of the Engineer.

**111. Site**

The Site of the Works shall be the area within the various road reserves, quarries, borrow pits, spoil areas, access roads and deviations, Contractor's Plant Yard and installations, storage areas, camp sites, Engineer's offices, laboratories and accommodation, shown on the Drawings or established specifically for the Contract.

Negotiations for any additional land required outside the permitted working space which may be required by the Contractor for any purpose whatsoever shall be carried out by the Contractor.

The Contractor's Plant Yard or Quarries shall be used by the Contractor for his offices, stores, plant, workshops, latrines and messing accommodation. The erection of temporary buildings or structures on other parts of the Site will not be allowed without the permission in writing of the Engineer's Representative.

Before the erection of any building or plant in the Contractor's Plant Yard or quarries, the Engineer's Representative shall be supplied with a drawing showing the layout of the area. Areas which the Contractor uses for his installations shall be fenced.

Where it is necessary for any reason whatsoever to enter on to land which does not form part of the Site, the Engineer's Representative shall be informed of the details and the land owner or occupier shall be consulted by the Contractor and his written permission obtained. In the event of the owner or occupier withholding his permission, full circumstances of the case shall be referred to the Engineer and no further action shall be taken until his instructions are received.

Under no circumstances is land to be interfered with whether for Permanent or Temporary Works until permission to proceed has been received from the Employer.

Possession of the Site will normally be given for ten-kilometre lengths at a time but may, if required, include bridge and culvert sites outside the ten-kilometre lengths. The Engineer will consider giving possession of greater lengths if the Contractor so requests.

From the date of such possession of the Site until a certificate of completion has been given, the Contractor shall be responsible for maintaining the old and new roads on the Site in a satisfactory and usable condition.

## **112. Construction Generally**

Materials available on the Site or materials made available or supplied by the Employer shall be used solely for the execution of the Works.

The Contractor shall be absolutely and solely responsible for the adequacy, safety and security of Temporary Works.

The Contractor shall minimise disturbance to lands, roads and other places on and around the site. No trees or other vegetation shall be removed except to the extent necessary for the carrying out of the Works.

Access shall be maintained to all properties adjacent to the Site. Temporary access tracks shall be constructed as required and maintained for the duration of the Contract.

All buildings erected by the Contractor on the Site shall comply with all bye-laws in so far as they may be applicable.

## **113. Protection From Water**

the Contractor shall keep the whole of the Works free from water. Except as otherwise specified, he shall be responsible for dealing with water, whether from existing drainage systems, water courses, underground springs, precipitation or any other source or cause. In discharging and diverting water he shall avoid flooding or damaging other works or services and causing erosion.

## **114. Pollution**

The Contractor shall be fully responsible for the disposal of all waste matter from the Site and take all necessary precautions to avoid pollution to water courses, neighbouring land and the environment generally.

## **115. Protection of Existing Works and Services**

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.

Where work is to be carried out in the vicinity of overhead power lines, the Contractor shall ensure that all persons working in such areas are aware of the relatively large distance that high voltage electricity can 'short' to earth when cranes, or other large masses of steel, are in the vicinity of power lines. The Contractor's attention is drawn to BS 162 which gives safe clearances for the various voltages.

The Contractor shall be held responsible for damage to existing works or services, and shall indemnify the Employer against any claims in this respect (including consequential damages). The Contractor shall be responsible for the reinstatement of services so affected.

In all cases where works or services are exposed, they shall be properly shored, supported or otherwise protected. Special care shall be exercised in filling and compacting the ground under mains, cables, etc., and to leave uncovered exposed water meters, stopcock boxes and other accessories.

The Contractor shall ensure that no fence or gate, except where these are required to be removed or altered for the proper execution of the Works, is damaged and that no gates are left open which may allow livestock to stray.

Installations adjacent to the Works, shall be kept securely in place until the work is completed and shall then be made as safe and permanent as before.

Notwithstanding the foregoing requirements, and without reducing the Contractor's responsibility, the Contractor shall inform the engineer immediately if any existing works or services are exposed, located or damaged.

**116. Diversion of Services**

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 Engineer and the appropriate Authority.

**117. Progress Photographs**

Coloured photographs showing the progress of the works shall be taken every month from position to be selected by the Engineer. Photographs shall not be less than 150 mm x 100 mm and shall be inscribed with the location, date when taken and a brief description or title. Each set shall comprise six prints of each of up to twenty negatives. All negatives shall be numbered and retained on the Site. On completion of the works, the negatives shall become the property of the Employer. Two prints of each photography shall be signed and dated on the back by the Engineer and the Contractor and one print each shall be retained by the Employer and the Engineer as an agreed record.

**118. Signboards**

The Contractor shall provide, erect and maintain signboards to the layout, colours and dimensions as the Engineer will direct.

These signboards are to be erected within one month of the date of commencement of the Contract. The Contractor shall remove the signboards at the end of the Defects Liability Period or its equivalent.

**119. Health, Safety and Accidents**

The Contractor shall ensure, so far as is reasonably practicable, 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, equipment 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, transport and disposal 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 the Laws of Turkmenistan.
- (d) the provision of a qualified officer or designation as Safety Officer of one of his senior staff who has 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 waterborne sanitation, refuse collection and disposal, complying with the Laws of Turkmenistan, all local Bye-laws and to the satisfaction of the Engineer, for all houses, offices, workshops and laboratories erected on the camp site or sites
- (g) the provision of an adequate number of suitable latrines and other sanitary arrangements at sites where work is in progress to the satisfaction of the Medical Officer in the area.
- (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 Engineer and the Police, if appropriate, as soon as possible after its occurrence.

## **120. Facilities for the Engineer and his Staff**

The Contractor shall provide and maintain houses, offices, laboratories, survey and laboratory equipment, furniture, transport and facilities for the Engineer and his staff, including senior staff, junior staff and technicians.

A description of the number and type of houses, office, laboratories, equipment and furniture required is given below.

On completion of the Contract, the ownership of all houses, offices, laboratories equipment and furniture and transport shall revert to the Contractor.

### **120.1 Office for Engineer's Representative and his Staff**

- (i) The general arrangement of the offices and accommodation, equipment and services required are as shown in the Schedules in Appendix I, II and III of these Documents. The offices and accommodation shall be air-conditioned and heated. All buildings, services and equipment in this Clause and as scheduled in the Appendix shall be for the sole use of the Engineer's Representative and his staff

during the period of the Contract but shall revert to the Contractor on completion of the Contract. The sites of the offices shall be to the approval of the Engineer's Representative.

The construction of this office accommodation shall be such as to facilitate rapid and easy dismantling and re-erection on a further site if the Contractor moves his main facilities during the progress of the Contract. Such removal should be co-ordinated with the similar programmed changes in the siting of the Contractor's facilities subject to the approval of the Engineer's Representative. The Contractor shall indicate in his Tender which moves, if any, are intended in his plan for performing the Works. Each siting and orientation shall be subject to the approval of the Engineer or his Representative and shall be reasonably adjacent to the Contractor's site office.

The Contractor shall submit with his Tender detailed drawings and specifications for his proposed design and method of construction of the office building and shall state any proposed deviation from the outline of the offices as shown in the Schedules. The Engineer will give serious consideration to the use of portable office units such as 'Portakabin' or similar provided the floor areas are adequate.

The Contractor shall arrange for connection of water and electricity supplies and for a telephone and telefax service. The Contractor shall arrange for the office to be connected to the Contractor's Site Office by means of an intercommunication telephone system at all times until after the issue of the final Certificate of Completion or such earlier date as may be authorised by the Engineer.

Rented office accommodation as an alternative, may be considered by the Engineer in places where large town centres are conveniently situated along the Works provided that the rest of the requirements of this Clause are fulfilled. Payment for such accommodation would be made monthly through the certificates on the basis of rental charges plus 5 %. Where unfurnished rented accommodation is chosen by the Engineer the Contractor shall provide furniture, equipment and fittings as listed in the Schedules and payment for the same shall be made on the basis of invoiced prices delivered to the accommodation plus 10 %. Where rented accommodation is decided upon by the Engineer a Variation Order will be issued.

(ii) Furniture and Equipment for Office

A schedule of office requisites, shown in the Schedules shall be provided by the Contractor and all items shall be subject to the approval of the Engineer's Representative.

Telephone shall have a separate direct line with privacy for conversation for the exclusive use of the Engineer. Four extensions to the telephone are needed. In addition to a conventional stationary telephone, a mobile telephone and a mobile fax machine shall be supplied. The provision and the installation of telephone and telefax shall be the responsibility of the Contractor and the payment of operation for these facilities shall be the responsibility of the Contractor.

All offices shall be regularly and properly cleaned for so long as they are in use.

Negotiations for obtaining suitable sites for office accommodation will be carried out by the Contractor and all costs involved for rental etc. shall be the responsibility of the Contractor for the duration of the Contractor.

(iii) Maintenance of Engineer's Representative's Offices

Until the end of the Period of Maintenance the Contractor shall maintain the offices in good repair to the satisfaction of the Engineer's Representative and shall maintain or cause to be maintained all water, electricity, telephone and telefax services. The electricity, telephone and telefax charges and shall supply such watchmen, cleaners, messengers or other attendance as may be required by the Engineer's Representative.

(iv) Removal of Engineer's Representative's Offices

On the completion of the Contract the Contractor shall remove as directed the Engineer's Representative's offices and equipment and reinstate the area to the Engineer's satisfaction.

(v) Portable Site Offices for Engineer's Representative's Staff

The Contractor shall provide portable offices for the use of the Engineer's Representative's Staff for the bridge construction sites. The use of 'Portakabin' or similar should be considered.

(vi) Testing Laboratory

The Contractor shall provide and maintain a laboratory and office to be sited in the Contractor's plant yard. the said laboratory and offices shall be in a waterproof and heat and cold isolated building of at least 60 m<sup>2</sup> internal floor area.

The building shall comply with the requirements specified for Housing and Offices in relation to rapid re-siting.

The laboratory and office is to be used exclusively for design and control testing and it shall be maintained in a clean and tidy fashion to the satisfaction of the Engineer's Representative. It shall be connected to the water and electricity supplies. The office shall be provided with all necessary furniture and equipment, stationery, proformas etc. to the satisfaction of the Engineer.

All samples and records shall be preserved as long as the Engineer may direct and they shall be kept and labelled in orderly fashion to his satisfaction. The laboratory, its equipment as detailed in the Schedule and all samples and all records shall be open to inspection by the Engineer's Representative during all site working hours.

The laboratory shall be staffed by the Contractor with an Engineer of Engineers well experienced in the testing of soils, concrete and bituminous materials.

The Contractor shall submit the name of the manufacturers and a list of laboratory equipment which he intends to provide for the approval of the Engineer.

The Contractor shall perform tests on materials as specified and shall supply the Engineer with two copies of the results of each test, such results being entered on a printed form approved by the Engineer.

A third copy of the results of each test shall be retained in the laboratory.

The Contractor shall at all times maintain a sufficient stock of all laboratory glassware, plasticware, rubberware etc., to allow for breakages and deterioration. In the event of any of the equipment becoming unusable through any cause the Contractor will, if required to do so by the Engineer's Representative, order replacements to be made.

On completion of the Contract the laboratory, equipment and air conditioners shall remain the property of the Contractor.

- (vii) The Contractor shall give the highest priority to the construction and/or the supplying of the Engineer's Representative's offices, accommodation and the laboratory. No permanent work on any section of the Contract shall be paid for until these items are made available for use unless otherwise agreed by the Engineer's Representative.

The time schedule for providing the offices, accommodation, laboratory read for occupation and use is thus:

- From the date of the Order to Commence within 30 days office and accommodation for the Engineer's Representative (the head of the site supervision team), for the secretary, and for the Turkmen Engineers. The office space shall be at least 3 rooms and may be temporary, or rented or mobile units.
- Within 60 days from the date of the Order to Commence all facilities for the Engineer's Representative office, accommodation and laboratory as specified shall be available and ready for use.

## **120.2 Accommodation**

- (i) Housing for Engineer's Representative's Senior Staff Accommodation

The housing shall be constructed to approved timber or other relevant standards as shown in Appendix I and II. It shall be well air-conditioned, heated and waterproofed. The materials and standard of workmanship shall be of a high quality and subject to the General Specification of Materials and Workmanship for Building Works adopted by the Government. The sites of the houses shall be to the approval of the Engineer's Representative.

The general arrangement of the houses and details of equipment, fittings, furniture and services to be provided is shown in the Schedules and the Contractor shall submit with his Tender detailed drawings and specifications showing his proposed design and indicating any basic alterations he would wish to make.

Two types of houses, Type 2 BR and 3 BR as specified in this Document, shall be of suitable design and construction. The Contractor should indicate in his tender if shifting of the facilities during the Works are intended in his plan for performing the work.

Negotiations for obtaining a suitable site for housing will be carried out by the Contractor and all costs involved for rental etc. shall be the responsibility of the Contractor for the duration of the Contract.

The Contractor shall provide furniture, equipment and fittings as detailed and listed in Appendix I and II and supply 24 hours per day all water, electricity, gas and kerosene consumed by the Engineer's representative and his staff and shall provide all necessary waterborne sanitation. The electrical fittings and equipment shall comply with the relevant British Standards and if a generator is required it shall be of at least 70 KVA rating if supplied solely for the Engineer's Representative and his staff. the whole shall be to the approval of the Engineer.

The Contractor shall provide car ports, access roads and temporary fences, and shall generally leave the sites of houses in a neat and tidy condition. All shall be completed and maintained to the approval of the Engineer's Representative.

Rented accommodation, either furnished or unfurnished may be considered by the Engineer as an alternative provided that the rest of the requirements of this Clause are fulfilled. Payment for such accommodation would be made monthly through the certificates on the basis of rental charges plus 5 % which additional percentage charge would be deemed to cover all operations involved in providing the accommodation including legal costs if any.

Where unfurnished rented accommodation is chosen by the Engineer the Contractor shall provide furniture, equipment and fittings as detailed and listed in the Appendix. Where rented accommodation is decided upon by the Engineer a Variation Order will be issued.

(ii) Engineer's Representative's Junior Staff Accommodation

A provisional sum may be included in the bill of Quantities to cover the cost and maintenance, including water and sanitary services, of housing for the Engineer's Representative's Junior Staff. It is envisaged that such housing, which in general shall be rented, shall be searched for by the Engineer's Representative's staff themselves. When suitable housing has been chosen the Contractor will be instructed to arrange for the drawing up of leases and/or any other legal documents with the landlords. The Contractor shall pay all rents and costs for maintaining services and shall claim reimbursement through the relevant items in the Bill of Quantities.

### **120.3 Staff**

(i) Engineer's Representative's clerical and technical staff

The Contractor shall be responsible in respect of wages, salaries, insurance, provident fund and all other costs or charges incurred for watchmen, chainmen, cleaners, recruited by the Engineer's Representative or the Contractor and employed on the Works, in the office and in the laboratory.

(ii) Assistance for Engineer's Representative

The Contractor shall provide at all times during the continuance of the Contract all such soils and survey assistants, workmen, pegs, tools etc., and transport therefore as the Engineer's Representative may require for the carrying out of his duties in connection with the Contract. The instruments and tools listed in the Schedules shall in any case be provided for the sole use of the Engineer's Representative and once supplied shall not be changed or removed without his consent.

**120.4 Radio Communication System**

The Contractor shall provide, install and maintain a radio communication system with a separate channel for the Engineer's use:

- 1 radio station in the office (incl. operator)
- 3 mobile units for the Engineer's vehicles

The radio communication system shall be operational similarly to the specified time scale for offices and laboratories.

**121. Vehicle for the Works Supervision**

Three Four Wheel Drive 5-door vehicles and two passenger salon type vehicles (medium size) of new manufacture shall be supplied, registered, comprehensively insured, maintained, fuelled and repaired. One driver for each vehicle shall be provided and paid for by the Contractor including all overtime. The vehicles shall be air-conditioned.

**122. Survey Equipment for the Engineer's Use**

The Contractor shall provide the survey equipment for the Engineer. The equipment shall be modern and include a self registering theodolite and electro-optical distance measuring instruments (total station) and automatic levelling instrument.

Survey assistants shall be provided by the Contractor.

**123. Existing Ground Levels**

The Contractor shall measure jointly with the Engineer the existing ground and commencing levels. The Contractor shall submit to the Engineer cross sections of the position and levels. The existing ground shall not be disturbed nor overlaid before the acceptance of the measurements and reports by the Engineer.

**124. Contractor's Office, Stores, Workshops**

The Contractor shall provide and maintain on approved sites suitable offices, sufficient stores, tanks and workshops for the proper storage of materials, fuel, potable water, plant and equipment. The stores shall be of such size and construction that they provide adequate storage and protection of stocks of materials, fuel, spares, etc. in quantities ensuring uninterrupted progress of the works, and the workshops shall be

suitably equipped to provide for carrying out major repairs, overhaul or modification by the Contractor of all plant and equipment in or on the works.

The Contractor shall be responsible for the water supply, electricity supply, telephone, sanitary and all other services necessary for constructional and domestic purposes for the duration of the Contract. He shall make all necessary arrangements with the authorities or persons for such electricity supply, telephone and shall make his own arrangements for water supply and sanitary services.

#### **125. As-Built Drawings**

The Contractor shall prepare as-built drawings on the basis of construction drawings and the actual construction performed.

Such drawings shall show the actual works as built all to the approval by the Engineer.

The Contractor shall submit as-built drawings for approval as soon as any one section or part of works has been completed.

All as-built drawings shall be available within 30 days after the provisional acceptance of works.

#### **125. Testing**

The Contractor shall provide and maintain for the duration of the construction period the relevant DIN, BS, ASTM & AASHTO literature etc. for testing referred to the Specifications and Drawings. This laboratory is also for the use by the Engineer.

Testing equipment shall comprise apparatus and everything necessary to carry out testing as required in the technical specifications, standards and codes.

Testing may be carried out at approved laboratories at the Contractor's expense, where the equipment/facilities on site are insufficient, and where the progress of the works is not delayed.

Wherever in the Specification tests on materials, tests on completed work and construction control tests are called for or implied, they shall be carried out according to and the materials shall comply with the requirements of the Specification issued by:

DIN Deutsches Institut für Normung e. V. -	German Standards and/or
BS	British Standard Code of Practice
BSCP or CP	British Standard Code of Practice
AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society of Testing and Materials
ISO	International Organisation for Standardisation

Certain DIN, BS, AASHTO and ASTM Specifications are listed in the various sections of this Specification for the Contractor's guidance but listing of a certain standard does not exclude materials complying to other standards accepted by the Engineer.

The Contractor shall carry out and report to the Engineer the results of the specified material and construction control tests before submitting materials and finished work to the Engineer.

All costs entailed in sampling, testing and in carrying out trial areas of construction as called for in the Specification and in the reinstatement of sampling and testing holes, shall be deemed to be included in the prices and rates entered by the Contractor in the Bill of Quantities.

The laboratory shall be operational and fully equipped before commencement of permanent works.

***Testing by the Engineer***

The Engineer shall, from time to time and when he deems necessary, perform such tests as are required to ensure that all requirements specified herein are being fulfilled.

In these cases the Engineer shall be allowed free access at all time to the Contractor's laboratory and test facilities and also to carry out without cost to the Employer any tests which the Engineer may deem necessary in connection with the works. The Contractor shall furnish all assistance to the Engineer, e. g. by the Contractor's laboratory technicians, as the Engineer may require.

All the costs incurred in the sampling and testing of materials and finished work, in carrying out trial areas of construction and other tests to ascertain Job-Mix Formulae as called for in the Specification, and in the reinstatement of sampling and testing holes, shall be deemed to be included in the price and rates entered by the Contractor in the Bill of Quantities.



## **200 Site Clearance**

### **Scope of Section**

This section covers general site clearance, stripping of topsoil and removal of bushes and trees, structures and other obstructions.

### **201. Site Clearance**

#### **201.1 General**

No clearance of or alteration to any main service or apparatus shall be done unless specifically ordered by the Engineer.

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 Engineer.

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 Engineer.

The Engineer may give instructions that specific trees, stumps or objects shall not be removed during the site clearance operation.

#### **201.2 Clearing, except trees**

Where site clearance is required, the defined area shall be cleared.

Vegetation, perishable material and other debris shall be carted to spoil areas. Disposal by burning may be authorised by the Engineer provided no fire hazard would result.

#### **201.3 Removal of trees**

Trees outside the construction width but within the road reserve shall not be cut down without the prior approval of the Engineer.

Stumps and tree roots shall be grubbed up. All holes left by removal of stumps and roots shall be backfilled with approved material compacted to 92 % MDD (AASHTO T180) up to the existing ground level or up to the formation level if the area is in cut.

### **202. Topsoil Stripping**

Where shown on the Drawings or directed by the Engineer the Contractor shall remove topsoil. The depth of the topsoil shall be as directed by the Engineer.

The Contractor shall, prior to removal of topsoil, excavate trial holes of a depth sufficient to enable the Engineer to measure the depth of topsoil.

Topsoil shall be stripped, loaded, transported and deposited in stockpile areas.

Should the Contractor strip to depths greater than those instructed by the Engineer then the Contractor shall replace the material with fill material at the Contractor's expense.

**203. Removal of Structures, Fences and Obstructions**

When instructed by the Engineer, the Contractor shall demolish wholly or in part, remove and dispose of all buildings, foundations, underground chambers, pits, tanks, structures, fences and any other obstructions which have not been designated to remain. Prior to demolition the Contractor shall ensure that services have been disconnected to the satisfaction of the appropriate authorities and/or owner. All holes resulting from the removal of structures below ground shall be backfilled with approved material compacted to 92 % MDD (AASHTO 180) up to existing ground level or up to formation level if the area is in cut.

The Contractor shall carefully take down such buildings, structures, fences etc. and the components shall be dismantled, cleaned and stacked in separate heaps. All materials which, in the opinion of the Engineer, are not fit for re-use shall be removed from the site to spoil areas. All materials which are re-usable shall remain the property of the Employer and shall be preserved and protected by the Contractor until removed by the Employer or until the expiry of the Defects Liability Period or its equivalent.

**204. Protection of Fences, Trees, Hedges etc.**

All existing paths, fences, walls, hedges, trees, shrubs and other features which are not removed or otherwise dealt with, shall be protected from damage.

### **300 Earthworks, Quarries, Borrow Pit, Stockpiles and Spoil Areas**

#### **Scope of Section**

This section covers all excavation of cuttings including side drains and benches, the placing and compaction of hard and soft material for fill in embankments, ground compaction, the formation of the subgrade, excavation and rockfill to swamps, topsoiling and grassing.

#### **301. Definitions and Classifications**

- (a) 'Original Surface': means the surface of the ground before any work has been carried out.
- (b) 'Stripped ground level': means the surface of the ground after the completion of clearing operations, and removal of topsoil.
- (c) 'Formation level': means the level at the completion of earthworks for roadworks prior to the laying of the pavement and surface soiling. The earthworks immediately below formation level is known as the subgrade.
- (d) 'Unsuitable material' shall include the following: material from swamps, marshes and bogs, peat, logs, stumps, roots and other perishable or combustible material: surface soil and highly organic clay and silt: material having a liquid limit above 65 % or more than 80 % passing the 75 microns sieve to BS 410: such other material as the Engineer may decide.
- (e) 'Suitable material': shall exclude unsuitable material as defined previously, and shall comprise all other natural materials acceptable to the Engineer's Representative for use in the Works.
- (f) 'Selected Fill': shall be material having liquid limit below 30 % and not more than 30 % passing the 75 microns sieve to BS 410.
- (g) 'Topsoil': shall mean soil from the surface layers of ground with sufficient humus content to support vigorous plant growth.
- (h) 'Hard material': shall be material which cannot be ripped to an average depth of rip greater than 300 mm by a track type crawler tractor complying with the following:
  - (i) in good order complete with all equipment and accessories as supplied;
  - (ii) rated 300 BHP flywheel power or over;
  - (iii) an operating weight of not less than 37.2 tonnes;
  - (iv) equipped with a hydraulically operated single tine ripper compatible with the tractor used; and
  - (v) operated by a qualified operator in accordance with the manufacturer's recommendations and to the satisfaction of the Engineer.

Where it is impracticable to prove hard material by the above method then the quantity of hard material, if any, shall be determined by the Engineer.

Where excavation contains individual boulders of hard material greater than 0.3 m<sup>3</sup> each in volume then such boulders shall be classified as hard material.

Hard material shall not be placed within 600 mm of the formation level in embankments and shall be removed to a depth of 300 mm or as otherwise instructed by the Engineer below formation level in cuttings.

- (j) 'Soft Material': Soft material shall be all materials other than hard material, except for material within swamps.

### **302. Explosives and Blasting**

**302.1** The Contractor shall not use or bring onto the Site explosives of any kind without the prior consent in writing of the Engineer. The explosives shall be stored in a manner and quantities acceptable to the Engineer in magazines provided by the Contractor at suitable positions. The Contractor shall be responsible for the prevention of unauthorised issue or improper use of explosives brought on the Works, and shall employ only experienced and responsible men to handle explosives for the purpose of the Works.

**302.2** The shots shall be properly loaded, tamped and where necessary, the Contractor shall use heavy blasting nets. Blasting shall be restricted to such periods as the Engineer may agree to. If in the opinion of the Engineer, blasting would be dangerous to persons or property, or to any finished work, or is being carried on a reckless manner, he may prohibit it and require excavation by other means. Use of explosives by the Contractor in large blasts as in seams, drifts, shafts, pits or large holes is prohibited unless authorised in writing by the Engineer.

### **303. Preparation Prior to Forming Embankments**

**303.1** The Contractor shall excavate benches in natural ground having a side slope greater than 1 in 5 or as instructed by the Engineer. The existing slopes, after the removal of topsoil shall be benched in accordance with the Drawings prior to the construction of embankments. The material which is excavated to form benches shall either be taken to spoil or if suitable used as fill. The actual bench widths will be shown on the Drawings or instructed by the Engineer.

**303.2** The existing ground under embankments, and bench surfaces where appropriate, shall be compacted over the full width of construction to 92 % MDD (AASHTO T180) to a depth of 150 mm.

**303.3** Where the existing ground is unsuitable for receiving fill, the Contractor shall excavate to the depth instructed by the Engineer, remove the material to a spoil area and replace it with suitable material compacted as for embankment earthworks.

### **304. Construction of Embankments and Cuttings**

Material obtained from cuttings or from side borrows or borrow areas adjacent to the road shall be used to construct embankments.

- 304.1** The Contractor may, to suit his method of working, take suitable fill material obtained from cuttings to spoil provide he substitutes an equivalent quantity of suitable fill material from a borrow pit or other source. The Contractor shall be solely responsible for the acquisition of land for the spoil and borrow areas required in these circumstances and any additional costs due to the substitution over and above the cost of taking the material from cuttings or benches to fill shall be at the Contractor's expense.
- 304.2** Material for use in the 300 mm below formation level in both embankments and cuttings shall not contain particles larger than 50 mm, unless permitted by the Engineer. In addition the material shall have a CBR of not less than 3.5 % measured after a 4-day soak on a laboratory mix compacted to a dry density of 95 % MDD (AASHTO T180), a swell of less than 1 % and a Plasticity Index of less than 30 %. In situ material in the 300 mm below formation level in cutting that does not meet these requirements shall either be cut to spoil or if suitable placed in the embankment and replaced with materials from cuttings or borrow pits that does meet the requirements for soft material for use in the 300 mm below formation level.
- 304.3** Where materials of differing quality are available for placing in embankments the Engineer may instruct that certain materials should be excluded from the upper 300 mm of fill and he may instruct that certain materials should be set apart, or obtained from borrow pits, for use in these upper layers.
- 304.4** Soft material as filled shall be deposited in layers not exceeding 150 mm compacted depth unless, as a result of site compaction trials, the Contractor has satisfied the Engineer that his compaction plant is capable of consistently achieving the specified densities at a greater depth; in no case shall this depth exceed 250 mm. Each layer shall extend over the full width of the embankment.
- 304.5** Hard material used for fill shall be of maximum dimension 250 mm, and be deposited in horizontal layers not exceeding 400 mm loose depth and shall extend over the full width of the embankment except for any specified external cover to slopes. The material shall be spread and levelled by a crawler tractor weighing not less than 15 tonnes. Each layer shall consist of reasonably well graded rock and shall be blinded with smaller rock fragments and gravel so as to fill as many of the voids as possible before the next layer is placed. The top 600 mm of the earthworks below formation level shall be formed using soft material.
- 304.6** During the construction of embankments the Contractor shall control and direct constructional traffic uniformly over the full width. Fill material shall not be stockpiled on embankments without the express permission of the Engineer.
- 304.7** When constructing embankments up to bridges and up to and over culverts, the Contractor shall raise the embankment equally on each side of such structures and shall unless otherwise instructed by the Engineer carry out this work concurrently with the filling to the structure as is feasible without damaging the structure.

**305. Compaction of Earthworks**

**305.1** The moisture content of fill material, shall be adjusted immediately prior to compaction by either uniformly mixing in water or drying out the material such that the moisture content during compaction is within the range shown by field trials or laboratory tests to be suitable for obtaining the required densities.

**305.2** Each layer of material shall be compacted at a moisture content within the above limits to a dry density equal to at least the percentage of the Maximum Dry Density (MDD) specified below:

- (i) All fill material in embankments, except the 300 mm below formation: 92 % MDD (AASHTO T180)
- (ii) The 300 mm below formation in embankments: 95 % MDD (AASHTO T180)
- (iii) the 300 mm below formation in cutting under the carriageway and shoulders: 95 % MDD (AASHTO T180).

**305.3** Each layer of hard material used as fill in embankments shall be systematically compacted by at least 8 passes of a towed vibrating roller weighing not less than 5 tonnes dead weight or a grid roller weighing not less than 13 tonnes dead weight or other approved plant. During compaction the surface of the layer shall be watered as necessary to facilitate the filling of the voids with the blinding material.

**306. Spoil Material**

**306.1** Spoil material shall be material from cuttings which is surplus to that required for fill or unsuitable material from cuttings which the Engineer has instructed to be excluded from use as fill in embankments or below formation level in cuttings. It shall also include unsuitable material from underneath embankments.

**306.2** Spoil material shall be deposited in spoil areas located by the Contractor, subject to the approval of the Engineer. The Contractor shall give the Engineer at least 24 hours notice of his intention to commence placing spoil material at a particular location.

**307. Borrow Pits**

Fill material which is required in addition to that provided by the excavation or widening of cuttings shall be obtained from borrow pits provided and operated in accordance with Section 600 of this Specification.

**308. Proofrolling**

All subgrade and embankment layers, cuttings, benches and original ground shall be proofrolled with a loaded scraper or truck with a minimum axle load of 8 tonnes. Proofrolling shall be satisfactorily completed before the layer is submitted to the Engineer for approval and shall be carried out in the presence of the Engineer. All such proofrolling shall be at the Contractor's expense.

**309. Trimming of Slopes**

The slopes of cuttings and embankments shall be trimmed to uniform batters as shown on the Drawings or as instructed by the Engineer. Such trimming shall be completed before the commencement of sub-base construction.

Any rock or boulder appearing in the face of a cutting or embankment shall be trimmed back to within the tolerances specified and, in addition, any such rock or boulder which is unstable shall be completely removed and the resulting void filled with suitable material compacted to the same standard as the surrounding earthworks.

**310. Topsoiling and Grassing**

**310.1** Where specified or instructed by the Engineer, the Contractor shall provide protection to embankment slopes, cut faces, side drains, shoulders, guiding dams and spoil or borrow areas by topsoiling.

**310.2** The minimum compacted thickness of topsoil shall be 50 mm and the quality of the topsoil shall be to the approval of the Engineer. Light compaction shall be carried out to the approval of the Engineer.

**311. Subgrade Surface Tolerances**

The level tolerance on the surface shall be - 35 to +10 mm

**312. Borrow Pits, Stockpiles, Spoil Areas**

**312.1** It is the responsibility of the Contractor to identify and to select the sources of aggregate for concrete and lean concrete, stone for bases, subbases, bituminous mix bases, binder course and wearing courses, chippings for surface dressings and rockfill for swamps. Such sources shall be designated as quarries or as borrow pits for the sources of natural materials such as fill materials for the construction of embankments, and gravel for sub-base, base, surfacing and shoulders. Such potential quarry or borrow pit sites as may have been identified prior to commencement of the Contract and were available for inspection at the time of Tender will also be the responsibility of the Contractor should he elect to use them.

**312.2** Additional borrow pits or quarries shall be identified and located by the Contractor during the Contract. Stockpile and spoil areas shall be located by the Contractor subject to the approval of the Engineer.

**313. Entry Upon Land**

**313.1** The Contractor shall, before entering upon any land provided by the Employer, satisfy himself that legal rights of entry have been obtained.

**313.2** Where it is necessary to agree levels for the calculation of quantities, the Contractor shall not enter the area until such levels have been agreed and the Engineer's approval obtained.

**314. Access Roads**

The Contractor shall provide the construction and maintenance of access roads to quarries, borrow pits, spoil and stockpile areas and for traffic operations.

**315. Site Clearance**

**315.1** Unless otherwise directed by the Engineer the Contractor shall remove topsoil and/or overburden from quarries, borrow pits, spoil and stockpile areas. The Engineer shall direct whether topsoil shall be stripped and stockpiled separately or shall be excavated and taken to spoil areas together with overburden. The Engineer may direct that suitable overburden be used in the Works.

**315.2** On completion of work in any quarry, borrow pit, spoil or stockpile area the overburden and/or topsoil which has not been used in the Works shall be pushed back, spread and landscaped over the area of the quarry, borrow pit, spoil or stockpile area. Where topsoil has been stockpiled separately it shall be pushed back and spread over the quarry, borrow pit, spoil or stockpile area after landscaping.



## **400 Passage of Traffic**

### **Scope of Section**

This Section covers the provisions that the Contractor must make to facilitate the safe and convenient movement of public traffic through the Works.

#### **401. Summary of Provisions**

- (a) Where public traffic using an existing road is affected by construction of the new road, the Contractor shall carry out one or more of the following:
  - (i) Effect improvements to and maintain existing roads.
  - (ii) Construct and maintain deviations.
  - (iii) Pass traffic through or over the Works.
- (b) The Contractor shall provide and maintain temporary signs, barriers, lights etc. along deviations and existing roads adjacent to the Works in order to ensure the safe passage of traffic during the Contract.
- (c) The Contractor shall provide adequate notice of the implementation of deviations etc. and shall ensure efficient and safe passage of traffic at all times.
- (d) The Contractor shall be required to provide and maintain all access and haul roads to ensure access to all parts of the Site for his plant, labour and materials.
- (e) The Contractor shall protect adjacent public roads from the effects of his own construction traffic.

#### **402. Construction of Deviations**

##### **402.1 General**

The length of a deviation shall be the shortest practicable route taking into account gradients and obstructions. Detailed alignment shall be agreed between the Engineer and the Contractor.

The Contractor shall give at least 1 month's notice in writing of his intention to commence construction of any deviation. Such notice shall include details of cross-covers, one-way traffic operations, restricted widths, culverts, drainage, drifts, bridges, earthworks, signs, barriers, lights, traffic lights, and methods of operation of the entire system. Upon approval of such notice in writing from the Engineer the Contractor shall become responsible for the passage of traffic including maintenance of the deviation and the project road in that section.

##### **402.2 Geometry**

Single-lane traffic operation shall not be permitted unless in the opinion of the Engineer, it is impracticable to provide a two-lane deviation. A single-lane carriageway shall not be less than 4.0 m wide with traffic control and passing bays provided at approximately 250 metre intervals.

### **402.3 Drainage and Drifts**

Temporary bridges shall be constructed by the Contractor if an existing bridge is inadequate and cannot be strengthened or if a drift would not be practicable.

### **402.4 Reinstatement of Deviation**

The Contractor shall reinstate the deviation to a condition similar to the condition prevailing prior to the commencement of construction of the deviation. Where the deviation is on private land the Contractor may obtain a written statement, signed by the landowners, requesting that the deviation be left unreinstated in lieu of reinstating the deviation. Where the deviation is within the road reserve or on other land owned by the Government the Contractor shall reinstate the deviation to a condition prevailing prior to the commencement of construction of the deviation, or such lesser reinstatement as may be agreed by the Engineer.

### **403. Maintenance of Deviations**

The Contractor shall maintain the deviations until the adjacent section of new road is opened to public traffic..

### **404. Passage of Traffic Through**

**404.1** Where traffic is to be passed through or across the Works the Contractor shall so order his work in half widths or in short lengths, so as to pass traffic over or across his work or in short lengths, so as to pass traffic over or across his work.

**404.2** The frequency and duration of delays to traffic while being passed through or across the Works, shall be kept to a minimum and shall not exceed 30 minutes without the prior agreement of the Engineer and should normally be less than 5 minutes. Any method of working, which requires a road closure in excess of 30 minutes shall require 48 hours prior notice to, and the agreement of, the Engineer, who may refuse to allow such closure in default of due notice or may require rescheduling of the closure.

**404.3** The Contractor shall ensure, when passing traffic through the Works, that all excavations and other hazards are properly protected with barriers and are illuminated at night.

### **405. Signs, Barriers and Lights**

**405.1** The Contractor shall provide, erect and maintain temporary signs, barriers, lights, traffic lights etc. along existing roads and along deviations.

**405.2** The number, type and siting of these signs etc. shall be as directed by the Engineer.

**405.3** The construction of all informatory signs, warning signs, mandatory signs and priority signs used for temporary signing shall comply with the requirements of the Turkmenistan Traffic Law.

**405.4** Where one-way traffic operation is necessary the Contractor shall provide, maintain and operate traffic lights. The use of 'Stop' and 'Go' boards provided, maintained and operated by the Contractor shall be permitted during day light in lieu of traffic lights. Traffic lights shall be used at all other hours.

**406. Assistance to Public**

The Contractor shall render such assistance to the public as shall be necessary to allow safe and convenient passage of traffic at all times.

**407. Contractor's Construction Traffic**

**407.1 Use of new road or road under construction**

The Contractor will not be permitted to use completed sections of the road or deviation or any completed pavement or surfacing layer for hauling earthworks, pavement or other materials with earthwork plant or vehicles having axle loads exceeding the legal limit. Furthermore, the use of completed sections of the road or completed pavement layers will be restricted if, in the opinion of the Engineer, damage to structures, subgrade, the formation, pavement or surfacing could ensue.

**407.2** The Contractor shall allow the Engineer to carry out check axle weighings on his vehicles and shall observe any instructions given by the Engineer with regard to reduced loadings should this prove necessary.

## **500 Pavements**

### **501. General Requirements**

**501.1** Prior to the construction of each pavement layer the previously prepared formation or layer shall be thoroughly cleaned of all foreign substances. Any ruts or soft spots which occur or any deviation from the specified tolerances or degree of compaction shall be corrected by scarifying, removing and/or adding approved material, relaying and recompacting the unsatisfactory areas to the required density and to the required lines and levels. Should any damage occur to the formation or a pavement layer prior to the construction of the next layer, it shall be rectified to the satisfaction of the Engineer at the expense of the Contractor.

Before the commencement of pavement construction, all subgrade drainage, open ditches, culverts or other special works shall be completed.

### **501.2 Alignment and Level Control**

Survey shall be provided and maintained by the Contractor in order that the Works will conform to the lines and levels shown on the drawings. Stakes, boards and boning rods shall be painted red and white in such a manner as to indicate clearly the lines and levels to be worked for each layer of pavement.

Before commencement of work on any section, the Contractor shall obtain the approval of the Engineer to the type of construction, alignment and levels of all such stakes, boards and boning rods.

### **501.3 Thickness and Surface Tolerances**

The thickness of each pavement layer shall be such that the depths from the required finished surface levels of the pavement to the surface of each pavement layer shall nowhere be less than the depths shown on the drawings. The surface of each layer other than the final layer may be lower than the required surface within the tolerances stated below, provided that any such deficiency shall be made good at the Contractor's expense by increasing the thickness of the course above the surface in question.

Each layer of pavement shall be finished to a surface profile parallel to the finished surface of the pavement shown on the drawings within the level tolerances shown below.

<b>Layer</b>	<b>Level Tolerance</b>	<b>Smoothness Tolerance</b>
	<b>mm</b>	<b>Maximum Depression under a 3 m straight edge</b>
		<b>mm</b>
Subbase Course	+ 0 to - 35	25
Base course	+ 0 to - 35	25
Binder layer	+ 0 - - 10	7
Surface layer	+ 5 to - 5	3

The above tolerances apply on straight profiles.

Equivalent tolerances shall apply on vertical curves.

#### **501.4 Thickness of Pavement Layers**

The thickness of the surface layer and binder layer together shall not be less than that shown on the drawings at any point. The thickness of other pavement layers may be less than that shown on the drawings provided that the level tolerances are met and the total thickness of the pavement is not deficient.

#### **501.5 Rectification of Surfaces out of Tolerances**

Areas of subbase course and base course which are too high may be cut down to the correct level provided that the surface can be regulated and compacted so that all the requirements of the Specifications are met. Otherwise they shall be cut out to the full depth of the layer and replaced. Areas of base course, which are too low may be levelled up with specified material or they may be left for filling with the next layer provided that the depression does not exceed the smoothness tolerance stated. Otherwise, areas which are too low shall be cut out to the full depth of the layer and replaced.

Areas of binder layer and surface layer (wearing course) which do not comply with the specified thickness, level and smoothness tolerances shall be cut out to the full depth of the layer and replaced.

#### **501.6 Junctions between Stages of Construction**

At junctions between stages of construction each complete layer of pavement structure shall be stepped back from the layer under. Each step shall have a width of at least 1.00 m.

#### **501.7 Construction Joints**

Construction joints in the bituminous pavement layers shall be staggered by at least the following distances:

- |  |        |
|--|--------|
| (a) Joints in binder layer relative to joints in surface layer (wearing course)                | 500 mm |
| (b) Joints in bituminous base course and compensation layer relative to joints in binder layer | 300 mm |

The Contractor shall produce a plan showing the position of all pavement construction joints for approval before pavement construction commences.

#### **501.8 Damage to Pavements**

All pavement layers shall be properly protected against the risk of damage by water, slips, falls, subsidence and floods from whatever cause. Any completed pavement layer which suffers damage shall be removed and replaced to the satisfaction of the Engineer and in accordance with the requirements of the Specification.

The sites of all pavement works shall, before work is commenced and throughout its execution, be drained of rain and subsoil water by means of temporary ditches, rubble and other drains or pumping.

The cost of complying with the requirements of this Clause shall be included in the rates entered in the Bills of Quantities for pavement items.

#### **501.9 Trial Construction**

Before commencing the construction of any pavement layer the Contractor shall carry out a trial for each of the layers concerned. These trials shall consist of the construction of areas of each pavement layer to the thickness shown on the drawings. A trial area shall be constructed for each pavement type (i.e. all the layers comprising each type) forming part of the permanent works. Each pavement trial shall be at least the full width of carriageway and 30 metres long. The location of the trial areas shall be agreed with the Engineer before their construction.

The Contractor shall prepare and test the formation in the trial areas in accordance with the Specification and when it is approved shall prepare, lay and compact each pavement layer in sequence as specified according to the thickness shown on the drawings so as to form a trial area for each type of pavement. Each pavement layer shall be subject to control testing by the Contractor and by the Engineer and shall be approved by the Engineer before the construction of the subsequent layer commences.

The plant, materials and methods used are to be those which will be used in the permanent works. The construction operations and compaction methods are to be varied so as to identify the optimum procedures which will satisfy the requirements of the Specification.

The test will be intended as non-destructive and will generally be made at the surface existing at the time of test, but some damage may occur and some tests may be made after excavation below the surface.

The construction of pavement layers forming part of the permanent works may commence only when trial construction of the layers concerned has been carried out to the satisfaction of and approval by the Engineer. The Contractor shall include in the rates entered in the Bills of Quantities for pavement items the costs of areas of trial construction for testing and for any delays or disruption which may arise therefrom.

#### **501.10 Aggregate Storage**

Aggregates shall be stored in single sizes in separate bins or on areas covered with tightly laid wood planks, sheet metal, hard compact gravel, concrete or other hard and clean surfaces; which surface shall be self draining and in such a manner that will preclude the inclusion of foreign material. Aggregates of different grades and sizes and from different sources shall be stored in separate piles, and if these piles are close together they shall be separated by bulkheads.

#### **501.11 Inspection of Plant and Equipment**

The Engineer shall have access at all time to all parts of any plant or equipment in use, for checking its adequacy and operation, and verification of weights, proportions, temperatures and any other characteristics relevant to the clauses of the Specification.

#### **501.12 Construction Control Testing**

Each layer of pavement shall be subject to construction control testing as described below. Each pavement layer must be tested by the Contractor to demonstrate

compliance with the requirements of the Specifications and the Standards. Only when test results demonstrate such compliance, shall the Contractor submit the layer for approval. The submission shall be made in writing, shall define the boundaries of the area of the layer for which approval is sought and shall be accompanied by the relevant control test results. Upon receipt of each submission, the Engineer may without unreasonable delay carry out such further testing and inspection as he considers necessary and shall thereafter either approve or reject the area and layer concerned. If the area and layer are rejected, the Engineer will give reason in writing.

Work on subsequent layers of pavement may not commence until the preceding layer has been approved in writing by the Engineer. The Contractor shall at his own expense remove any material deposited contrary to this requirement.

The Contractor is wholly responsible for protecting and maintaining the condition of the work submitted for approval and shall at his own expense remove or reconstruct as the Engineer directs any material which may have deteriorated before the subsequent layer has been completed and approved.

The costs of any disturbances or delays due to construction control testing procedures shall be deemed to be included in the rates entered in the Bill of Quantities for pavement items.

## **502. Natural Material Sub-base and Capping Layer**

### ***Scope of Section***

This Section cover the provision, laying and compacting of natural gravel material for sub-base and capping layer.

### **502.1 Definitions**

#### ***Natural Materials***

The term 'natural material' includes lateritic gravel, quartzitic gravel, calcareous gravel, soft stone, conglomerate, sand or clayey sand or a combination of any of these materials. A natural material is also referred to as 'gravel'.

Natural material shall be material which can be extracted from a borrow area or a road cutting by ripping to a depth of 300 mm with a single tine hydraulic ripper acceptable to the Engineer drawn by a track type crawler tractor in good order complete with all equipment and accessories as supplied and rated at 300 BHP flywheel power and over with an operating weight of not less than 37.2 tonne and being operated in accordance with the manufacturer's recommendations.

The material may require the use of either a grid or sheepsfoot roller with more than 8000 kg mass per metre width of roll to break it down and/or screening to achieve the specified grading.

Natural material for sub-base and capping layer may be obtained from any of the existing or new gravel pits.

## 502.2 Material Requirements

The grading and other requirements after placing and compaction of the materials shall conform to the following tables:

Table 502.1

Plasticity characteristics for granular sub-base		
Liquid Limit	Plasticity Index	Linear Shrinkage
< 45	< 12	< 6

Table 502.2

Typical particle size distribution for sub-bases	
BS Sieve size (mm)	Percentage by mass of total aggregate passing test sieve
50	100
37.5	80 - 100
20	60 - 100
5	30 - 100
1.18	17 - 75
0.3	9 - 50
0.075	5 - 25

Table 502.3

Embankment Heights and CBR Values	
Embankment Height (m)	Required CBR Value
< 1.0	> 30 % dry
> 1.0	> 30 % soaked (4 days)

503. In sections of road reconstruction the existing base course material shall be considered downgraded as subbase material. The material so considered subbase shall be tested for the requirements set out in tables 502.1 through 502.3. Where the requirements are not met in quality or in thickness, additional subbase material shall be added to provide the quality and thickness specified.

504. The existing bituminous pavement made from cold asphalt and gravel shall be milled and sieved to grading for re-use in the subbase material or in the shoulder. The existing bituminous pavement material does not conform to any given grading, but consists locally of larger gravels and finer material.

### 505. Selected Subgrade Material and Capping Layers

These materials are specified to provide sufficient cover on weak subgrades. A minimum CBR of 15 per cent is specified at the highest anticipated moisture content measured on samples compacted in the laboratory at the specified field of 95 per cent of the maximum dry density in the British Standard (Heavy) Compaction Test, 4.5 kg rammer. The built-in thickness is 400 mm in areas susceptible to increased moisture content where the height of the dam is less than 1.00 m.



## **506. Bituminous Pavement**

### **506.1 Bituminous Prime Coat**

#### ***Materials***

Bituminous materials to be used shall be as specified below or similar approved.

Prime coat: RC 30

### **506.2 Construction and Equipment Requirements**

#### **(a) Application of bituminous spray treatments**

##### **(i) Prime Coat**

The exact quantities to be applied may be varied to suit field conditions and will be proposed by the Contractor from trials for the approval of the Engineer.

A prime coat shall be applied over the full width of the surface of the subbase to receive the bituminous rolled asphalt roadbase.

##### **(b) Weather Limitation**

Bituminous spray treatments shall not be carried out during rain. They shall only be applied when the surface is dry or contains moisture not in excess of that which will permit uniform distribution and the desired penetration.

##### **(c) Preparation of Surface**

Immediately before applying the prime coat, all loose material, dirt or other objectionable material shall be removed from the surface to be treated by power brooms and/or blowers, supplemented by hand brooms if necessary. If the surface to receive prime coat is excessively dry and/or dusty so that the bituminous material freckles, it shall be lightly and uniformly sprinkled with water immediately in advance of priming, but bituminous material shall not be applied until all free surface water has disappeared.

##### **(d) Equipment**

All equipment, tools and machines used in the performance of the work shall be subject to the approval of the Engineer and shall be maintained in satisfactory working condition at all times.

(i) The distributor for the bituminous material shall be selfpropelled, pneumatic tyred and have sufficient power to maintain uniform speeds for proper application of bitumen. It shall be so designed and equipped as to distribute the bituminous material uniformly on variable widths of surface at readily determined and controlled rates within the ranges specified. The distributor shall be equipped with an accurate tachometer showing the driver the speed in metres per minute. The distributor tank shall have an appropriate capacity and shall be fitted with a device for indicating the quantity in the tank at any time. It shall be equipped with heaters capable of maintaining appropriate spraying temperatures and fitted with an accurate thermometer. The circulation system shall permit of pumping around the tank and around the spray bar without actually spraying. Spray bars shall be available for spraying in varying width. The spray nozzles shall be arranged

to give a uniform spray and the shut-off shall be quick acting with an antidrip device.

The distributor shall also be fitted with hand spraying equipment. Distributors shall be fitted with an accurate metering device. The truck shall be fitted with a gauge bar and chain clearly visible to the driver to enable him to follow the required edge. The spray bar shall be adjustable transversely so that the operator can follow the required edge independently.

- (ii) Brooms and blowers shall be of the power type, and shall be suitable for cleaning the surface to which the prime coat is to be applied.

(e) Method of Application

Immediately following completion of the preparation of the surface, the bituminous material shall be applied by means of the pressure distributor at the appropriate temperature for the type of bituminous material, the type of spraying nozzle and the rate of application.

The material shall be applied so that uniform distribution is obtained at all points of the surface. The distributor shall be equipped so as to obtain satisfactory results at the junction of previous and subsequent applications.

(f) Curing and Maintenance

Following the application of prime material, the surface shall be allowed to cure to evaporate the volatiles. In the case of the prime coat curing shall be not less than 48 hours without being disturbed, or for such additional period of time as may be necessary to allow the bitumen to penetrate.

The treated surface shall be maintained in satisfactory condition until the layer of pavement has been placed. During this interval, no traffic will be permitted on the treated areas and the Contractor shall protect the surface against damage and shall repair all defects.

### **506.3 Cleaning of Asphalt Pavement Surface**

- (a) The existing surfaces shall be cleaned off every foreign substances or matter, including bitumen or bituminous or non-bituminous joint sealant material, rubber, oils, fuels, markings and loose particles. The Contractor is free to employ mechanical brooms, jet-water devices, sand-blasting or surfaces milling. The method employed must be suitable to prepare and achieve a surface ready for application of tack coat.

### **506.4 Removal of loose and/or Deteriorated Material on Existing Surfaces**

- (a) Where the existing surfaces are loose or deteriorated partly or fully, milling of the loose or deteriorated part shall be carried out, subject to approval by the Engineer. Such areas shall be inspected and repaired prior to preparing the area for overlay. The surface shall be reinstated by asphaltic concrete, under items for surface repairs.

#### **506.5 Milling to Existing Surfaces in Adaptation Areas**

- (a) For preparation of the asphalt overlay at end areas or to the sides of the road milling shall be carried out as shown on the drawings to allow laying of asphalt in the minimum thickness and flush to road shoulders. The milling method shall include preparation and achievement of the surface ready for application of the tack coat.

#### **506.6 Mixture**

The bituminous layers to be used are mixtures of dried hot aggregate and hot straight run bitumen.

#### **506.7 Aggregate**

Aggregates for premixed bituminous layers shall be obtained from approved sources and consist of hard, tough, heavy, compact, approved broken rock, screened, graded as specified hereafter and free of faulty, flaky, elongated, soft or decomposed pieces, excess of dust and any dirt, acids or other deleterious substances.

In addition to the general requirements, the aggregate shall have an Aggregate Crushing Value not exceeding 25 %, a Los Angeles Abrasion test value of not more than 30 % and a Sodium Sulphate Soundness loss of not greater than 12 % after 5 cycles. The Flakiness Index of the aggregate shall not be greater than 20 %. The bitumen affinity of the stone should be good and the bitumen retention shall be at least 75 % when tested for stripping.

The aggregates shall conform to German Standard DIN No. 52 101 to 52 103.

#### **506.8 Filler**

Filler is to be either Portland cement or limestone powder/dust.

#### **506.9 Bitumen**

Bitumen B 65 shall be used.

Bitumen is to be as specified in DIN 1995 from which the values below have been extracted:

Ser. No.	Property	Grade B 45	Testing in accordance with
1	Needle penetration 100 g, 5 s, 25°C, 0.1 mm	50 - 70	DIN 52 010
2	Softening point and ball °C	49.0 - 54.0	DIN 52 011
3	Breaking point according to Fraaß max. °C	- 8	DIN 52 012
4	Ash content max. %	0.50	DIN 52 005
5	Paraffin max. %	2.0	DIN 52 015
6	Density at 25 °C min. g/cm <sup>3</sup>	1,000	DIN 52 004
7	Increase in softening point, ring and ball by thermic action max. °C	6.5	DIN 52 016 DIN 52 011
8	Deduction of needle penetration by thermic action max. %	40	DIN 52 016 DIN 52 010

#### 506.10 Design of Mixtures

The Contractor is to design the mixtures in the limits laid down in the following schedules:

Bituminous Asphalt Concrete	Binder 0/22 mm	Surface Course 0/11 mm
Aggregates		
Crushed Stone		
Crushed Sand		
Natural Sand		
Fines		
Gradation		
Size < 0.09 mm Weight %	3 - 9	6 - 10
Size > 2 mm Weight %	65 - 80	50 - 60
Size > 8 mm Weight %	--	15 - 30
Size > 11.2 mm Weight %	--	≤ 10
Size > 16 mm Weight %	≥ 20	--
Size > 22.4 mm Weight %	≤ 10	--
Crushed Sand/Natural Sand	≥ 1 : 1	≥ 1 : 1
Bitumen Content Weight %	3.8 - 5.5	5.9 - 7.2

#### 506.11 Job Mix

As soon as possible after commencement of aggregate production and well in advance of commencing bituminous work, the contractor shall carry out Marshall tests on trial mixes within the Specification limits and he shall submit the results to the Engineer together with his proposals for the precise proportions of stone, bitumen and filler to be used. The Engineer shall then either approve the proposals or adjust the quantities to be used.

The Contractor shall likewise propose and the Engineer approve or adjust the temperatures of stone and bitumen for mixing. In the event of any difficulty arising in fulfilling the Specification requirements, the Engineer shall have power to amend the aggregate grading limits. The precise proportions of bitumen and filler, and the aggregate grading, all approved or adjusted by the Engineer, shall constitute the Job-Mix Formula.

The Engineer's approval or adjustments on the Job-Mix Formula shall not relieve the Contractor of any responsibility to comply with the Specification requirements. The Engineer's approval of both the mix and the finished work will depend on fulfilment of all Specification requirements as evidenced by tests carried out by both the Engineer and the Contractor.

## **506.12 Mixing Plant**

The mixing plant shall be designed, co-ordinated and operated so as to produce mixtures within the Job-Mix Formula, and shall have a capacity required to complete the works in the periods specified. The plant shall be a weigh-batch type or a volumetric-proportioning continuous-mixing type, provided the equipment has demonstrated that it is suitable for producing finished mixtures complying with the Job-Mix Formula specified above. Any plant used shall conform to all the requirements specified in paragraph A below, and, in addition, any batch mixing plants and continuous mixing plants shall conform to the special requirements specified in paragraphs B or C below, whichever is applicable.

### **(a) Requirements for all Plants**

#### **(i) Equipment for Preparation of Bitumen:**

Tanks for storage of bitumen shall be capable of heating the material under effective and positive control at all times to the temperature requirements specified.

Heating shall be accomplished by steam-coils, electricity, or other means that will allow no direct flame to come in contact with the heating tank. The circulating system for the bitumen shall be of adequate size to ensure proper and continuous circulation between storage tank and mixer during the entire operating period. All pipelines and fittings shall be steam-jacketed or otherwise properly insulated to prevent heat loss. The storage tank capacity shall be sufficient for at least a 24 hours run.

#### **(ii) Feeder for Dryer:**

The plant shall be provided either with cold stone bins or with a reclaiming tunnel under the separate stockpiles for uniformly feeding the aggregate into the dryer so that uniform production and uniform temperature will be secured. Where bins are used they shall be at least three in number and of sufficient size to store the amount of aggregate required for continuous operation. Each bin, or each stockpile opening above the reclaiming tunnel, shall be provided with an adjustable mechanical feeder capable of delivering a uniform and continuous flow of the aggregate at the desired rate.

(iii) Dryer:

A rotary dryer of any satisfactory design for drying and heating the aggregate shall be provided. The dryer shall be capable of drying and heating the aggregate to the specified temperature requirements.

(iv) Screens:

Plant screens capable of screening all heated aggregates to the required sizes and proportions, and having normal capacities in excess of the full capacity of the mixer, shall be provided.

(v) Hot Bins:

The plant shall include at least three storage bins for heated aggregate of sufficient capacity to supply the mixer when it is operating at full capacity. The bins shall be arranged to ensure separate and adequate storage of appropriate fractions of the aggregates. Each bin shall be provided with an overflow pipe of such size and at such location as to prevent any backing up of the material into other bins. Adequate dry storage shall be provided for the filler and provision shall be made for accurately weighing or proportioning it to the mixtures.

(vi) Bitumen Control Unit:

Satisfactory means shall be provided to obtain the proper amount of bitumen in the mix within the tolerances specified by the Job-Mix Formula, either by weighing, metering or volumetric measurements. Suitable means shall be provided, either by steam-jacketing or other methods of insulation, for maintaining the specified temperature of the bitumen in the pipelines, meters, weigh-buckets, spray bars, and other containers or flow lines.

(vii) Thermometric Equipment:

An armoured thermometer with a range of 95°C to 210°C shall be fixed in the bitumen feed line at a suitable location near the discharge valve at the mixer unit. The plant shall be further equipped with an approved dial-scale mercury-actuated thermometer, an electric pyrometer or other approved thermometric instrument, so placed at the discharge chute of the dryer as to indicate the temperature of the heated aggregate.

(viii) Control of Mixing Time:

The plant shall be equipped with positive means to govern the time of mixing and to maintain it constant. The time of mixing refers to the interval between the time the bitumen is spread on the aggregate and the time the same aggregate leaves the mixing unit, for continuous mixing plants, and the total of dry and wet mixing time for batch plants.

(ix) Dust Collectors:

The plant shall be equipped with effective dust collectors. Provision shall be made to waste the material so collected or to return it uniformly to the mixture, as directed by the Engineer.

(x) Safety Requirements:

Adequate and safe stairways to the mixer platform and sampling points should be provided and guarded ladders to other plant units shall be placed

at all points where accessibility to plant is required. Accessibility to the top of truck bodies shall be provided by a suitable device to enable sampling to be undertaken. Means shall be provided to raise and lower scale calibration, sampling and other similar equipment between the ground and mixer platform. All gears, pulleys, chains, sprockets and other dangerous moving parts shall be thoroughly guarded. Ample and unobstructed passage shall be maintained at all times in and around the truck loading area. All equipment and exposed high temperature lines, so located as to endanger personnel or create a fire hazard, shall be properly guarded or suitable insulated.

(b) Special Requirements for Batch Mixing Plants

(i) Plant Scales:

Scales for any weigh-box or hopper shall be of standard make and design, either of the beam or springless dial type, sensitive to 0.5 % of the maximum load that may be required. When of the beam type, there shall be a separate beam for each size of aggregate with a single telltale actuated by each separate beam, and a tare beam for balancing the hopper. Standard test weights shall be provided for checking the accuracy of the plant scales.

(ii) Weigh-Box:

The equipment shall include means for accurately weighing each size of aggregate in a weigh-box suspended on scales, ample in size to hold a full batch without hand raking or running over. The weigh-box shall be supported on fulcrums and knife edges so constructed that they will not be easily thrown out of alignment or adjustment. The gates on both the bins and the weigh-box shall be so constructed as to prevent leakage of aggregate when closed.

(iii) Bitumen Bucket:

A bitumen bucket shall be used for weighing the bitumen. It shall have sufficient capacity to hold less than 15 % of the rated capacity of the mixer. It shall be steam-jacketed or equipped with properly insulated electric heating units, and shall be suspended on dial or beam scales equipped with a telltale so that the weight of the bucket will be shown for each weighting and the net weight of bitumen measured accurately to within 1 % above or below the weight required. The bucket shall be so arranged that the heated bitumen will be delivered in a thin, uniform sheet or in multiple streams over the full width of the mixer, except in the case of a mixer where the bitumen is sprayed.

An accurate flow meter may be substituted for a bitumen bucket subject to performance checks which satisfy the Engineer.

(iv) Mixer Unit for Batch Method:

The plant shall include a batch mixer of an approved steam-jacket, twin-pugmill type and shall be capable of producing a completely uniform mixture. The batch capacity of the mixer shall not be less than 1 tonne. The mixer shall have an accurate time lock to control the operation of the complete mixing cycle by locking the weigh-box gate after charging the mixer, until the closing of the mixer gate at the completion of the cycle. The time lock shall lock the bitumen bucket throughout the dry-mixing period

and shall lock the mixer gate throughout the dry and wet mixing periods. The dry-mixing period is defined as the interval of time between the opening of the weigh-box gate and the application of the bitumen; the wet-mixing period is the interval between the application of the bitumen and the opening of the mixer gate. The control of the timing shall be flexible and capable of being varied at intervals of not more than 5 seconds throughout cycles up to 3 minutes.

A mechanical batch counter shall be installed as part to register only the actuation of the bitumen bucket release and to preclude the register of any dry batches or the register of any material through the operation of pulling bins. If not enclosed, the mixer box shall be equipped with an adjustable hood to prevent loss of fine material by dispersion. The clearance of the blades from all fixed parts shall not exceed 20 mm.

(c) Special Requirements for Continuous Mixing Plants

(i) Gradation Control Unit:

The plant shall include a means for accurately proportioning each bin size of aggregate either by weighing or by volumetric measurement. When gradation control is by volumen, the unit shall include a feeder mounted under the compartment bins. Each bin shall have an accurately controlled individual gate to an orifice for volumetrically measuring the material drawn from each respective bin compartment. The orifice shall be rectangular approximately 200 mm by 230 mm with one dimension made adjustable by positive mechanical means provided with a lock.

Indicators shall be provided on each gate to shown the gate opening in millimetres.

(ii) Weight Calibration of Aggregate Feed:

The plant shall include a means for calibration of gate openings by means of weight test samples. The materials fed out of the bins through the individual orifices shall be by-passed to a suitable test box. Material from each compartment shall be confined to a separate box section. The plant shall be equipped to handle conveniently such test samples weighing up to 400 kg and to weigh them on accurate platform scales. Mechanical means shall be provided to accurately proportion the filler to the mixing unit.

(iii) Synchronisation of Aggregate and Bitumen Feed:

Satisfactory means shall be provided to afford positive interlocking control between the flow of aggregate from the bins and the flow of bitumen from the meter or other proportioning device in order to ensure the accurate and uniform proportioning of bitumen. This control shall be accomplished by interlocking mechanical means or any positive method subject to approval by the Engineer.

(iv) Mixer Unit for Continuous Method:

The plant shall include a continuous-mixer of an approved, steam-jacketed, twin-pugmill type and shall be capable of producing a completely uniform mixture. The paddles shall be of a type adjustable for angular position on the shafts and reversible to retard the flow of the mix. The mixer shall carry a manufacturer's plate giving the net volumetric contents of the mixer at the several heights inscribed on a permanent gauge and also giving the rate of



feed of aggregate per minute at plant operating speed. Unless otherwise required, mixing time shall be determined by the following formula:

$$\begin{array}{l} \text{Mixing time} \\ \text{in seconds} \end{array} = \frac{\text{Pugmill dead capacity in kg}}{\text{Pugmill output in kg per second}}$$

### 506.13 Equipment

All equipment, tools and machines used in the performance of the work covered by this section of the Specification shall be subject to the approval of the Engineer, and shall be maintained in satisfactory working condition at all times.

- a) **Mechanical Spreaders & Finishers:** The spreaders and finishers shall be self-propelled, equipped with hopper, distributing screws and a heated adjustable screed on a frame supported at once end within the wheel-base or track length and arranged to reduce the effect of an uneven surface.

They shall be capable of adjusting and laying to the required width and profile without causing segregation, dragging, burning, irregularities or other surface defects, and of being operated at a speed consistent with a character of the mix and the thickness of the course being laid, so as to produce a surface having a uniform density and surface texture.

They shall be capable of using elevation guidance from laser beam and/or elevation wire, and shall be capable for setting the required transverse slope.

- b) **Power Rollers:** The roller to be used for commencing compaction shall be a 6 - 8 tonnes or 8 -10 tonnes tandem roller with a variable drive roll pressure and a multi-wheel pneumatic tyred roller with tyres capable of being inflated to a pressure of at least 0.7 n/mm<sup>2</sup>. The roller to be used for completing compaction shall be a 10 - 12 tonnes tandem or three-wheel roller with a rear roller pressure variable up to at least 5 kg/mm of roller width.

Rollers shall be equipped with adjustable scrapers, water tanks, and sprinkling apparatus, which shall be used to keep the wheels wet for the purpose of preventing the bituminous mixture from sticking to the wheels. The roller shall be capable of reversing without backlash.

- c) **Power Blowers and Power Brooms:** Blowers and brooms shall be suitable for cleaning the surface to be paved.
- d) **Small Tools:** The small tools shall consist of rakes, shovels, tempers, pavement cutters, wood sandals and stilt sandals of standard type, and other small tools as may be required.

### 506.14 Weather Limitations

Bituminous pavement material shall not be mixed when the moisture content of the aggregate is such as to interfere with the uniformity of the mixing temperatures or with continuous plant operations. It shall not be laid when the underlying layer is damp, or when it has pools of water, or during rainfall or when the temperature of the underlying layer or ambient temperature is below 5°C.

### 506.15 Preparation of Surface

- a) Immediately before applying the surfacing the existing surface shall be in a condition in all ways complying with the requirements of the Specification and thoroughly, cleaned of all loose or foreign matter.

Where no asphalt grid is laid, the surface shall be tack-coated, just sufficiently in advance of the placement of the bituminous mixture so as to provide a thin adhesive film of bitumen to ensure a good-bond. The rate of spray of tack coat is 0.5 l/m<sup>2</sup> or as adjusted by the Engineer. Should it be necessary to apply a tack-coat a second time because the previous surface has become dusty or has lost its freshness through delay in laying surfacing on it, or through negligence, than the re-application of tack-coat shall be at the expense of the Contractor.

### 506.16 Mixing

Bituminous material shall be produced in an approved plant as specified.

- a) Preparation of Aggregate: Aggregate shall be furnished in several sizes. Each size and/or type of aggregate as delivered shall be stockpiled separately. Where cold feeder bins are used each aggregate size shall be placed in a separate bin. Aggregates shall be handled and transported between the crushing and screening plant and the stockpiles or cold-feed bins of the dryer and mixer, and between stockpiles and the dryer, by plant and methods which shall ensure that segregation does not occur, and that moisture content variations are not large enough to affect the uniformity of the temperature of heated aggregate at entry to the mixer. Aggregates shall not be permitted to roll down the slopes of stockpiles in either placing or feeding to the dryer. Stockpile layers of aggregate with moisture contents differing sufficiently to affect the uniformity of the temperature shall not be worked simultaneously. The mechanical feeders shall be adjusted to provide delivery of the desired proportions to the dryer. The aggregate shall be heated and thoroughly dried before entering the hot bins. The temperature of the aggregate, determined as it enters the mixer, shall be such that the temperature of the finished mixture will be within the range specified. The heated and dried aggregates shall be screened and conveyed to separate bins ready for mixing with the bitumen, and shall be separated into at least three sizes as designated or approved by the Engineer. Filler may be batched without heating.
- b) Preparation of Bituminous Mixtures: The aggregates without filler, prepared as specified above, shall be accurately weighed or measured, and conveyed into the mixer in the proportionate amounts of each aggregate size required to meet the Job-Mix Formula. The required amount of bitumen for each batch, or calibrated amount for continuous mixing, shall be introduced into the mixer. In batch mixing, the bitumen shall be added after the aggregates have been introduced into the mixer and mixed for 5 to 10 seconds. In both types of plant the filler shall be added after the bitumen, and mixing shall continue for at least a minute after addition of the filler, and as much longer as may be required to obtain a homogeneous mixture.

The temperature of the aggregate and bitumen at entry into the mixing chamber shall be chosen within the above limits stated in ZTV Asphalt StB 94 and having regard to the prevailing air temperature and haulage distance to ensure that the temperature of the mix is between not lower than 130°C for the binder and 140°C for the surface layer when it is laid. Thermometers reading between 120°C and 200°C shall be provided in the bitumen heating tank and for use in the mixing chamber or at its discharge point. Thermometers for observing air and surface temperatures between 0°C and 80°C and for observing mix temperatures between 100°C and 200°C shall be provided at each laying point.

The volume of the aggregate and bitumen shall not be so great as to extend above the tips of the mixer blades when the blades are in a vertical position. All overheated and carbonized mixtures, or mixtures which foam or show indication of moisture, will be rejected. When moisture is detected in the finished mixture, all aggregates in the bins shall be removed and returned to the stockpiles.

#### **506.17 Transportation**

The bituminous materials shall be transported from the mixing plant to the spreader in trucks having tight, clean, smooth beds and sides which have been treated to prevent adhesion of the mixture to the truck bodies. A thin film of soapy water or lubricating oil may be used to prevent adhesion but gasoline, kerosene or other solvents shall not be used for this purpose. Deliveries shall be made so that spreading and rolling of all the mixtures prepared for a day's run can be completed during the shift and artificial light approved by the Engineer shall be provided for night work. Any wet loads will be rejected. Hauling over freshly laid material will not be permitted.

#### **506.18 Placing**

Mixtures which have a temperature of less than 130°C for the binder and 140°C for the surface layer when dumped into the spreader will be rejected. The spreader shall be adjusted and the speed regulated so that the surface of the course will be smooth and of such depth that, when compacted, it will conform to the cross section shown on the drawings. Hand dressing or adjustment of the machine laid course will not be permitted without the express approval of the Engineer. Laying width shall be proposed by the Contractor for approval by the Engineer. The precise laying arrangements are to be submitted to and agreed by the Engineer before work commences. When forming a hot longitudinal joint the 150 mm strip along the edge against which additional material is to be laid shall not be rolled until such additional material is placed, except when the work is to be discontinued. After the first lane has been placed and rolled, the adjacent lane shall be placed while the unrolled 150 mm strip is hot and in readily compactable condition. Where work is discontinued rolling shall be carried to the edge of the laying width and cold joints shall be formed on a vertical edge cut 100 mm in from the edge of the rolled mix and thinly coated with hot bitumen prior to re-commencement. Initial rolling of the adjacent lane shall begin along the joint. Placing of the surfacing shall be as continuous as possible.

Only in areas where the use of machine spreading is impractical may the mixture be spread by hand and carefully dressed with rakes. If satisfactory results are not achieved, the Engineer may direct that the Job-Mix Formula be varied for these areas. The loads shall not be dumped any faster than can be properly handled by the shovellers and rakers. Contact surfaces of previous constructed concrete pavement, kerbs, manholes, and similar structures shall be painted with a thin coat of bitumen prior to placing the bituminous mixtures.

#### **506.19 Compaction**

The mix shall be rolled immediately after laying and before its temperature has fallen below 105°C by tandem and pneumatic rollers as specified and such rolling shall be continued only for so long as it is effective and does not have any detrimental effect. The above minimum rolling temperature may be lowered at the sole discretion of the Engineer if this is necessary to ensure the best results in this initial rolling. Compaction of the mix shall, if necessary, be continued by heavier rollers and it shall be completed by a tandem roller or three-wheel roller imposing at least 5 kg/mm of roller width. This further and final compaction shall be carried out when the temperature of the mix is low

enough to avoid any detrimental effect but still high for the rollers to work effectively and compact the mix to the density specified. Compaction of aircraft pavements shall include rolling by pneumatic tyred rollers with tyres inflated to 0.7 N/mm<sup>2</sup>. This rolling shall be carried out when the mix is at a temperature low enough to avoid displacement of the mix or over-compaction, but high enough to permit compaction with the kneading action of the tyres.

Final rolling shall be carried out parallel to the lanes and shall start at the extreme sides of the lanes and proceed towards the centre of the surfacing, overlapping on successive trips by one-third of the width of the rear wheel of the three-wheel roller. On superelevated curves, rolling shall begin at the low side and progress towards the high side. Alternate trips of the roller shall be of slightly different lengths. Tests for conformity with the smoothness specified shall be made by the Contractor immediately after initial compaction, and any deviations in excess of the specified tolerances shall be corrected. The speed of the rollers shall not exceed 5 km per hour and shall at all times be slow enough to avoid displacement of the hot mixture. Any displacement of the mixture occurring as the result of reversing the direction of the roller, or from any other cause, shall be corrected. Rolling of the surfacing shall be continued until all roller marks are eliminated and a density of at least 98 % of the maximum density achieved during the Job-Mix Formula determination has been attained.

During rolling, the wheels of the rollers shall be moistened to prevent adhesion of the material to the wheels, but an excess of water will not be permitted. The rollers shall be operated by competent and experienced roller drivers. The minimum of rollers to be furnished by the Contractor shall be adequate to implement the optimum compaction procedures determined during trial pavement construction for each spreading machine in operation. In all places not accessible to the rollers the mixture shall be thoroughly compacted with vibrating plates, and operated vibrating rollers or with hot hand tampers weighing not less than 15 kg with a tamping face of not more than 0.03 m<sup>2</sup>. Skin patching of an area that has been rolled will not be permitted. Any mixture that becomes mixed with foreign material, or is in any way defective, shall be removed and replaced with fresh, and compacted as specified.

The rollers shall not be permitted to stand on surfacing which has not been fully compacted. All necessary precautions shall be taken to prevent the dropping of oil, grease, gasoline, or other foreign matter on any bituminous course.

## **506.20 Joints**

All joints shall present the same texture, density and smoothness as other areas of the surfacing. The joints between old and new lanes, or sections, shall be carefully made in such manner as to ensure a continuous bond between the old and new pavement. All trimmed contact surfaces shall be coated with a thin, uniform coat of hot bitumen before a fresh mixture is placed.

- a) Transverse: The roller shall pass over the unprotected end of the freshly laid mixture only when laying of the surfacing is to be discontinued for such length of time as to permit the mixture to become cold. The end of the previously laid section shall be trimmed to expose an even, vertical face for the full thickness of the course. The fresh mixture shall be raked uniformly against the joint and initial compaction secured with the tandem roller, followed by regular rolling.
- b) Longitudinal: When the edges of the longitudinal joints are irregular, honeycombed, or poorly compacted, all unsatisfactory sections of joint shall be trimmed to expose an even, vertical face for the full thickness of the course. Fresh mixture shall be raked uniformly against the joint, followed by rolling.

#### **506.21 Inspection of Plant and Equipment**

The Engineer shall have access at all times to all parts of the mixing plant for checking the adequacy of the equipment in use, inspecting the operation of the plant, verifying weights, proportions, and character of materials and checking temperatures being maintained in each portion and of the completed mixture.

#### **506.22 Sampling and Testing**

The Contractor shall be responsible for carrying out the following tests during all times that mixing and laying work is in operation:

- a) The grading of the aggregate in each bin or at each stockpile extraction point and the grading of the combined aggregate shall be determined at intervals not exceeding two hours during mixing.
- b) The bitumen content, the particle size analysis and the Marshall stability, flow value and voids shall be determined at intervals not exceeding:
  - (i) two hours during mixing for:
    - the first 20 working days, or
    - for the first 10 working days after any change of material or mixing technique, or
    - for 2 working days after any unsatisfactory result, and
    - plus in all three cases such longer period as the Engineer may require in the event uneven or unsatisfactory results being obtained during these periods, and
  - (ii) four hours after the above periods.

In addition, the Contractor shall submit to the Engineer suitable sized samples of all aggregates and bitumen required for tests (1) and (2) above at least 20 days before laying is commenced, and of each day's production of aggregate, and of each batch delivery of bitumen.

The Contractor shall allow for the cost of complying with all the above in his rates for surfacing.

#### **506.24 Adaption of Transition Area of Asphalt Concrete Overlay and Preparation before Airtraffic Resummences**

The asphalt concrete overlay end areas shall be adapted by transition to the existing asphalt surface at the proposed end areas as shown in the longitudinal section drawings. To maintain the minimum thickness on the new overlay layer, part of the existing surface has to be removed. The Contractor shall propose the equipment/plant and method for removal of part of the existing surface to the Engineer for approval. The existing surface after removal of the surface part shall be prepared to receive the new asphalt in an equal minimum thickness. Tack coat and joint forming shall be as specified for asphalt surfacing.

#### **506.25 Standards**

All pavement works, material, equipment and sampling and testing are to be in accordance with the following German Standards:

- 1) All pertinent DIN Standards of the "Deutsches Institut für Normung", especially

DIN 1995	'Bituminous Binder'
DIN 1996	'Testing of Bituminous Constructions'
DIN 52 001 - 52 045	Testing of Bituminous Binder'
DIN 55 946	'Bitumen'
DIN 66 100	'Gradation'
  
- 2) ZTVT Stb 93  
  
Zusätzliche Technische Vertragsbedingungen und Richtlinien für den Bau von Fahrbahndecken aus Asphalt.
  
- 3) ZTV bit - Stb 84/90  
  
Technische Vorschriften und Richtlinien für den Bau bituminöser Fahrbahndecken, Teil 3 (Technical Instructions and Standards for the Construction of Bituminous Roads Pavements, Part 3)

#### **506.26 Testing of Bituminous Layers**

The construction control tests on bituminous layers shall consist of the determination, from 100 mm diameter samples of the full depth of the layer, of density, percentage voids in mix, percentage voids filled with bitumen and bitumen content as a percentage by weight of the whole mix. These tests shall be carried out on samples taken at a frequency of one for every 1,000 m<sup>2</sup> with a minimum of five tests for areas less than 5,000 m<sup>2</sup>.

## **600 Culverts and Drainage Works**

**601.** This section covers the following:

- (a) The provision and installation of concrete pipe culverts
- (b) The construction of minor structures including culvert inlet and outlet structures
- (c) The excavation and/or fill and all work associated with the construction of:
  - trenches to receive culverts
  - inlet drains
  - outfall drains

Side drains are covered under Earthworks.

**602. Materials**

### ***Concrete Pipes and Fittings***

- (a) Concrete pipes shall comply with the requirements of BS 5911 Parts 100 or 3.
- (b) Concrete for concrete pipes shall be Class 30/10.
- (c) The pipes shall have flexible joints in accordance with BS 5911 Part 100 or ogee joints in accordance with BS 5911 Part 3.
- (d) Reinforcement may be inserted in the pipes to strengthen them for handling, but the size, spacing and placing of reinforcement shall be to the approval of the Engineer.
- (e) All concrete shall be compacted either by spinning or vibrating.

**603. Order of Works**

- (a) The Drawings give a guide only to the location and size of each culvert. Precise details of length, skew and invert levels will be issued to the Contractor from time to time as construction proceeds. The Contractor should allow in his programme a period of 30 days between submission of cross-sections in accordance with Section 3 of the Specification and the issue of precise culvert details.
- (b) Where the Contractor considers that drainage conditions are such that it is not necessary to construct a pipe culvert ahead of the embankment, the Engineer may consent to its installation after construction of the embankment on the following conditions:
  - (i) that the Contractor will be responsible for any damage or delays to the culvert or to the embankment earthworks; and
  - (ii) that the construction of the culvert shall follow immediately upon the substantial completion of the embankment earthworks.
- (c) Where culverts are to be constructed under a road formation in cutting, excavation and backfill shall be carried out after the bulk earthworks are complete but before the processing of the 300 mm layer below formation level in cuttings unless otherwise agreed.

#### **604. Excavation for Culverts**

Should excavations be effected to a greater depth or width than is necessary, the Contractor shall backfill the excess excavation with approved materials, compacted to the density of the adjacent ground, to the correct levels and dimensions.

The Contractor shall carefully set aside the various suitable materials encountered so that they may be reused for backfilling. If excavated materials are unsuitable the Contractor shall dispose them in spoil areas.

Where, in the opinion of the Engineer, the surface of the excavation has become soft or unsuitable due to the Contractor's method of working, the Contractor shall at his own expense remove and replace the unsuitable material with non-structural concrete or other material acceptable to the Engineer.

The final excavated surface in soft material on which culverts or structures are to be constructed shall be compacted to a dry density of at least 92 % MDD (AASHTO T180) to a depth of 150 mm.

For culverts which are to be constructed approximately on the existing ground after the removal of topsoil, the Contractor shall level the existing ground by excavating and/or filling in layers. He shall then compact the ground for 150 mm below invert or underside of bedding material to a dry density of 92 % MDD (AASHTO T180) such that the foundation for the culvert or bedding is true to grade and of uniform density over the whole length of the culvert.

The Engineer's approval of the final excavated surface shall, where required, be adequately timbered and supported.

Where instructed by the Engineer, shoring and supporting timber shall be left in trenches or other excavations.

Where ground conditions are such that a satisfactory foundation cannot be achieved the Contractor shall remove the unsuitable material either until a suitable material is encountered or to the depth and width agreed by the Engineer. The Contractor shall backfill the resultant excavation with approved material to a dry density of 95 % MDD (AASHTO T180).

#### **605. Bedding and Laying of Pipe Culverts**

- (a) The bottom of the excavation shall be compacted to 92 % MDD (AASHTO T180) and shaped to the lower part of the pipe such that the barrel of the culvert rests on it over a width of at least one third of its diameter, and throughout the length of barrel.

Voids shall be formed under the joints and sockets so that adequate space is provided under the pipe to form the joint. When the joint has been formed the void shall be packed hard with bedding material. The underside of the barrel shall be packed hard with selected fill material with a maximum particle size of 20 mm, at a suitable moisture content, and rammed solid.

- (b) Pipes are laid on a concrete bed. The pipes shall be bedded on 1 : 3 cement; sand mortar at least 50 mm thick, 150 mm wide and extending the full length of the barrel.



After the joints have been formed, concrete Class 15/20 shall be packed hard under the barrel and sockets of the culvert and extending upwards on each side of the pipe to the height shown on the Drawings.

**606. Concrete Beds, Surrounds and Haunches**

The floor of the trench shall be thoroughly cleaned, trimmed and compacted before any bed, surround or haunch is placed and shall be subject to approval by the Engineer before concreting is commenced.

All concrete for beds, surrounds and haunches shall be Class 15/20 formed to the dimensions shown on the Drawings or instructed by the Engineer.

Unless otherwise instructed by the Engineer, 150 mm of concrete surround shall be provided to concrete pipes in the following circumstances:

- (a) concrete pipes up to and including 600 mm diameter with less than 600 mm cover or more than 3.0 m of cover
- (b) concrete pipes over 600 mm diameter and not exceeding 900 mm diameter with less than 1.0 m of cover or more than 3.0 m of cover, and
- (c) concrete pipes over 900 mm diameter, at any depth

**607. Backfill**

Backfill for concrete and metal pipes and minor drainage structures shall be obtained from the excavation and in the event of there being insufficient excavated material or the culvert is laid close to or above existing ground then selected backfill shall be obtained from borrow pits. All backfill whether from excavated material or borrow pits shall have a CBR of at least 10 % measured after 4 day soak on laboratory specimens compacted to 95 % MDD (AASHTO T180), a Plasticity Index of less than 25 %, a maximum particle size of 20 mm and shall be compacted to a dry density of 92 % MDD (AASHTO T180).

For pipe culverts which have been placed and where no concrete haunch or surround is called for, selected fill material, consisting of the best available from the excavation shall be placed in layers not exceeding 150 mm compacted thickness and thoroughly compacted along the remainder of the underside of the barrel of the pipe and in the joint holes. Similar selected material shall then be laid in layers, not exceeding 150 mm compacted thickness, and compacted to 92 % of MDD (AASHTO T180) and brought up uniformly on both sides of the pipe up to a height of not less than 300 mm over the crown. The remainder of the trench shall then be backfilled with the best selected material available, placed in layers not exceeding 150 mm compacted thickness and compacted to 92 % MDD (AASHTO T180). Compaction around the pipe shall be carefully done. No power rammers shall be used within 300 mm of the pipe.

Timbering and sheeting left in for the purposes of supporting the excavation shall be eased up 150 mm at a time in step with the backfill layer and compaction of the backfill shall be achieved under and behind such timber and sheeting.

For pipe culverts which have been constructed close to, above or where the culvert protrudes above the existing ground the backfilling under the flanks and alongside and over the culverts shall be placed and compacted in layers not exceeding 150 mm after compaction to a density of at least the density required for the material in adjoining layers of embankment fill. The width of backfilling along the flanks of the culvert shall be at least  $(2+1.5 h)$  metres from each side of the culvert (Where 'h' is the height from

the underside of the layer being compacted to the crown of the pipe in metres). All existing ground under this backfill shall be compacted to 92 % MDD (AASHTO T180) to a depth of 150 mm.

The material used for filling alongside the culvert above existing ground shall be the same material as will be used for the adjacent embankment fill. Backfilling shall be carried out simultaneously and equally on both sides of the culvert to avoid unequal later forces.

In all cases there shall be cover of at least 600 mm over the crown of the culvert before construction equipment is driven over it unless other protective measures approved by the Engineer have been provided.

The filling in subsoil drains shall be clean hard crushed rock or gravel, and, in soils where fines are not liable to migrate, the grading shall be in accordance with BS 882 for 37.5 mm maximum size graded aggregate or as otherwise instructed by the Engineer.

Where permeable filter membranes are instructed they shall be 'Terram' or similar approved material. Transverse joints shall be lapped by at least 0.5 m with the upstream material laid on top. Longitudinal joints shall be stitched together. 'Terram' or similar approved material shall not be left exposed to sunlight for more than 3 weeks, and shall be installed in accordance with the manufacturer's instructions.

#### **608. Protection Work**

Where shown on the Drawings or instructed by the Engineer the Contractor shall provide and place protection works.

Protection works in connection with drainage channels, culvert inlets and outlets and river training will consist generally of stone pitching, gabions or rip-rap.

#### **609. Minor Drainage Structures**

Minor drainage structures shall include culvert inlet and outlet structures, catchpits, cascades and spillways. Typical details are shown on the Drawings but working details will be issued by the Engineer from time to time during the Contract.

Concrete for minor drainage structures shall be Class 20/20 unless otherwise shown on the Drawings.

Unless otherwise specified or shown on the Drawings concrete shall be reinforced in the back and front faces of all walls and the top and bottom of all slabs with 10 mm diameter high yield deformed bars placed at 200 mm centres both horizontally and vertically to form a mesh.

#### **610. Gabions**

Gabions shall be 'Maccaferri' boxes and/or 'Reno' mattresses both with diaphragms at 1 metre centres, 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 unless otherwise instructed by the Engineer comply with the requirements shown below:

**Wire for Gabion Construction**

		<b>Diameter (mm)</b>	<b>Galvanising (g/m<sup>2</sup>)</b>
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

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 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/mm<sup>2</sup>.

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 Engineer. Gabions, as constructed shall be within a tolerance of  $\pm 5\%$  on the height or width instructed and  $\pm 3\%$  on the length instructed.

Gabions shall be handpacked 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 instructed by the Engineer the Contractor shall place filter fabric ('Terram' or similar approved) behind gabion faces 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 Engineer the existing soil shall be backfilled, thoroughly compacted against the sides of the gabions and finished flush with the top surface of the gabion.

**611. Mitre Drains, Cut-off Drains, Catchwater Drains, Side Drains, Culvert Outfall Drains and Earth Drains**

Mitre drains, cut-off drains, catchwater drains, culvert outfall drains and earth dams shall be formed at the location and to the lines and levels shown on the Drawings or as instructed by the Engineer.

Where shown on the Drawings or instructed by the Engineer the Contractor shall construct earth dams in side drains, cut-off drains, catchwater drains, mitre and outfall drains to prevent the flow overshooting the drainage works or to direct flows into culvert inlets. Similar earth structures may also be used as erosion checks. Earth dams shall be formed in selected fill material compacted to a minimum dry density of 90 % MDD (AASHTO T180):

**612. Cleaning and Maintenance**

The Contractor shall be responsible for maintaining all drainage structures, culverts, channels and drains free of silt and extraneous material until the end of the Contract, including the Defects Liability Period or its equivalent and shall repair any damage to the Works caused by his failure to maintain the drainage system.

## **700 Road Furniture**

This section covers the supply and installation of items of road furniture including such things as road signs, road markings, various posts, fences and gates, guard rail, kerbs.

### **701. Edge Marker Posts**

Edge marker posts shall be constructed and erected in accordance with the Drawings. They shall be set out at the outer edge of the shoulder with their tops at a constant height above the edge of the carriageway at such locations as the Engineer instructs. Culvert marker posts shall be erected in accordance with the Drawings at the outer edge of the shoulder on one side of the carriageway for each culvert.

Markers shall be erected and painted with two coats of an approved white paint before the road is opened to traffic and shall be kept clean until completion.

### **702. Permanent Road Signs**

Road signs shall be obtained from a manufacturer approved by the Engineer and before placing any order for the manufacture of the road signs, the Contractor shall submit to the Engineer two copies of the following information:

- (a) Name of the firm from which he proposes to obtain the signs together with place of manufacture or fabrication.
- (b) A description of the items to be supplied with manufacturer's specification together with a description of quality, grade, weight and strength.
- (c) Manufacturer's 'type' test certificates, or recent test results carried out on similar terms.
- (d) A sample sign, post and fittings which samples shall be stored on site for the Engineer.

All colours on the pavement road signs, with the exception of black and grey, shall be reflectorised, unless otherwise specified or instructed by the Engineer. The reflective sheeting shall comply with the requirements and shall be applied by mechanical vacuum-heat application method to the approval of the Engineer. The sign plate shall be covered by clear lacquer of a make recommended by the manufacturer of the reflective material.

Permanent road signs shall comply with the requirements of the Turkmen Standard in respect of quality including the pre-treatment, preparation and protective coatings for the frame, posts and fittings. Unless directed otherwise posts, frames, fittings and the backs of signs shall be painted with a finish coat of grey. Bolts and nuts shall be spot welded after erection to prevent theft, and a grey epoxy paint shall be applied to all areas so treated.

The Contractor shall excavate in any material for the foundation of the road signs, provide and place concrete Class 15/20, embedded all round and under the posts and backfill the remaining excavation all as shown on the Drawings or directed by the Engineer. Foundations for signs of areas over 5 m<sup>2</sup> shall not be covered up until they have been approved by the Engineer.

All signs shall be maintained in a clear and legible condition and shall be washed down when necessary.

**703. Reflective Materials on Road Signs**

Unless otherwise shown, signs are to be fully reflectorised.

**704. Road Marking Paint**

(a) General Requirements

The paints to be used for road surface marking shall comply with BS 6044. It shall be suitable for applying by brush, low pressure spraying equipment and high pressure spraying equipment. The paint shall be reflectorised unless otherwise specified.

The paint shall be of a type approved by the Engineer, and if not on the current approved list, samples shall be submitted to the Engineer at least 6 months prior to its proposed use.

(b) Colour

(i) White

The colour of white markings shall be BS Colour No. 00E55 of BS 4800. The pigment used for white materials shall be titanium dioxide Type A (Anatase) or Type R (Rutile) complying with BS 1851.

(ii) Yellow

The colour of yellow markings shall be to BS Colour No. 08E51 of BS 4800.

(c) Drying time

the drying time allowed shall be specified by the manufacturer, subject to the touch dry condition being reached in a maximum of 15 minutes.

(d) Reflectorisation

(i) Non-reflectorised

Paint specified to be non-reflectorised shall have minimum reflective brightness values, as compared to magnesium oxide (MgO) of for white 80 % and for yellow (using a yellow filter of 5800 Å) 65 %.

(ii) Internal reflectorisation

Internally reflectorised paint shall be specifically manufactured for this purpose and shall contain ballotini beads to BS 6088. The ballotini shall be reasonably spherical and free from flaws, and of a size suitable for this method of reflectorisation, subject to a maximum size of 0.5 mm.

(iii) Surface reflectorisation

Surface reflectorisation of the paint shall be by application of ballotini beads to BS 6088 to the wet paint film. The ballotini shall be reasonably spherical and free from flaws and of a size suitable for this method of reflectorisation, subject to a maximum nominal size of 0.8 mm.

(e) Application

Prior to application of paints, the road surface to be marked shall be thoroughly cleaned of all loose material and shall be completely dry.

The application of paint shall be done by a purpose-made machine, unless brushing is specifically permitted by the Special Specification. All application instructions issued by the paint manufacturer shall be strictly adhered to.

The spraying rate for cold paint will vary with the roughness of the surface, but shall be such as to give continuous coverage and a minimum dry film thickness of 0.125 mm.

(f) Traffic Control

Warning signs shall be erected when painting is in progress and traffic shall not be allowed to pass over wet paint. Any painting disfigured by traffic, or any painting not complying with the Specification shall be effaced and repainted.

**705. Guardrails**

Dimensions and erection details for guardrails are shown on the Drawings.

(a) Materials

(i) Beams

Beams for guardrails shall be Class A with a Type 1 finish in accordance with AASHTO M180 and shall be obtained from a manufacturer approved by the Engineer.

(ii) Posts

Posts shall be constructed of steel, timber or concrete (Class 20/15 reinforced with 16 mm diameter mild steel bars) as shown on the Drawings.

(iii) Blocks

Blocks shall be made from well seasoned approved hardwood free from loose knots and shakes other than surface splits not exceeding 3 mm depth.

(b) Erection

Guardrail shall be erected in accordance with the manufacturer's published instructions and the Drawings. Where there is any conflict, the Drawings shall take precedence.

Where posts are placed in excavated holes, the excavation shall have sides which are approximately vertical.

The Contractor shall provide the guardrail with all posts, blocks, nuts, washers and shall repair galvanising, backfill around the posts and remove any surplus material to spoil.

When erection is complete and the section has been approved by the Engineer the nuts shall be spot welded to the guardrail or to the bolt to stop their removal.

Galvanised coating damaged by spot welding or cutting shall be renovated either by the use of low melting point zinc alloy repairs rods or powders made

specifically for this purpose, or by the use of at least two coats of zinc-rich paint to BS 4652.

(c) Tolerances

Guardrails shall be erected at the instructed or detailed offsets and levels from the pavement centreline and shall be correct within a tolerance of  $\pm 20$  mm in line and level. In addition adjacent plates shall not vary in line or grade by more than 5 mm measured from a line extended from one plate to the end of the adjacent plate; where the guardrail is on a horizontal or vertical curve the calculated deflection shall be added to this tolerance.

**706. Kerbs**

Where shown on the Drawings or directed by the Engineer the Contractor shall excavate in any materials, provide and place concrete for the haunch, backfill, remove surplus material to spoil, provide, lay and joint precast concrete kerbs, edgings and quadrants.

Precast concrete kerbs, edgings and quadrants shall comply with the requirements of BS 340, and shall be laid in accordance with the Drawings.

The concrete for the haunch shall be concrete Class 15/40 which shall comply with the requirements of Section 17 of this Specification.

For radii of 12 m or less, kerbs of appropriate radius shall be used.

Any 1.0 m length of kerb, edging or quadrant deviating more than 3 mm from line and level at either end shall be made good at the Contractor's expense by lifting and relaying.

**707. Kilometre Marker Posts**

Where shown on the Drawings or directed by the Engineer the Contractor shall excavate in any material, provide and place kilometre marker posts as detailed.

Concrete for backfill to kilometre marker posts shall be Class 15/20.



APPENDIX I, 1/12

1. Housing and Office Accommodation for Engineer's Representative and Staff.

1.01 The types of buildings to be constructed are designated as follows:

Three bedroom house	type 3BR
Two bedroom house	type 2BR
Engineer's Representative's Office	type ERO

1.02 The sites for the buildings and the site layouts shall be agreed with the Engineer's Representative and shall be subject to approval by the Engineer.

1.03 The Contractor shall prepare detailed working drawings showing the site layout, fencing, access roads, water, telephone and electrical services, surface water, soil and waste drainage, septic tanks and full details of each type of building. The drawings shall comply with the requirements of the Building Regulation currently in force.

1.04 The Contractor shall submit these drawings for the approval of the Engineer.

1.05 Construction shall conform with the requirements of the General Specification for Building Works.

1.06 Drawings of the buildings and a schedule of finishes, fittings and furniture are included in these documents as a guide to the general standard required. The Contractor may use the drawings provided as the basis for preparing his working drawings. Should the Contractor wish to submit designs which are substantially different in either layout or construction, such alternative designs shall comply with the following requirements.

1.06.1 The space provided, the Standard of construction and finishes, and the provision of fittings and furniture shall not be inferior to those set out in the schedule.

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1.06.2 The housing and office accommodation may be of either permanent or temporary construction, the latter being on acceptable standards equivalent to those described.

1.06.3 The office and houses types 3BR and 2BR shall be provided with airconditioning, but all office and housing accommodation shall be so arranged as to ensure maximum natural cross-ventilation.

1.06.4 The designs shall tackle full account of the topography, natural drainage, foundation conditions and climate at the site.

## 2. APPROXIMATE INTERNAL FLOOR AREAS

### 2.01 3 Bedroom House (3BR) and 2 Bedroom House (2BR)

<u>Room No.</u>	<u>Description</u>	<u>Area m2</u>	
		<u>3BR</u>	<u>2BR</u>
1	Kitchen Store	2.7	2.7
2	Carport	16.3	16.3
3	Kitchen	7.8	7.8
4	Living-Dining Room	41.2	34.2
5	Front Stoep	7.8	7.8
6	Bathroom	6.4	6.4
7	Passage	12.4	8.5
8	Toilet	2.4	2.4
9	Bedroom	17.4	17.4
10	Bedroom	16.0	-
11	Bedroom	18.1	18.1
12	Stoep	<u>4.0</u>	<u>4.0</u>
	Total	152.5	125.6

### 2.02 Engineer's Representative's Office (ERO)

<u>Room No.</u>	<u>Description</u>	<u>Area, m2</u>
51	Conference Room and Senior Resident Engineer's Office	36.7

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52	Resident Engineer's Office	11.9
53	Resident Engineer's Office	11.9
54	Resident Engineer's Office	11.9
55	Secretary's Office	11.9
56	Drawing Office	11.9
57	Technician's Office	11.9
58	Technician's Office	11.9
59	Pantry	5.1
60	Store	2.4
61	Printing Room	7.8
62	Toilet/Shower	11.9
63	Toilet/Shower	<u>11.9</u>
	Total	159.1

2.03 Finishes

2.03 Floor Finishes

2.03.1 Concrete Slab Trowelled Smooth

3BR and 2BR: Room 2

2.03.2 Granolithic Screed.

3BR and 2BR : Rooms 5 and 12

ERO : Rooms 59 - 63

2.03.3 Thermoplastic Tiles on Screed.

3BR and 2BR : Rooms 1,3, 6 and 8.

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ERO : Rooms 51 - 58.

2.03.4 Wood Mosaic Tiles on Screed

3BR and 2BR : Rooms 4, 7, 9 and 11.

2.04 Wall Finishes

2.04.1 Cement-sand render

On all blockwork faces.

2.04.2 Prime coat plus 2 coats washable emulsion paint.

On all untilted rendered surfaces.

2.04.3 Ceramic Tiles.

3BR and 2BR : to a height of 1.50m in Rooms 3, 6 and 8.

2.04.4 Metal Mosquito Mesh in Full-height timber frames.

3BR and 2BR : Rooms 5 and 12.

2.04.5 All Timber Surfaces.

Aluminium primer, undercoat plus 2 coat acrylic gloss paint.

2.05 Ceiling Finishes.

2.05.1 Softboard on Timber Battens.

3BR and 2BR : All Rooms except Room ERO ; All rooms.

2.06 Doors and Windows

2.06.1 Doors.

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2.06.11 Lipped Flush door, 2040 x 726 x 35 hung on 1 pair 100 mm solid brass butt hinges.

All doors except those noted below.

2.06.12 Screen door, metal mosquito mesh on timber frame with door closer, hung on 1 pair 100 mm solid brass butt hinges.

3BR and 2 BR External door to Room 5.

2.06.13 Timber framed and Pannelled External Door, 2000 x 807 x 40 hung on 1 1/2 pairs 100 mm solid brass butt hinges.

3BR and 2BR : External doors to Rooms 3, 4 and 12.  
Provide rubber door stops for all doors.

2.06.2 Door locks and Furniture

2.06.21 Night Latch.

3BR and 2BR : Rooms 3 and 4.

2.06.22 Locking latchset with lever furniture.

3BR and 2BR : Rooms 6 and 8  
ERTO : All doors to Rooms 62 and 63.

2.06.3 Window.

2.06.31 6 x 150 blade adjustable louvres, aluminium frames.

3BR and 2 BR : Rooms 3,4,7,9,10,11 and 6/7  
ERO : Rooms 51 - 59 and 61.

2.06.32 4 x 150 blade adjustable louvres, aluminium frames.

3BR and 2BR : Rooms 1,2,8 and 6/5.  
ERO : Rooms 62 and 63.

2.06.33 Timber Jalousies, side hung in timber frames, with 75mm solid brass butt hinges and barrel bolts top and bottom.

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2.06.34 Metal (aluminium or galvanised steel) Mosquito proofing.

3BR, 2BR, ERO : All external windows.

2.07 Electrical Fittings

Wiring shall be PVC insulated, PVC sheathed, suitably earthed. Drops to wall switches shall be run in conduit concealed in the render.

2.07.1 Intake.

2.07.11 Earth leakage circuit breaker in lieu of main switch.

3BR, 2BR, ERO (if not wired from adjacent house)

2.07.12 Distribution Board with miniature circuit breakers.

3BR, 2BR, ERO (if not wired from adjacent house).

2.07.2 13 Amp Power Point.

3BR and 2BR	:Rooms 2, 5 and	-	1 No. each
	Room 3	-	5 No.
	Rooms 4	-	6 No.
	Rooms 9, 10 and 11	-	3 No. each
ERO	Rooms 52-69 and 61	-	2 No. each.

2.07.3 Pendant Light Fittings with Wall Switch (including bulb)

3BR and 2BR	Rooms 1, 5, 6, 8, 9		
	10, 11 and 12	-	1 No. each
	Room 7	-	2 No. each
	Room 4	-	3 No. each
ERO	Room 51	-	4 No. each.

2.07.4 Fluorescent Light Fittings with Wall Switch (including tube)

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3BR and 2BR	Room 2	-	1 No.
	Room 3	-	2 No.
	Externally	-	4 No.
ERO	Rooms 55-58	-	2 No. each.

2.07.5 Electrical Water Heater, 75 litre, 2.0kw Mounted in Roof Space with Access through Trapdoor in Ceiling equivalent Roof Mounted Solar Water Heater.

3BR and 2BR	1 No. each.
ERO	1 No.

2.07.6 Shaver Socket.

3BR and 2BR	Room 6	-	1 No. each
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2.07.7 Airconditioning.

3BR and 2BR	Room 4	-	2 No. each
3BR and 2BR	Rooms 9,10,11	-	1 No.. each
ERO	Rooms 51-58 and 61-	-	fully airconditioned

throughout.

Airconditoner shall be without chlorofluorocarbon.

2.07.8 Telephone

3BR and 2BR	Room 4
ERO	PBX in room 55 with receivers in rooms 51-

54

2.07.9 Ceiling Fans

3BR and 2BR	Rooms 4, 9, 10, 11-	-	1 No. each
ERO	Rooms 51-58	-	1 No. each

2.08 Plumbing Fittings

2.08.1 3BR and 2BR.

Room 3

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Stainless steel Double drainer sink with hot and cold water supply.

Room 6

Fressed steel bath with hot and cold water supply. Shower over, with thermostatic control tap. Wash/hand basin with hot and cold water supply. Water closet with plastic seat and low level cistern.

Room 8

Wash/hand basin with hot and cold water supply. Water closet with plastic seat and low level cistern.

Externally..

Stand pipes with taps and hosepipe to cover full area of garden.

In roof space.

1500 litre cold water storage tank accessible through trapdoor in ceiling.

2.08.2 ERO

Rooms 62 and 63

1 wash/hand basin with hot and cold water supply.  
2 water closets with plastic seats and low level cisterns  
1 shower tray and shower with hot and cold water supply and thermostatic control tap.

Room 59

1 Stainless steel double drainer sink with hot and cold water supply.

Externally

1 standpipe with tap and hosepipe.

In roof space.

1500 litre cold water storage tank accessible through trapdoor in ceiling.



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2.09 Built-in Fittings.

2.09.1 3BR and 2BR

Room 1

2 levels of timber shelving.

Room 2

Work bench. Lockable ventilated cupboards for garden tools and 2 gas bottles.

Room 3

Floor mounted kitchen fittings with cupboards, drawers and timber worktop over. Total length 3.6m.

Room 6

1 Wall cabinet with mirror, glass shelf, glass holder and tooth brush rack.

1 Soap tray

2 Towel Rails

1 Toilet Roll Holder

1 Curtain Rail with plastic shower curtain

3 Clothes hooks.

Room 8

1 Toilet Roll holder

1 Towel Rail

1 Wall cabinet with mirror.

Rooms 9, 10 and 11

Built-in cupboard approx. 2.4 x 0.6m with hanging rail, drawers, shoe rack, full length mirror, high level cupboard over.

Externally

- 2 Steel footscrapers
- 1 Washing line with supports.

2.09.2 ERO

Rooms 62 and 63

- Wall mounted mirror above wash/hand basin.
- Soap tray in shower compartment.
- Towel rail in shower compartment and adjacent to wash/hand basin.
- Toilet roll holder for each W.C.
- 4 Clothes hooks.

Rooms 51 - 58

- 2.44 x 1.22m sheet softboard, braced, framed and fixed to wall as pin board
- 2m Wooden shelving fixed to wall.
- 2 Coat hooks, Ceiling fan.

Externally.

- 2 Steel footscrapers.

2.10 Furniture etc.

The ownership of all furniture shall revert to the Contractor on completion of the Contract.

- 2.
- 10.1 3BR and 2BR.

Room 2:

- 2 No. gas bottles.
- 1 regulator
- Hose to connect to cooker in kitchen.

Room 3

- 4-ring gas cooker with grill and oven.
- 180 litres refrigerator, and 200 litres deep freezer (German Standard DIN 8946/Classification ST or equivalent) with a minimum thickness of the isolation of 50 mm and 75 mm respectively of approved brand and without chlorofluorocarbon.
- A modern type of washing machine, providing a washing temperature of up to 95°C and a spinning of min. 800 revolutions per minute.

1 Water filter.  
Kitchen table and chair  
1 Ironing board  
1 Small plastic refuse bin Doormat.

Room 4:

3-seater settee plus 4 easy chairs, complete with cushions and covers.  
1 Centre table and 4 occasional tables.  
1 Card table  
1 Dining Table plus 6 Chairs  
1 Writing Desk plus Chair  
1 Bookcase  
1 Standing fan  
1 Sideboard/room divider  
1 standing lamp.

Rooms 5 & 12

1 Verandah table and 6 cane chairs.

Room 6

1 Stool  
1 Timber floor grating  
1 Laundry basket.,  
1 Lavatory brush set.

Room 8:

1 Lavatory brush set.

Rooms 9, 10, 11:

2 Beds complete with spring mattresses, mattress covers, pillows.  
2 Bedside tables.  
1 Dressing table with mirror and stool  
2 Bedside lamps  
1 Waste paper basket.

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Externally

1 Large plastic refuse bin

2.10.2 ERO

8 Tables 1.5m x 0.9m

10 Desks 1.5m x 0.9m, with lockable drawers.

1 Occasional table

3 Plan chests, 4 drawers, A2 size.

3 Drawing boards on adjustable stands with sliding straight edge

6 Lockable cupboards

1 Lockable filing cabinet, 4 drawers

24 Upright chairs, upholstered seats

1 Typist's adjustable swivelling chair

4 Arm chairs

3 Draughtsman's stools

1 Refrigerator 0.2cu. m.

1 Chilled drinking water dispenser

1 Office Safe

8 Wastepaper baskets

8 Letter trays.

2.11 External Works

Within each house plot, strip vegetation, grade ground surface to suitable falls, spread top soil if necessary, plant grass, plant Milkbush hedge on all boundaries and/or erect chainlink fence as directed, construct entrance drive and carpark, erect gate posts and instal gate to entrance drive, construct septic tank and soakaway (if not shared by several buildings), construct walkways paved with 600 x 600 x 50 mm concrete paving slabs, construct surface water drains to outfalls.

2.12 Portable Fire Extinguishers

Portable fire extinguishers shall be provided and maintained in serviceable order at selected locations.

APPENDIX II, 1/2

Instruments and equipment to be provided for the sole use of the Engineer's Representative and Staff.

2.01 The ownership of all items listed in this Appendix shall revert to the Contractor on completion of the Contract.

2.02 Office Equipment

- 1 Office Typewriter, non-electric, Olympia SG 3L with 620mm carriage, or similar
- 1 Photocopier \*
- 1 Duplicator, Gestetner 410, or similar
- 1 Combi Punch/Binder
- 1 Micro Computer PC \*\*
- 1 Programmable calculator with printer and cassette reader
- 2 Calculators

\* for paper sizes A 3 and A 4 equipped for reduction up to 71 % and enlargement up to 141 %

\*\* including colour screen, laser printer and word processing software 'Microsoft Word for Windows' (latest version).

2.03 Drawing Office Equipment

- 4 Set-square
- 10 Scales, metric, triangular
- 2 sets Rapidograph Variant pens
- 2 Sets Rapidograph Varioscript pens
- 2 Sets Rapidoguide Stencils
- 1 Set Railway curves
- 2 Sets drawing instruments (compass, dividers, etc.)
- 1 1500mm rustless steel straightedge
- 1 Planimeter, sliding bar, mag tracer metric
- 1 Plan printer
- 1 Full Set of all British Standards, British Standard Codes of Practice and all other publications referred to in the Contract Documents.

2.04 Field Equipment

- 10 Pairs Waterproof boots
- 10 Safety helmets

APPENDIX II, 2/2

- 1 Theodolites ( Zeiss or similar) complete with centering tripod and standard accessories
- 1 Electronic Distance Measurers complete with 4 target prisms equipped with their poles.
- 2 Automatic Engineer's levels (Zeiss or similar) complete with tripod
- 4 Levelling staves folding type, 4m long, graduated in metres and hundredths, suitable for use with above levels, including rod level.
- 5 Best quality steel tapes 30m x 13mm in case
- 10 Best quality steel pocket tapes 3m x 13mm
- 1 Steel tape repair kit, complete
- 2 Tape thermometers, centigrade
- 3 Fibreglass tapes 30m x 13mm in case.
- 2 Surveyors umbrellas
- 12 Ranging pole 2m
- 1 4m long aluminium straight edge with wedges.

**APPENDIX III, 1/3****Soils and Materials Laboratory Facilities**

- 3.01 The Contractor shall provide suitable premises, transportation, equipment and staff to ensure the continuing availability of adequate testing facilities throughout the period of performance of the Contract in order to implement the Standards of quality of materials and workmanship required under the terms of the Contract.
- 3.02 The provision of Laboratory facilities to the satisfaction of the Engineer's Representative shall be a pre-requisite for the commencement of construction operations.
- 3.1 Premises
- 3.1.1 Laboratory premises shall consist of a main base laboratory with separate sections for soils, aggregates and concrete and bituminous materials, together with a suitable store for the orderly storage of samples in sufficient number corresponding to the period for which the Engineer's Representative shall require the preservation of samples.
- The size of the laboratory shall be sufficient for the execution of all testing at the frequencies specified herein, and shall provide adequate accommodation for both the Engineer's testing requirements and those of the Contractor. The laboratory shall be adequately furnished with work surfaces, benches, sinks, cupboards and storage and equipped for the execution of all testing specified herein. The Contractor shall submit to the Engineer for approval the names of the manufacturers and a list of the laboratory equipment.
- The Contractor shall at all times maintain a sufficient stock of all laboratory glassware, plasticware, rubberware etc., to allow for breakages and deterioration. In the event of any of the equipment becoming unusable through any cause the Contractor will, if required to do so by the Engineer's Representative, order replacements to be made.
- 3.1.2 The facilities served by the main laboratory shall be supplemented by site laboratories which may consist of temporary premises capable of easy dismantling and re-erection, or mobile laboratories. The location of such subsidiary site laboratories shall be agreed with the Engineer's Representative with the view of providing ease of access to construction operations.
- 3.1.3 The bituminous materials section of the main laboratory or site laboratory shall include an air-conditioned room with thermostatic control for maintaining the necessary range of temperature as specified for the relevant test procedures.

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**3.2.      Transportation**

3.2.1      The Contractor shall make provision for the necessary transportation of laboratory personnel, equipment and samples. Any delays to construction operations, or disapproval by the Engineer's Representative arising from the non-execution of prescribed tests due to the Contractor's default in this connection shall be the responsibility of the Contractor.

**3.3         Equipment**

3.3.1      In addition to the general laboratory equipment for measurement, sampling and preparation of samples for test, specialised equipment for routine testing shall be provided by the Contractor and maintained in good order and adjustment throughout the period of performance of the Contract. The main testing requirements are listed but other tests may be requested by the Engineer's Representative if he so considers necessary.

**3.3.2      Soils**

Classification  
Linear Shrinkage  
Specific gravity  
Compaction (Moisture-density relationship)  
California Bearing Ratio (Unsoaked and soaked)  
Field density  
Sulphate content

**3.3.3      Aggregate and Concrete**

Particle size distribution  
Shape characteristics (Elongation and Flakiness)  
Specific gravity  
Bulk density  
Voids  
Absorption  
Organic impurities  
Aggregate Crushing Value  
Consistency of concrete  
Compressive strength (Cement and concrete)  
Initial and final setting times (cement)

**3.3.4      Bituminous Materials**

Depot tray test  
Field tray test  
Immersion tray test  
Viscosity of Cutback bitumen  
Bitumen penetration value



APPENDIX III, 3/3

3.4 Staff

3.4.1 The staff required for Quality Monitoring will be provided by the Engineer, the Contractor shall employ suitably trained and experienced technical assistants assisted by a sufficient number of semi-skilled labourers to carry out the testing requirements of the works, under the supervision of a professionally qualified and experienced Materials Engineer.

The Contractor shall be responsible in respect of wages, salaries, insurance, provident fund and all other costs or charges incurred for watchmen, chainmen, cleaners, recruited by the Engineer's Representative or the Contractor and employed on the Works, in the office and in the laboratory.

## **SYMBOLS AND ABBREVIATIONS**

### **1. SYMBOLS**

Symbols for units of measurement conform to the SI system as set out in BS 5775 (ISO 31/1.). Examples are given below:

$\mu$	Micron = $m \times 10^{-6}$
mm	Millimetre
m	Metre
km	Kilometre
mm <sup>2</sup>	Square millimetre
m <sup>2</sup>	Square metre
km <sup>2</sup>	Square kilometre
ha	Hectare
m <sup>3</sup>	Cubic metre
l	Litre
rad	Radian
°C	Degrees celsius
kg	Kilogram
g	Gram = $kg \times 10^{-3}$
mg	Milligram = $kg \times 10^{-6}$
mg/l	Milligrams per litre
t	Tonne = $kg \times 10^3$
kg/m <sup>3</sup>	Kilogram per cubic metre
N	Newton
N/m <sup>2</sup>	Newton per square metre

### **2. ABBREVIATIONS**

The following abbreviations are used:

ACV	Aggregate Crushing Value
AIV	Aggregate Impact Value
ALD	Average Least Dimension
BA	Bitumen Affinity
CBR	California Bearing Ratio
FI	Flakiness Index
LAA	Los Angeles Abrasion Value
LL	Liquid Limit
LS	Linear Shrinkage
MC	Moisture Content
MDD	Maximum Dry Density
OMC	Optimum Moisture Content
PI	Plasticity Index
PL	Plastic Limit
PM	Plasticity Modulus (PI x % passing 0.425 mm sieve)
SE	Sand Equivalent

**Abbreviations Cont ....**

<b>SG</b>	<b>Specific Gravity</b>
<b>SI</b>	<b>International Standard Units of Measurements</b>
<b>SSS</b>	<b>Sodium Sulphate Soundness Test, loss on 5 cycles</b>
<b>STV</b>	<b>Standard Tar Viscosity</b>
<b>TS</b>	<b>Tensile Strength</b>
<b>UC</b>	<b>Uniformity Coefficient</b>
<b>UCS</b>	<b>Unconfined Compressive Strength</b>
<b>VIM</b>	<b>Voids in Mix</b>
<b>VMA</b>	<b>Voids in Mineral Aggregates</b>
<b>OPC</b>	<b>Ordinary Portland Cement</b>
<b>w/c</b>	<b>Water cement (ratio)</b>
<b>wt</b>	<b>Weight</b>
<b>dia</b>	<b>Diameter</b>
<b>hr or h</b>	<b>Hour</b>
<b>min</b>	<b>Minute</b>
<b>sec</b>	<b>Second</b>

