REPUBLIC OF GHANA
MINISTRY OF ROADS AND HIGHWAYS
GHANA HIGHWAY AUTHORITY

Sinohydro Master Project Support Agreement (Construction of Priority Infrastructure Projects)

ENGINEERING, PROCUREMENT AND CONSTRUCTION/TURNKEY CONTRACT

FOR

REHABILITATION OF NEW ABIREM – OFOASEKUMA – AKIM ODA ROAD (38KM) LOT 9

CONTRACT NO.: GHA/HO/TRC//EPC/SINOHYDRO/LOT9/ER/129//2018

Employer:

The Ministry of Roads and Highways
P.O. Box M57
Ministries
Accra, Ghana

Contractor:

Sinohydro Corporation Ltd.
No.22 Che Gongzhuang West Road
Haidian District
Beijing, P.R. China

August 2018

TABLE OF CONTENTS

SECTION 1 - AGREEMENT

AGREEMENT

This Agreement is made and entered into on the 06 day of August 2018 Between

THE REPUBLIC OF GHANA represented temporarily by the **Ministry of Roads and Highways**, pending the establishment of the Integrated Aluminium and Bauxite Development Authority, whose postal address is P.O. BOX M57 Ministries, Accra. (hereinafter referred to as "**The Employer**") and acting per the Minister or his duly authorised representative which expression shall, where the context so admits include its successors-in-title and assigns, of the one part.

AND

SINOHYDRO CORPORATION LTD., a company incorporated under the laws of China, whose registered office is at No.22 Che Gongzhuang West Road Haidian District Beijing, China (hereinafter referred to as "**The Contractor**") and acting per its Managing Director, or his duly authorized representative which expression shall, where the context so admits include his successors-in-title and assigns, of the one part.

WHEREAS

1. The Government of the Republic of Ghana has signed a Master Project Support Agreement (MPSA) with Sinohydro Corporation Limited to support priority infrastructure projects in Ghana;
2. The Government of the Republic of Ghana and Sinohydro Corporation Limited have agreed to co-operate to develop the priority projects in modules acceptable to the Parties;
3. The Employer requires that the Works known as the **REHABILITATION OF NEW ABIREM – OFOASEKUMA – AKIM ODA ROAD (38KM) LOT 9** (the "Project") should be executed by the Contractor for design, execution and completion of the Works and the remedying of defects therein.
4. The parties to the MPSA intend to apply the funds from the MPSA to eligible payments under the contract for the Project;

THE EMPLOYER AND THE CONTRACTOR AGREE
as follows:

1. In this Agreement words and expressions shall have the same meaning as are respectively assigned to them in the Documents of Contract hereinafter referred to.
2. The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

   i) The Agreement;

   ii) The Letter of Acceptance;

   iii) The Contractor's proposal;

iv) The Particular Conditions of Contract;

v) The Annexes to Particular Conditions of Contract;

vi) The FIDIC General Conditions of Contract for EPC/ Turnkey Projects (First Edition, 1999);

vii) The Employer's Requirements;

viii) The Technical Specifications and Detailed Drawings;

ix) Any other documents as the Parties may agree all as mutually agreed to or as to be agreed to by the Parties.

3. In consideration of the payment to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer for the design, execution and completion of the Works and remedying any defects therein in conformity with the provisions of the Contract. The US Dollar shall be the currency of payment for the Contract.

4. The Employer hereby covenants to pay the Contractor, in consideration of the design, execution and completion of the Works for the sum of **Thirty Million, Three Hundred and Sixty-Eight Thousand, Eight Hundred Seventy-One United States Dollars, Sixty-Five Cents Only (US$ 30,368,871.65)**, hereinafter referred to as the Contract Price.

5. (a) The Contract shall come into full force and effect on the date when all of the following conditions are fully satisfied:

i) The Contract having received approval from the Parliament of Ghana in accordance with Article 181(5) of the 1992 Constitution;

ii) Execution of this Agreement by the Parties;

iii) Parliamentary approval of the Financing Agreement and this EPC Agreement in accordance with Article 181 of the 1992 Constitution and Articles 55(1) and 56(1) of the Public Financial Management Act, 2016 (Act 921);

iv) Signing of Deferred Payment Agreement and approval by the China Export Credit Insurance Corporation (SINOSURE);

v) Public Procurement Authority's approval for sole sourcing Sinohydro Corporation Limited for the implementation of the Project;

vi) Submission of Performance Bank Guarantee by the Contractor.

vii) Completion of a Value for Money Audit by the Ministry of Finance.

(b) "Deferred Payment Agreement" means the agreement signed between the Employer and the Contractor for arranging the payment under this Contract

6. (a) Both Parties hereby acknowledge and agree that the terms and conditions of this Contract may be subject to further modifications and amendments according to the requirements by the financing institutions in China in relation to the credit facility for the Project, including but not limited to the China Export Credit Insurance Corporation ("Sinosure", as the underwriter of export credit insurance policy) and the Industrial and Commercial Bank of China ("ICBC", as the Financier)."

(b) Employer's repayment guarantee: As the condition to guarantee the due enforcement of the payment obligation for the deferred payment, the Employer shall provide the guarantee acceptable to the Contractor that the Employer has ability to pay the deferred payment under the Deferred Payment Agreement."

7. The Parties shall notify each other in writing when all conditions precedent under Clause 5 have been satisfied. If any of these conditions are not satisfied within a period of 365 days after the date of execution of this Agreement, this Agreement shall become void and ineffective and any securities issued in relation to the above Works shall be returned.

8. The following documents shall be deemed to form, to be read and construed as part of this Agreement:

a) This Agreement;

b) The Letter of Acceptance from the Employer;

c) The Contractor's proposal;

d) The Particular Conditions of Contract;

e) General Conditions of Contract for EPC/ Turnkey Projects as published by FIDIC (First Edition, 1999);

f) The Employer's Requirements;

g) The Technical Specifications and Detailed Drawings;

h) The Bill of Quantities;

i) Any other documents as the Parties may agree all as mutually agreed to or as to be agreed to by the Parties.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with their respective laws.

SIGNED FOR AND ON BEHALF OF THE EMPLOYER

NAME Kwasi Amoako-Attah

TITLE MINISTER
MINISTRY OF ROADS & HIGHWAYS

In the presence of:

NAME Edmund Offei-Annor

Address _____

SIGNED FOR AND ON BEHALF ON BEHALF OF THE CONTRACTOR

NAME _____

TITLE _____

In the presence of:

NAME ~~Huang Guanghui~~

Address _____

SECTION 2 - LETTER OF ACCEPTANCE

FORM OF LETTER OF ACCEPTANCE

GHANA HIGHWAY AUTHORITY

In case of reply the number and date of this letter should be quoted

Our Ref.GHA/.....
Your Ref. No.

Tel. 0302 -664627-9
0302 - 666591-4
0302 - 664620-3
Fax. 233 3021 665571/664627
Email: ce@highways.gov.gh
Website:www.highways.gov.gh

REPUBLIC OF GHANA

HEAD OFFICE
P.O.BOX 1641
ACCRA

Date.....2018

TO:

The Chief Representative
Sinohydro Corporation Ltd.
No.22 Che Gongzhuang West Road
Haidian District
Beijing, P.R. China.

Dear Sir,

Subject: **REHABILITATION OF NEW ABIREM – OFOASEKUMA – AKIM ODA ROAD (38KM) LOT 9**

We have the pleasure to inform you that the Public Procurement Authority by letter No._____dated _____has given approval for single sourcing of your firm for the above Contract. The Department of Urban Roads Entity Tender Committee by letter No._____dated_____has accepted the proposal you submitted on_____and consequently awarded to your firm the above contract at the Contract Price of **Thirty Million, Three Hundred and Sixty-Eight Thousand, and Eight Hundred Seventy United States Dollars, Eighty Cents Only (US$ 30,368,870.80)** for completion in twenty-four (24) calendar months.

The Employer's Representative is the Chief Executive, Ghana Highway Authority, Head Office, Accra

You are required to submit a Performance Security in the form of a Performance Guarantee amounting to 10% of the Contract Price. The Performance Security shall be from an acceptable bank. A foreign bank providing the Performance Guarantee shall have a corresponding bank located in Ghana.

Signature

ERNEST K. ARTHUR
(AG. CHIEF EXECUTIVE)

SECTION 3 - LETTER OF PROPOSAL

LETTER OF PROPOSAL

July, 2018
Beijing, the People's Republic of China

TO:

Ministry of _____

Dear Sirs,

Subject: REHABILITATION OF NEW ABIREM – OFOASEKUMA – AKIM ODA ROAD (38KM) LOT 9

We have examined the Conditions of Contract and the Employer's Requirements for the above-named Works. We have examined, understood and checked these documents and have ascertained that they contain no errors or other defects. We have visited the site where the Works are to be constructed.

We accordingly offer to design, execute and complete the Works and remedying any defects therein, in conformity with such documents which includes this letter and all other documents for the sum of **Thirty Million, Three Hundred and Sixty-Eight Thousand, and Eight Hundred Seventy United States Dollars, Eighty Cents Only (US$ 30,368,870.80).**

If this offer is accepted, we will provide the specified Performance Security, commence the Works as soon as is reasonably practicable after the Commencement Date, and complete the Works in accordance with the above-named documents within the Time for Completion. We guarantee that the Works will then conform with the Performance Guarantees included with the Particular and General Conditions of Contracts and Annexes.

The quantities set out in the Bill of Quantities attached to our Proposal shall not be taken as the final quantities of the Works which the Contractor is required to design, execute and construct and shall be used only for the purposes of obtaining the Contract Price. The final quantities shall only be established after the detailed design has been approved. The Employer and the Contractor agree and guarantee that the price determined from the final approved design shall however not exceed the amount stated in this Letter of Proposal.

Signature

In the capacity of
Sinohydro Corporation Ltd.
No.22 Che Gongzhuang West Road
Haidian District
Beijing, P.R. China

SECTION 4 - GENERAL CONDITIONS OF CONTRACT

General Conditions of Contract

The General Conditions of Contract governing this Contract shall be the "***Conditions of Contract for EPC/Turnkey Projects***" First Edition 1999 published by the Fédération Internationale des Ingénieurs Conseil (FIDIC).

These Conditions are subject to the variations and additions set out in the "Particular Conditions of Contract" which include amendments and additions to such General Conditions including the Annexes to the Particular Conditions of Contract.

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

SECTION 5 - PARTICULAR CONDITIONS OF CONTRACT

Particular Conditions of Contract

The Conditions of Contract comprise the "General Conditions", which form part of the "Conditions of Contract for EPC Turnkey Projects" First Edition 1999 published by the Fédération Internationale des Ingénieurs Conseil (FIDIC) and the following "Particular Conditions of Contract" which include amendments and additions to such General Conditions including the Annexes to the Particular Conditions of Contract.

Clause 1 – General Provisions

Sub-Clause 1.1.3.1

Delete this Sub-Clause and replace it with the following:

"Base Date shall mean 28 (twenty – eight) days prior to the submission of the Proposal to the Employer"

Sub-Clause 1.1.3.2 Commencement Date

Amend this Sub-Clause as follows:

"Commencement Date" means the date all relevant conditions precedent have been satisfied as defined in Clause 8 of the Particular Conditions.

Sub-Clause 1.1.6.9 Final Design

Add the following definition:

"Final design" means the detail design or shop drawing.

Sub-Clause 1.2 Interpretation

Add the following to the end:

"'*In these Particular Conditions, "cost plus reasonable profit" means cost plus 3% of this Cost.*"

Sub-Clause 1.3 Communications

Add the following paragraph at the end of this Sub-Clause.

The Employer's contact and delivery address shall be as follows:

MINISTRY OF ROADS AND HIGHWAYS

Postal Address: P.O. BOX M57 Ministries, Accra

Email: info@mrh.gov.gh

Telephone: *+233 302 661 575*

The Contractor's contact and delivery address shall be as follow:

Sinohydro Corporation Limited

Postal Address : No.22 Che Gongzhuang West Road Haidian District Beijing, China

Local Address: Block 14 Ghana Airways Street, Airport Residential Area Accra.

Telefax : 86-10-58382715

Email: huangguanghui126@126.com

Telephone: +86-10-58382977 or +233-24-942-4099

Sub-Clause 1.4 Law and Language

"The Contract shall be governed by the Laws of Ghana.

The ruling language shall be English.

The language for communications shall be English."

Sub-Clause 1.13 Compliance with Laws

Add to Sub-Clause 1.13(b) as follows:

"Notwithstanding the provisions of Sub-Clause 1.13 [Compliance with Laws], the Contract excludes any applicable Taxes and levies. In the event that the Contract is not exempt from all applicable Taxes and levies, the Employer shall reimburse the Contractor amounts of such exempt Taxes and levies on supplies and services that the Contractor pays and is unable to recover from the appropriate revenue agency.

Subject to the approval of Parliament of The Republic of Ghana and notwithstanding the provisions of sub-Clause 1.13 [Compliance with Laws], all the Contractor's equipment, plant and vehicles imported by the Contractor under the Contract, shall be exempt from the payment of import duties and taxes provided that the Contractor shall post with the Customs authorities of the Ghana Revenue Authority, a bond guarantee in an amount equivalent to the full import duties and taxes which would be payable on the assessed import value of such Contractor's equipment, plant and vehicles and callable in the event that the Contractor's equipment, plant and vehicles are not re-exported from Ghana on completion of the Contract."

Clause 2 – The Employer

Sub-Clause 2.1 Right of Access to the Site

Add at the end of the Sub-Clause.

"The Employer shall give to the Contractor temporary right of access to the Site to undertake site investigation and geological survey upon signing of the Contract."

Clause 3 – The Employer's Administration

Sub-Clause 3.1 The Employer's Representative

Add the following at the end of the first sentence of the first paragraph of this Sub-Clause:

"The Employer's Representative is The Chief Executive, Ghana Highway Authority

Address: P. O. Box 1641,

Accra, Ghana

Tel: +233 0302 663922,

Email: ce@highways.gov.gh

Clause 4 – The Contractor

Sub-Clause 4.2 Performance Security

Delete the first paragraph of the Sub-Clause and replace with the following:

"The Contractor shall obtain (at his cost) a Performance Security for proper performance of the Works. The Performance Security shall be an Unconditional Performance Bank guarantee in an amount equivalent to 10% of the Contract Price, The Guarantee shall be furnished by a bank approved by the Employer. A foreign bank providing a guarantee shall have a corresponding local bank in Ghana."

Amend second paragraph as follows:

The Contractor shall deliver the Performance Security to the Employer within 56 days after the issue of the Letter of Acceptance and EPC Contract has been approved by the Parliament of Republic of Ghana.

Clause 8 – Commencement, Delays and Suspension

Sub-Clause 8.1 Commencement of Works

Amend this Sub-Clause as follows:

"(a) The Commencement Date shall be determined by the Employer when all of the following conditions precedent have been satisfied:

(i) The Contract comes into full force and effect

(ii) The Contractor receives the full amount of the Advance Payment in accordance with Sub-Clause 14.2

(iii) At least 20% of the Site has been handed over to the Contractor so as to allow the commencement of performance by the Contractor of the works

(iv) The Employer has issued the Notice of Commencement to the Contractor.

Sub-Clause 8.2 Time for Completion

The Time for Completion is twenty-four (24) calendar months.

Sub-Clause 8.7 Delay Damages

The Delay Damages shall be 0.025% of the proportion of the Contract Price not yet handed over as delay damages in respect of the Works, payable (per day) in the proportions of currency in which the Contract Price is payable.

The maximum amount of delay damages shall be five percent (5%) of the Contract Price of the outstanding Works"

Clause 11 – Defects Liability

Sub-Clause 11.1 Completion of Outstanding Work and Remedying Defects

The Defect Notification Period shall be Three hundred and sixty-five (365) days from the date of issuance of Taking-Over Certificate.

Clause 13 – Variations and Adjustments

Sub-Clause 13.8 Adjustments for Changes in Costs

Replace Sub-Clause 13.8 with the following:

f) The strength requirement shall be satisfied if none of the compressive strengths obtained is lower than 50 N/mm^2 and the difference between the highest and lowest values is not more than 20% of the average. All results shall be reported.

v) Compressive Strength (Resinous)

a) The compressive strength for resinous bedding mortars shall be carried out on six 40 mm cubes at an age of 24 hours.

b) The 40 mm cube moulds shall comply with BS 6319: Part 1 and shall be carefully filled using a funnel to ensure void-free cubes. There shall be no compaction.

c) Testing shall comply with BS 6319: Part 2.

d) The strength requirement shall be satisfied if none of the compressive strengths obtained is lower than 50 N/mm^2 and the difference between the highest and lowest values is not more than 20% of the average. All results shall be reported.

vi) Expansion Test

a) Short term expansion shall be determined by the method described in ASTM Standard C827-87. Results shall be determined from the mean of two tests.

b) The expansion of cementitious bedding mortars at 24 hours shall be less than 2.5% and greater than 0.25%.

c) The volume change of resinous bedding mortars at 24 hours shall be between -0.6% and +1.0%.

vii) Water Absorption Test

a) Absorption of water by resinous bedding mortars shall be determined by the method described in ASTM Standard C413-83. The absorption shall be not more than 0.4%.

viii) Elastic stability tests for cementitious bedding mortars shall be carried out on one set of three cubes made at 20°C.

a) Curing shall comply with BS 1881: Part 111. After a minimum of 28 days, the cubes shall be placed in water at 20°C heated at a uniform rate to 45°C in 24 hours.

b) Upon attaining 45°C the cubes shall be sealed in a plastic bag and then loaded at a compressive stress of 30 N/mm^2 maintained for 6 hours at 45°C and the strain measured.

c) The total compressive strain shall not exceed 1% on each cube.

ix) Elastic stability tests for resinous bedding mortars shall be carried out on one set of two 40 mm cubes complying with BS 6319: Part 1.

a) On removing the cubes from the moulds after 24 hours they shall be heated at a uniform rate to 45°C in a further 24 hours.

b) Upon attaining 45°C the cubes shall be loaded at a compressive stress of 30 N/mm^2 maintained for 6 hours at 45°C and the strain measured.

c) The total compressive strain shall not exceed 1% on each cube.

24.6.S Movement Joints and Sealants

Add the following Sub-Clause 24.6.8:

24.6.8 Bridge Deck Expansion Joints

Bridge deck expansion joints, and sealing of gaps in bridges shall be as shown on the Drawings and shall comply with the requirements of this Specification.

Only bridge deck expansion joints which have received approval in accordance with the requirements of UK DTp Departmental Standard BD 33/88 shall be incorporated into

The contract is not subject to price adjustment.

Clause 14 – Contract Price and Payment

Sub-Clause 14.1 Contract Price

Delete this Sub-Clause 14.1(c) and replace with the following:

"The quantities set out in the Bill of Quantities annexed to the Particular Conditions herein shall not be taken as the final quantities of the Works which the Contractor is required to design, execute and construct and shall be used only for the purposes of obtaining the Contract Price. The final quantities shall only be established after the detailed design has been approved. The Employer and the Contractor agree and guarantee that the price determined from the final approved design shall however not exceed the Contract Price stated in the Agreement hereinabove."

Sub-Clause 14.2 Advance Payment

Delete this Sub-Clause and replace with the following:

"The Employer shall make an advance payment, as an interest-free loan for mobilization and design, when the Contractor submits a guarantee in accordance with this Sub-Clause.

The amount of the Advance Payment shall be twenty percent (20%) of the Contract Price less Provisional sums and Contingency. The advance payment will become due upon Contract effectiveness and is to be paid after receiving (i) a Statement (under Sub-Clause 14.3 [Application for Interim Payments]), (ii) the Performance Security in accordance with Sub-Clause 4.2 [Performance Security], and (iii) a guarantee in amounts and currencies equal to the value of the advance payment.

The guarantee shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer. Unless and until the Employer receives the guarantee, this Sub-Clause shall not apply. The Advance Payment Guarantee shall be in the form of a bank guarantee and shall be issued by a bank acceptable to the Employer. A foreign bank providing the Performance Guarantee shall have a corresponding bank located in Ghana.

The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount may be progressively reduced by the amount repaid by the Contractor. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date twenty-eight (28) days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

Deductions shall commence in the Payment Certificate in which the gross value of works certified to date in the interim payment certificate exceeds thirty percent (30%). Deductions shall be made at a rate of twenty five percent (25%) of the Gross amount of each Payment Certificate.

If the advance payment has not been repaid prior to the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15 [Termination by Employer], Clause 16 [Suspension and Termination by Contractor] or Clause 19 [Force Majeure] (as the case may be), the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Employer.

Sub-Clause 14.3 Application for Interim Payments

Delete sub-paragraph (c) of this Sub-Clause and replace with.

"(c) an amount to be deducted for retentioncalculated by applying ten percent(10%) of the payments made under Sub-Clause 14.6 [Interim Payments] until the amount so retained by the Employer reaches the limit

of Retention Money of 5% of the Contract Price."

Sub-Clause 14.4 Schedule of Payments

Delete this Sub-Clause and replace with the following:

"The Payments payable to the Contractor by the Employer under the Contract shall be made based on the milestone specified in the Schedule of Payments and shall be made based on percentage contributions of the various project components as follows:

Table 1: Road Works Payment Schedule

Sr.No	Milestone	Proportion of the Payment (Roads)
1	**Design**	**5.00%**
1.1	Preliminary Design	1.5%
1.2	Detailed Design	3.5%
2	**General items**	**5.00%**
2.1	The lump sum to be spread equally over the	5%
3	**Earthwork/ Paving**	**40.00%**
3.1	When excavation and formation is Complete	15%
3.2	When sub-base is complete	12%
3.3	When base is complete	13%
4	**Bridges/Culverts**	**10%**
4.1	When bridges/ Culverts are complete	10%
5	**Road Surface Work**	**30.00%**
5.1	When Surfacing works are complete	20%
5.2	When Road line marking is complete	4%
5.3	When Road furniture is complete	6%
6	**Drainage channels**	**10.00%**
6.1	When drainage works is complete	10%
	Total	**100%**

Sub-Clause 14.7 Timing of Payments

Amend this Sub-Clause to include the following:

"The timing of payments indicated in the Contract means the period for processing of the payment certificates by the Employer up to the point when the Bank receives the payment certificates for payment."

Sub-Clause 14.8 Delayed Payment

The financing charges for payments shall be calculated at the annual rate of three percent (3%) above the relevant 6-month LIBOR rate and shall be paid in US Dollars.

Amend 3rd paragraph of this Sub-Clause as follows:

The Contractor shall be entitled to this payment after formal notice and certification and without prejudice to any other right or remedy."

Sub-Clause 14.9 Payment of Retention Money

Delete the last paragraph of this Sub-Clause.

Add the following paragraphs at the end of the Sub-Clause.

"Provided always that the Employer's Representative shall certify in each interim certificate issued pursuant to Sub-Clause 14.6 [Issue of Interim Payment Certificates], the Employer shall make payment of the Retention Money if he obtains a guarantee in a form and provided by a bank approved by the Employer, in amounts and currencies equal to the payment.

When the Taking-Over Certificate pursuant to Sub-Clause 10.1 [Taking Over of the Works and Sections] has been issued, the value of the retention money guarantee shall be reduced to one-half (50%) of the limit of Retention Money.

The Contractor shall ensure that the guarantee is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security in Sub-Clause 4.2 [Performance Security] and shall be returned to the Contractor accordingly."

Clause 17 – Risk and Responsibility

Sub-Clause 17.6 Limitation of Liability

The total liability sum shall not exceed the Contract Price.

Clause 18 – Insurance

Sub-Clause 18.1 General Requirements for Insurance

Delete the sixth paragraph and replace it with the following:

"The relevant insuring Party shall within 42 days from the Commencement Date submit to the other Party:

(a) evidence that the insurances described in the Clause have been effected within 21 days calculated from the

Commencement Date, and

(b) copies of the policies for the insurances described in Sub-Clause 18.2 [insurance of Works and Contractor's Equipment] and Sub-Clause 18.3 [insurance against injury to Persons and Damage to Property] within 42 days calculated from the Commencement Date."

Sub-Clause 18.2 Insurance for Works and Contractor's Equipment

Replace sub-paragraph (d) of this Sub-Clause with the following:

"(d) shall also cover loss or damage from the risks listed in sub -paragraph (c) of Sub-Clause 17.3 [Employer's Risks] with deductibles per occurrence of not more than the amount $20,000.00 to these Conditions, and"

Sub-Clause 18.3 Insurance against Injury to Persons and Damage to Property

The limit per occurrence shall be not less Five Hundred United States Dollars ($500.00).

Clause 20 – Claims Disputes and Arbitration

Sub-Clause 20.3 Failure to Agree Dispute Adjudication Board

The appointing authority shall be the President of FIDIC or a person appointed by the President.

Sub-Clause 20.6 Arbitration

Replace Sub – clause 20.6 with the following:

'All disputes arising out of the Agreement, unless amicably settled shall be dealt with in accordance with the provisions of the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL) by a panel of three (3) arbitrators of whom one shall be appointed by the Employer, the other by the Contractor and the 3rd by the two arbitrators.

a) The language for the arbitration shall be English and the place of arbitration shall be London, England.

b) The arbitrators appointed under the UNCITRAL shall have full power to open up, review and revise any decision, opinion, instruction, determination, certificate or valuation made relating to the dispute prior to commencement of the arbitration proceedings.

Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties and the DAB shall not be altered by reason of any arbitration being conducted during the progress of he Works.

The Award of the Arbitral Tribunal pursuant to the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL) shall be final and binding on the Parties.

In the course of arbitration proceedings the Parties shall continue to perform their respective obligations under the Agreement with the exception of the part of the Agreement or Works under Arbitration."

ANNEXES TO PARTICULAR CONDITIONS OF CONTRACT

A. BILL OF QUANTITIES (BOQ)

CONSTRUCTION / REHABILITATION OF SELECTED ROADS AND INTERCHANGES IN GHANA - PHASE 1

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9			BILL OF QUANTITIES	
CESMM CODE	DESCRIPTION	UNIT	QUANTITY	RATE (US$)	AMOUNT (US$)
1.0	**BILL No. 1: GENERAL ITEMS**				
	Contractual Requirements				
A110	Performance Security	Item	Sum		144,293.54
A120	Insurance of the Works	Item	Sum		162,330.23
A130	Third Party Insurance	Item	Sum		
	Specified Requirements				
A223.1	Provide for Client's Project Management Service such as residential and office accomodation for Engineer's staff, site visits and meetings, vehicles for supervisory staff, head office support, capacity training and development, STI, HIV/AIDS and Malaria education, etc	Item	Prov. Sum		720,000.00
A223.2	Percentage adjustment on Item A223.1	%		25	180,000.00
A279.1	Level to reinstate borrow pit area to effect proper drainage, return topsoil to enhance vegetation growth	m²	200,000	0.19	38,000.00
A279.2	Provide and install project sign post indicating Contract name, Contractor, Source of funding and Supervising agency as per ER's instruction.	nr	2	1,000.00	2,000.00
A3	**Method Related Charges** Items for method related charges, if any, shall be inserted by the Tenderer in accordance with Section 7 of the CESMM 1991 Edition. **(CESMM CODE descriptions for such items shall be distinguished between Fixed and Time-Related Charges)** ***BIDDERS SHALL ATTACH A BREAK-DOWN OF ALL LUMP SUM FIXED CHARGES**				
A312.1	Obtain land in consultation with the Client, Set up Contractor's office, camp, store, workshop etc, and hand over same to the Employer upon completion. Structure to be suitable for the intended purpose of the local community,	Item	Sum		600,000.00
A312.2	Maintain Contractor's office camp, store and workshop	month	24	2,030.00	48,720.00
	Other Provisional Sums				
A420.1	Pay compensation to property owners for crops and properties	Item	P.Sum		450,000.00
A420.2	Percentage adjustment on Item A420.1	%		25	112,500.00
A420.3	Pay Service Authorities cost for diversions and relocations	Item	P.Sum		200,000.00
A420.4	Percentage adjustment on Item A420.3	%		25	50,000.00
	TOTAL GENERAL ITEMS CARRIED TO GRAND SUMMARY				**2,707,843.77**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9				BILL OF QUANTITIES
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (US$)
	THE WORKS				
	BILL NO. 2.1				
D	SITE CLEARANCE AND DEMOLITION				
D 100	Clear existing road and shoulders, ditches, verge of bush, shrubs, undergrowth and trees not exceeding 500mm girth, grub up roots and dispose, including backfilling holes with approved fill material as directed	Ha	13.04	2,454.55	32,007.33
	BILL NO. 2.1 - DEMOLITION & SITE CLEARANCE				
	Carried Forward to Collection of Bill Nr.2				**32,007.33**
	BILL NO. 2.2				
E	EARTHWORKS				
E211	Excavate to remove topsoil average depth not exceeding 150mm and dispose as directed	m^3	14910	2.40	35,784.00
E 220	Excavate for cutting in material other than topsoil or artifical hard material and stock pile for re-use	m^3	33000	4.00	132,000.00
E 323	Excavate for foundation in material other than rock depth (0.5 - 1m)	m^3	44,984	19.31	868,641.04
E 420	Excavate material from approved borrow pit including 5km haulage	m^3	23,400	9.00	210,600.00
E 524.1	Scarify existing gravel road surface to a minimum depth of 100mm, reshape and compact.	m^2	11,250	0.61	6,862.50
E 524.2	Scarify existing bitumen road surface to a minimum depth of 100mm, reshape and compact.	m^2	413,190	0.85	351,211.50
E 625.1	Load up imported fill material, deposit, Spread and compact in embankment to approved profiles as directed including approaches; including 1 km haulage.	m^3	56,400	4.50	253,800.00
E 900.1	Haulage in excess of 5km for gravel fill material (0 - 20km)	m^3km	1,128,000	0.53	597,840.00
	BILL NO. 2.2 - EARTH WORKS				
	Carried Forward to Collection of Bill Nr.2				**2,456,739.04**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9				BILL OF QUANTITIES
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (US$)
	BILL NO. 2.3				
F	**CONCRETE WORKS**				
	Provision of Concrete				
F 214	Designed mix, grade C15/20 Cubical	m^3	1	213.26	213.26
F 253	Designed mix, grade C25/20 Cubical	m^3	9,939	225.74	2,243,629.86
	Placing of Concrete				
F511	Mass concrete in blinding; thickness not exceeding 150mm	m^3	1	36.33	36.33
F 522	Mass concrete in bases footing and ground Slab thickness 150-300mm	m^3	2,201	41.97	92,375.97
F 542	Mass concrete in Walls	m^3	5,493	41.97	230,541.21
F 580	Ditto; U-Drain 150 - 300mm	m^3	2,086	41.97	87,549.42
F 623	Reinforced concrete in bases, footings and ground slabs; thickness 150-300mm	m^3	159	42.77	6,800.43
	Haulage of Aggregates				
F900.1	In excess of 1km for sand (1 - 20km)	m^3km	87,465	0.53	46,356.45
F900.2	In excess of 1km for chippings (20 - 100km)	m^3km	874,651	0.50	437,325.50
G	**CONCRETE ANCILLARIES**				
	Formwork				
G 144	Rough finish; Plane vertical surfaces; width 0.40 - 1.22m	m^2	8,860	13.50	119,610.00
G 115	Rough finish; Plane to horizontal surfaces ; width 0.40 - 1.22m	m^2	1,062	13.50	14,337.00
G 244	Fair finish; formwork to vertical surface width 0.4≤1.22	m^2	3,554	13.50	47,979.00
G 253	Fair finish, curved to one radius in one plane, width 0.4 - 1.22m	m^2	5,561.0	13.50	75,073.50
				C/F	**3,401,827.93**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9				BILL OF QUANTITIES
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (US$)
				B/F	3,401,827.93
	Reinforcement				
G 514	Ditto; nominal size 12mm	tons	11.43	2,150.00	24,574.50
	Pipe Work				
I243	Provide, lay and joint 900mm diameter precast concrete pipe; in trench 1.5-2.0m deep	m	12	354.00	4,248.00
	Supports & Protection				
L544	Mass concrete class 15/40 surround to single 900mm precast concrete pipe including formwork complete	m	12.00	303.76	3,645.12
N130.2	Ditto size 6000mm x 900mm 25mm	nr	10.00	105.00	1,050.00
	BILL NO. 2.3 - CONCRETE WORKS				
	Carried Forward to Collection of Bill Nr.2				**3,435,345.55**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9				BILL OF QUANTITIES
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (US$)
R	**BILL NO. 2.4** **ROAD AND PAVINGS**				
	Sub-base, flexible road bases and surfacing				
R.114	Provide, lay and compact approved granular sub-base material in carriageway including shoulders to thickness 150mm to stabilise road bed Include 1km haulage	m^2	493,810	2.80	1,382,668.00
R 124	Provide mechanically stablised 50% natural gravel and 50% crushed rock base material, spread and compact 150mm thick including haulage not exceeding 1km	m^2	450,110	8.44	3,798,928.40
R.900.1	Extra over Items R114 and R124 for haulage of materials in excess of 1km (0 - 20km)	m^3km	1,111,073	0.53	588,868.43
R 900.2	Extra over Item R124 for haulage of graded crushed rock in excess of 1km (100 -250km)	m^3km	4,050,990	0.30	1,215,297.00
	Precast Concrete Kerbs				
R.611	Provide and place Precast concrete (grade C25/20) kerbs	m	16,423	31.00	509,113.00
	BILL NO. 2.4 - ROAD AND PAVINGS **Carried Forward to Collection of Bill Nr.2**				**7,494,874.83**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9				BILL OF QUANTITIES
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (US$)
	BILL NO. 2.5				
R	**ROAD SURFACING WORKS**				
R 349. 1	Supply designed spray rate and spray AC 10 (80-100 pen) bitumen including preparation of surface for primer seal work.	litres	529,329	3.73	1,974,398.51
R 349 .2	Supply incorporate cutter oil (ATK) kerosine in class AC 10 (80-100 pen) binder as designed and spray for primer seal.	litres	100,825	1.79	180,476.11
R349.3	Supply designed spray rate and spray AC 10 (80-100 pen) bitumen including preparation of surface for first seal work.	litres	630,154	3.73	2,350,474.42
R349.4	Supply designed spray rate and spray AC 10 (80-100 pen) bitumen including preparation of surface for second seal work.	litres	630,154	3.73	2,350,474.42
R 349.4a	Supply, precoat, desgned spread rate apply and incorporate 10mm chippings (Primer Seal	m^3	4,501	175.00	787,692.50
R 349.4b	Supply, precoat, desgned spread rate apply and incorporate 14mm aggregates (First Seal)	m^3	5,001	185.00	832,703.50
R 349.4c	Supply, precoat, desgned spread rate apply and incorporate 10mm aggregates (Second Seal)	m^3	4,501	175.00	875,213.89
R 390.1	Haulage of chippings in excess of 1km for Items R349.4a, R349.4b and R349.4c (Km 20-100)	m^3km	840,205	0.50	420,102.67
	BILL NO. 2.5 - ROAD SURFACING WORKS Carried Forward to Collection of Bill Nr.2				**9,771,536.01**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9				BILL OF QUANTITIES
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE	AMOUNT (US$)
	BILL NO. 2.6 **TRAFFIC SIGNS & ROAD MARKINGS**				
R	**ROAD MARKINGS**				
R 811.1	Provide and install concrete kilometer post 975mm with-reflective markers at both sides as per drawing	nr	36	94.32	3,395.52
R 811.2	Provide and install Retro-reflective Road signs (regulatory warning & information) on single pole as directed by ER	nr	90	219.26	19,733.40
R 811.3	Provide and install Retro-reflective Advance Directional Sign on double pole as directed by ER	nr	8	313.20	2,505.60
R 811.4	Provide and install Retro-reflective double pole informatory signs for (Town Gates) as directed by ER	nr	16	313.20	5,011.20
R 824.1	Provide120mm x 3.0mm thick retro-reflective thermoplastic roadline marking (continuous) at the edge.	m	87,400	3.70	323,380.00
R 824.2	Provide120mm x 3.0mm thick retro-reflective thermoplastic roadline marking at centre line (continuous)	m	30,590	3.70	113,183.00
R 824.3	Provide120mm x 3.0mm thick retro-reflective thermoplastic roadline marking at centre line (intermittent).	m	11,400	3.70	42,180.00
R 824.4	ditto 150mm intermittent at junctions	m	7,600	4.20	31,920.00
R 890.1	Provide and install Retro-reflective of varying width roadline marking 3.0m thick for Zebra crossing	m2	144	28.00	4,032.00
X 181	750mm high W-section galvanized metal crash barrier with galvanised steel support as specified.	m	1,000	89.53	89,530.00
	BILL NO. 2.6 - TRAFFIC SIGNS & ROAD MARKINGS Carried Forward to Collection of Bill Nr.2				**634,870.72**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9	BILL OF QUANTITIES
		AMOUNT (US$)
	BILL No. 2 THE WORKS	
	COLLECTION	
1	BILL No. 2.1 DEMOLITION & SITE CLEARANCE	32,007.33
2	BILL No. 2.2 - EARTHWORKS	2,456,739.04
3	BILL No. 2.3 - CONCRETE WORKS	3,435,345.55
4	BILL No. 2.4 - PAVINGS	7,494,874.83
5	BILL No. 2.5 - SURFACING WORKS	9,771,536.01
6	BILL No. 2.6 - TRAFFIC SIGNS & ROAD MARKINGS	634,870.72
7	BILL No. 2.7 - PROVISION OF 10NO. SPEED TABLE	68007.6
8	BILL No. 2.8 - BUS BAY, WALKWAYS AND LORRY PARK	1,131,385.74
	BILL No.2 - TOTAL AMOUNT Carried Forward to Summary	**25,024,766.82**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9			BILL OF QUANTITIES	
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE USD $	AMOUNT USD$
	BILL No. 2.7				
	Trapezoidal speed tables(10 no.)				
E323	Excavate for foundation in material other than rock depth (0.5 - 1.0m)	m3	4	19.31	77.24
	Insitu Concrete Works				
F263	Provide concrete 30/20	m3	90	369.86	33,287.40
	Placing of Concrete				
F621	Place concrete in structure	m3	90	41.97	3,777.30
	Haulage				
F900.1	Extra over haulage of sand for concrete works (0-20 km)	m3km	792	0.53	419.76
F900.1	Extra over haulage of chippings to site (20 - 100km)	m3km	7920	0.50	3,960.00
	Formwork				
G112	Formwork rough finish to edges of speed table (0.1 - 0.2m)	m2	10	13.50	135.00
	Reinforcement				
G513	Plain round steel bars to BS 4449 10mm diameter at 300mm centres laid at bottom of speed table and toe	ton	1.90	2,150.00	4,085.00
	Ramble Strip				
R 812.1	Provide and Install Reflectors on approved points	Nr	30	23.25	697.50
R 811.1	Provide and install non reflective Hump warning single pole single face road signs	Nr	20	167.78	3,355.60
R 811.2	Ditto- Hump information signs	Nr	20	167.78	3,355.60
R 811.3	Ditto- 50kph Speed limit	Nr	20	167.78	3,355.60
				C/F	**56,506.00**

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9			BILL OF QUANTITIES	
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE USD $	AMOUNT USD$
B/F				B/F	56,506.00
R8240.3	Provide and apply 150 mm thick tropicalised white reflective thermoplastic material in 3mm wide	m2	131	28.00	3,668.00
R890	Provide and install 150mm diameter x 750mm high steel bollards filled with lean concrete and painted in 2 reflective colours as specified by the Engineer	Nr	40	149.64	5,985.60
R824	Provide and apply 120mm thick tropicalised white reflective thermoplastic paint at slope of speed table for safe crossing	m2	66	28.00	1,848.00
	SPEED TABLES CARRIED TO COLLECTION				68,007.60

GHANA HIGHWAY AUTHORITY	REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9			BILL OF QUANTITIES	
CESMM CODE	DESCRIPTION	UNIT	QTY	RATE USD $	AMOUNT USD$
	BILL NO. 2.8				
	BUS BAY, WALKWAYS AND LORRY PARK				
R114	Provide, lay and compact 150mm thick gravel Sub-base	m2	20,000	2.80	56,000.00
R125	Provide, lay and compact 200mm thick approved mechanically stabilised base 150mm thick comprising 50% gravel and 50% crush rock including 1km haulage.	m2	20,000	8.44	168,800.00
R190.1	Haulage of natural gravel material in excess of 1km for Items R114 and R125 (0 - 20km)	m3km	108,000	0.53	57,240.00
R190.2	Haulage of crush rock material in excess of 1km for Item R125 (20-100km)	m3km	160,000	0.50	80,000.00
	INTERLOCKING BRICK/BLOCK ROADS/PAVINGS				
	Block; Spec 200 x 100 x 80 thick paving blocks; 50 N/mm²; laid on quarry dust bed 50 thick including polythene and well compacted				
	Pavings				
X430.1	level or to falls; general - **Lorry Park**	m2	10,000	36.35	363,500.00
	Block; Spec 200 x 100 x 80 thick paving blocks; 30 N/mm²; laid on quarry dust bed 50mm thick including polythene and well compacted				
X430.2	level or to falls; general - **Pedestrain Walkways and Bus Bays**	m2	10,000	32.71	327,100.00
	Kerbs, Channels and Edgings				
H510	150mm x 350mm non-mountable type straight kerb once splayed and finished fair on all exposed faces cast on 100mm x 280mm foundation including all necessary excavations, backfilling and formwok complete as per drawing	m	4,341	18.14	78,745.74
	BUS BAY, WALKWAYS AND LORRY PARK				**1,131,385.74**

CONSTRUCTION/REHABILITATION OF SELECTED ROADS AND INTERCHANGES IN GHANA - PHASE 1

REHABILITATION OF NEW ABIREM - OFOASEKUMA - AKIM ODA ROAD (38KM) - LOT 9

ITEM	GENERAL SUMMARY	PAGE	AMOUNT (US$)
1	BILL NO.1 - GENERAL ITEMS		2,707,843.77
2	BILL NO.2 - THE WORKS		25,024,766.82
3	SUBTOTAL OF BILLS	A	27,732,610.59
4	SPECIFIED PROVISIONAL SUMS INCLUDED IN SUBTOTAL OF BILLS	B	**1,370,000.00**
5	TOTAL OF BILLS LESS PROVISIONAL SUMS (A-B)	C	26,362,610.59
6	10% OF (C) PHYSICAL CONTINGENCY	D	2,636,261.06
7	ADJUSTMENT ALLOWANCE (ADD/SUBTRACT)	E	
8	NET BID PRICE (A) +(D) +(E) + (F) (CARRIED FORWARD TO FORM OF BID)	F	**30,368,871.65**

B. FORM OF PERFORMANCE SECURITY

Form of Performance Security

Brief description of Contract _____

Name and address of Beneficiary _____

_____ (whom the Contract defines as the Employer)

We have been informed that_____(hereinafter called the "Principal") is your contractor under such Contract, which requires him to obtain a performance security.

At the request of the Principal, we (*name of bank*) _____hereby irrevocably undertake to pay you, the Beneficiary/Employer, any sum or sums not exceeding in total the amount of _____(the "guaranteed amount", say:_____) upon receipt by us of your demand in writing and your written statement stating:

(a) that the Principal is in breach of his obligation(s) under the Contract, and

(b) the respect in which the Principal is in breach.

*[*Following the receipt by us of an authenticated copy of the taking-over certificate for the whole of the works under clause 10 of the conditions of the Contract, such guaranteed amount shall be reduced by % and we shall promptly notify you that we have received such certificate and have reduced the guaranteed amount accordingly.*]*[1]

Any demand for payment mus: contain your *[*minister's/directors'*]* (i) signature(s) which must be authenticated by your bankers or by a notary public. The authenticated demand and statement must be received by us at this office on or before (*the date 70 days after the expected expiry of the Defects Notification Period for the Works)*

_____(the "expiry date"), when this guarantee shall expire and shall be returned to us.

We have been informed that the Beneficiary may require the Principal to extend this guarantee if the performance certificate under the Contract has not been issued by the date 28 days prior to such expiry date. We undertake to pay you such guaranteed amount upon receipt by us, within such period of 28 days, of your demand in writing and your written statement that the performance certificate has not been issued, for reasons attributable to the Principal, and that this guarantee has not been extended.

This guarantee shall be governed by the laws of_____ and shall be subject to the Uniform Rules for Demand Guarantees, published as number 458 by the International Chamber of Commerce, except as stated above.

Date_____ Signature(s)_____

C. FORM OF ADVANCE PAYMENT GUARANTEE

Brief description of Contract _____

Name and address of Beneficiary _____

_____(whom the Contract defines as the Employer).

We have been informed that_____(hereinafter called the "Principal") is your contractor under such Contract and wishes to receive an advance payment, for which the Contract requires him to obtain a guarantee.

At the request of the Principal, we (name of bank)_____hereby irrevocably undertake to pay you, the Beneficiary/Employer, any sum or sums not exceeding in total the amount of _____(the "guaranteed amount", say: _____) upon receipt by us of your demand in writing and your written statement stating:

(a) that the Principal has failed to repay the advance payment in accordance with the conditions of the Contract, and

(b) the amount which the Principal has failed to repay.

This guarantee shall become effective upon receipt [of the first instalment] of the advance payment by the Principal. Such guaranteed amount shall be reduced by the amounts of the advance payment repaid to you, as evidenced by your notices issued under sub-clause 14.6 of the conditions of the Contract. Following receipt (from the Principal) of a copy of each purported notice, we shall promptly notify you of the revised guaranteed amount accordingly.

Any demand for payment must contain your signature(s) which must be authenticated by your bankers or by a notary public. The authenticated demand and statement must be received by us at this office on or before (*the date 70 days after the expected expiry of the Time for Completion*)_____ (the "expiry date"), when this guarantee shall expire and shall be returned to us.

We have been informed that the Beneficiary may require the Principal to extend this guarantee if the advance payment has not been repaid by the date 28 days prior to such expiry date. We undertake to pay you such guaranteed amount upon receipt by us, within such period of 28 days, of your demand in writing and your written statement that the advance payment has not been repaid and that this guarantee has not been extended.

This guarantee shall be governed by the laws of and shall be subject to the Uniform Rules for Demand Guarantees, published as number 458 by the International Chamber of Commerce, except as stated above.

Date_____ Signature(s)_____

D. FORM OF RETENTION MONEY GUARANTEE

Form of Retention Money Guarantee

Brief description of Contract _____

Name and address of Beneficiary _____

_____(whom the Contract defines as the Employer).

We have been informed that (hereinafter called the "Principal") is your contractor under such Contract and wishes to receive early payment of *[part of]* the retention money, for which the Contract requires him to obtain a guarantee.

At the request of the Principal, we (*name of bank*)_____hereby irrevocably undertake to pay you, the Beneficiary/Employer, any sum or sums not exceeding in total the amount of

_____(the "guaranteed amount", say:_____) upon receipt by us of your demand in writing and your written statement stating:

(a) that the Principal has failed to carry out his obligation(s) to rectify certain defect(s) for which he is responsible under the Contract, and

(b) the nature of such defect(s).

At any time, our liability under this guarantee shall not exceed the total amount of retention money released to the Principal by you, as evidenced by your notices issued under sub-clause 14.6 of the conditions of the Contract with a copy being passed to us.

Any demand for payment must contain your signature(s) which must be authenticated by your bankers or by a notary public. The authenticated demand and statement must be received by us at this office on or before (*the date 70 days after the expected expiry of the Defects Notification Period for the Works*) _____
(the "expiry date"), when this guarantee shall expire and shall be returned to us.

We have been informed that the Beneficiary may require the Principal to extend this guarantee if the performance certificate under the Contract has not been issued by the date 28 days prior to such expiry date. We undertake to pay you such guaranteed amount upon receipt by us, within such period of 28 days, of your demand in writing and your written statement that the performance certificate has not been issued, for reasons attributable to the Principal, and that this guarantee has not been extended.

This guarantee shall be governed by the laws of and shall be subject to the Uniform Rules for Demand Guarantees, published as number 458 by the International Chamber of Commerce, except as stated above.

Date_____ Signature(s)_____

E. DISPUTE ADJUDICATION BOARD AGREEMENT

[for each member of a three-person DAB]

Name and details of Contract

Name and address of Employer

Name and address of Contractor

Name and address of Member

Whereas the Employer and the Contractor have entered into the Contract and desire jointly to appoint the Member to act as one of the three persons who are jointly called the 'DAB' [and desire the Member to act as chairman of the DAB] to adjudicate a dispute which has arisen in relation to

The Employer, Contractor and Member jointly agree as follows:

Whereas the Employer and the Contractor have entered into the Contract and desire jointly to appoint the Member to act as sole adjudicator who is also called the "DAB" to adjudicate a dispute which has arisen in relation to

_____*

The Employer, Contractor and Member jointly agree as follows:

1. The conditions of this Dispute Adjudication Agreement comprise the "General Conditions of Dispute Adjudication Agreement", which is appended to the General Conditions of the "Conditions of Contract for EPC/Turnkey Projects" First Edition 1999 published by the Federation Internationale des Ingenieurs-Conseils (FIDIC), and the following provisions. In these provisions, which include amendments and additions to the General Conditions of Dispute Adjudication Agreement, words and expressions shall have the same meanings as are assigned to them in the General Conditions of Dispute Adjudication Agreement.

2. *[Details of amendments to the General Conditions of Dispute Adjudication Agreement, if any.]*

3. In accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement, the Member shall be paid a daily fee of_____per day.

4. In consideration of these fees and other payments to be made by the Employer and the Contractor in accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement, the Member undertakes to act as the DAB (as adjudicator) in accordance with this Dispute Adjudication Agreement.

5. The Employer and the Contractor jointly and severally undertake to pay the Member, in consideration of the carrying out of these services, in accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement.

6. This Dispute Adjudication Agreement shall be governed by the law of

SIGNED by	SIGNED by	SIGNED by
For and on behalf of the Employer in the presence of Witness: Name: Address:	For and on behalf of the Contractor in the presence of Witness: Name: Address:	For and on behalf of the Member of DAB in the presence of Witness: Name: Address:

SECTION 6

EMPLOYER'S REQUIREMENTS

EMPLOYER'S REQUIREMENTS

The purpose of the Employer's Requirements document is to:

Set out precisely the requirements of the Employer to facilitate Contractors to price the works accurately;

Describe and determine the result to be achieved by the Contractor;

Specify the project requirement in terms of performance parameters or specifications; and

Remove any risk of unforeseen costs for elements of work that have not been accounted for.

PROJECT BACKGROUND

Roads in Ghana play very important role in the transportation of goods and passengers as over 95% of all travel is by road. It provides easy access to different locations of social and economic importance such as education, health facilities, markets, shops etc. access to these facilities are essential for economic development and the improvement of the quality of life.

The Government of Ghana (GOG) recognizes the importance of road transport in facilitating socio-economic development of the nation. It is in this direction that the National Transport Policy of the Ministry of Roads and Highways (MRH) set out objectives to create an integrated, efficient, cost-effective and sustainable transport system responsible to the needs of society, supporting growth and poverty reduction.

In line with these strategic objectives, the Ghana Highway Authority (GHA) seeks to reduce the average travel time on the arterial roads especially at intersections and to progressively reduce the walking and waiting time for public transport in low income communities in the urban areas of Ghana.

Congestion and poor conditions of the existing road network coupled with the limited supply of alternative routes has resulted in long travel times and high vehicle operating cost. The existing roads also have limited facilities for pedestrians, particularly vulnerable pedestrians (children, aged and the physically challenged) which make them unsafe. The intersections being considered are all at grade and with the high volumes during the peak periods congestion has become intolerable.

These factors militate against the potential of the road infrastructure contribution to economic development and improved quality of life of the people of Accra and the nation as a whole.

Project Overview

The GHA intends to rehabilitate the NEW ABIREM – OFOASEKUMA – AKIM ODA ROAD (38KM0 LOT 9 to ease traffic congestion and thereby help to improve the quality of life of the citizenry and enhance economic growth.

The main objectives of this Project are to reduce travel time and reduce congestion being faced daily by motorists and to enhance socio-economic development of our urban centers and the nation as a whole.

The Ministry of Roads and Highways is seeking a partner to deliver the above-mentioned projects. The contract is to be guided by these Employer's Requirements.

This transaction will be subject to all the relevant laws and regulations of the Republic of Ghana and due diligence to ensure that the Government achieves Value for Money (VfM).

The commencement of these projects are dependent of the fulfilment of all relevant Regulations, Laws and Approval under the Constitution and Laws of the Republic of Ghana.

PROJECT DESCRIPTION

The project is in the Eastern Region traversing between New Abirem through to Ofoasekuma through to Akim Oda. A total of 38KM of the stretch is to be Rehabilitated under this Contract.

1 OUTPUT SPECIFICATION AND SCOPE OF PROJECT

3.1 Output Specifications

Table 2 outlines the minimum output specifications for the Design and Construction of Selected Arterial Roads and Interchanges in our urban areas.

Table 2: Minimum Output Specifications

Item	Output	Specification
1	Roads	Level of Service D (min) at year 20
2	Intersections	Level of Service D (min) at year 20
3	Bridges and Tunnels	2 x 3 lanes span 100-year design life
4	Primary Drains	50-year return period
5	Secondary Drains	15-year return period

3.2 Scope of Work

The scope of works to be undertaken as part of this project shall comprise Engineering, Procurement and Construction of the Works.

(a) Design
The Design shall address the following:

- Preliminary Design which should include but not limited to the following;
  - Improvement of the pavement condition
  - Development of network of local roads to ensure connectivity without necessarily using the improved facility

- Detailed Engineering Design
  The Detailed Engineering Design should include but not limited to the following;
  - Resolution of the Vehicular conflict at these locations;
  - Road and drainage improvement works;

(b) Construction
The Construction means the construction of the selected roads under the Contract.

3.3 Design of the Works

3.2.1 *Route Location*

The route for the selected roads have been identified but the available Right of Way (ROW) for the various routes have to be confirmed and recommendation made as to their adequacy for the implementation of the project.

3.2.2 *Topographical Surveys*

All necessary topographical data shall be collected in digital format to help the design required for the roads. Surveys may be undertaken to help produce the design required for the routes. The data shall include the existing ground model and details of all existing physical features

above ground within the limits of the proposed Right Of Way for the afore-mentioned routes.

Additional topographical studies may be undertaken to confirm the availability of the proposed Right-of-Way (ROW). All major storm channels shall be included in this topographical study. Where modifications to the ROW are required, the necessary proposals will be made, discussed and confirmed by the appropriate statutory authority.

Major obstacles within the proposed ROW, including buildings, shall be identified and proposals made for the removal or otherwise of these structures.

The EPC Contractor shall complete an acquisition survey for the ROW to a scale acceptable by the Survey and Mapping Division (S&MD) of the Lands Commission.

All survey information shall be linked to the National Grid and shall be reproducible in AUTOCAD or any graphic software to appropriate scale.

3.2.3 *Traffic and Transport Surveys*

The EPC Contractor shall collect all traffic and transport data necessary for the project. This may include Traffic volume counts, Turning Movement Counts, Origin-Destination Surveys, Parking Surveys, Public Transport Surveys, Axle load surveys, etc.

The objectives of the traffic data collection are:

i. To assess the potential use of the road by all categories of transport;
ii. Project the design year traffic flow;
iii. Determine design year pavement loading characteristics; and
iv. Undertake economic evaluation of the project.

3.2.4 *Geotechnical Investigations*

All necessary geotechnical investigations shall be carried out to help with the assessment and design of road pavement, earth retaining structures and foundations of bridges.

3.2.5 *Hydrological Studies*

All necessary hydrological data shall be collected to enable adequate sizing of primary or secondary storm drains, roadside drains, bridges and culverts. The EPC Contractor must coordinate his activities with the Hydrological Division of Ministry of Water Resources, Work and Housing for proper implementation. An inventory of existing drains, culvert or streams shall be prepared.

3.2.6 *Utility Routes and Relocation*

Adequate liaison shall be established with all the Utility Authorities: Ghana Water Company Limited (GWCL), Telecom Operators and Electricity Company of Ghana (ECG) to obtain the present location of their pipes, cables, plants and facilities. Information on their long-term development plans should also be collected. The information should be represented on Utility Plans to the same accuracy as all other topographical data. Where necessary, trial holes should be sunk to locate accurately the indicated utilities.

On a base map showing existing utilities, proposals for relocation and new utility routes should be prepared in sufficient detail to help with relocation of utility lines and for future utility works. For drawings prepared for various roads, detailed mapping of existing utilities shall be indicated and costs for relocation of such utilities incorporated in the bill of quantities.

3.2.7 *Geometric Design of Roads*

Geometric design of the proposed route must provide adequate vertical and horizontal details relating to existing and proposed physical features of the route. This must be drawn to a scale of 1:1000 or any appropriate scale.

3.2.8 *Geometric Design of Intersections*

General arrangement drawings; and vertical and horizontal alignment drawings for the major intersections shall be provided at a scale of 1:500 or any appropriate scale.

3.2.9 *Right of Way Drawings*

These shall be at a scale of 1:2500 and shall be in a format that is approved by the Land Commission Secretariat for the acquisition of ROW. In the situation that the Road ROW has been acquired the Contractor shall survey and reproduce the ROW to verify its availability. He shall also make recommendations for additional land and provide drawings for the acquisition.

3.2.10 *Drainage Design*

Based on the necessary Hydrological data, recommendation shall be made for the effective drainage of the roads, intersections, interchange, bridges and surrounding properties. A schedule for all crossings shall be prepared and represented on the geometric design drawings in sufficient detail. Subsoil drainage systems, where required will also be indicated.

3.2.11 *Pavement Design*

Based on the information previously collected, recommendation shall be made for the relevant pavement configuration for roads, walkways, non-motorised traffic routes, bus-bays and any other relevant facility.

3.2.12 *Structural Design*

All structures, including bridges and culverts, must be designed in accordance with design guide from Ghana Highway Authority and must conform to standard details pertaining to DUR. Drawings shall be prepared to indicate function and sufficient construction details to enable estimation of quantities.

3.2.13 *Pedestrian Facilities*

Non-motorized systems are a tremendous asset which provides a host of benefits by lessening the traffic burden and providing alternative routes to school, work, shopping and other trip destinations. They are also a major transport option for the urban poor. The Contractor shall therefore adopt a comprehensive approach to make adequate provision for pedestrians in the detailed design. These facilities must be provided in a way that is convenient and safe to use. Details must be provided for the construction of these facilities on the drawings. Schemes and designs on how to integrate the NMT facilities into the overall design must be clearly provided by the Contractor.

3.2.14 *Traffic Signals Operations*

Where traffic lights are required, adequate capacity analysis must be undertaken to justify the number of lanes recommended for each movement and the staging design. The location of all poles, signal heads, controllers, detectors and any other ancillary facility must be clearly indicated on the drawing. Details for ducting and cabling must also be provided.

The traffic lights along a particular corridor must be coordinated and the EPC Contractor must design and detail the systems required to achieve this.

3.2.15 *Street Lights*

Details must be provided for the installation of street-lights for adequate lighting of all facilities within the ROW and intersections. The EPC Contractor is to liaise with the Electricity Company of Ghana for their advice and any specifications they may have for street-lights.

3.2.16 *Road Furniture and Marking*

The EPC Contractor must provide adequate information on the drawings for all road signs, markings and other furniture that is required for information and safe operation of the roads.

3.2.17 *Landscaping & Public Art*

The EPC Contractor shall provide schemes to enhance the immediate vicinity of the road; e.g., tree planting, landscaping of median, etc.

Design landscaping and public art along the roads and surrounding areas in a way that will create a pleasant urban environment and address the requirements of the Environmental Protection Agency.

3.2.18 *Utility Relocation and Ducts*

On a base map showing existing utilities, proposals for relocation and new utility routes should be prepared in sufficient detail to help with relocation ahead of scheme implementation and for future utility works.

The relocation schemes should be discussed with the utility agencies and evidence of agreements reached with the utility agencies should be included in the relocation drawings.

The EPC Contractor is advised to make adequate provision in his proposals for this.

3.2.19 *Implementation Plan*

An interdependence and time frame analysis should be undertaken to advice on staging and implementation strategy for the project. The EPC Contractor shall break the project down into packages for implementation. He shall indicate, with justification (economic & technical), the priority for implementing the packages. He shall develop an implementation schedule in consultation with the Client.

3.2.20 *Bill of Quantities*

The EPC Contractor shall prepare the Bill of Quantities (BOQ) for all the Works using the Civil Engineering Standard Method of Measurement (CESMM) 3rd Edition. Provision should also be made for measures to mitigate the environmental and social impact of the project. The Bill of Quantities will be prepared according to the project packages agreed with the Employer.

3.2.21 *Cost Estimate*

The EPC Contractor shall fully price a copy of the BOQ using the most current prices at the time and making adequate provision for price fluctuation. The EPC Contractor shall also estimate the cost for detailed design and supervision of the works, giving the basis of his estimate.

3.2.22 *Safety Audit*

A safety audit shall be undertaken by an independent Entity to be nominated by the Employer. The EPC Contractor shall be required to address all the issues raised in the safety audit report to the mutual satisfaction of all in the Final Design. The EPC Contractor will be required to include in his final report a statement to this effect from the safety auditor.

3.4 Safeguards

3.3.1 *Environmental and Social Impact Assessment*

The EPC Contractor shall follow the Ministry of Roads and Highways' Environmental and Social Management Framework (ESMF) and the Environmental Protection Agency (EPA) regulations in preparing the appropriate instrument required for the assessment of an Environmental and Social Impact Assessments.

The objectives of the ESIA is to:

- Establish baseline information on both natural and built environment including the socio economic activities within the corridors of the project road.
- Assess both positive and negative impacts.
- Propose effective measures to mitigate the negative impacts.
- Outline management clauses and enforcement of the mechanisms to be included in the contract document regarding the implementation of the mitigation measures, and
- Prepare a monitoring and management plan indicating parameters to be monitored, responsibilities and outputs.

3.3.2 *Resettlement Action Plan*

The EPC Contractor shall follow the Ministry of Roads and Highways' Resettlement Policy Framework (RFP) in preparing the appropriate instrument required for the preparation of the appropriate Resettlement Plan where the project involves the displacement of people.

The primary objective of RAP is to identify the full range of people that are likely to be affected by the project, and to justify their displacement after consideration of alternatives that would minimize or avoid displacement. It also seeks to ensure that people who may be affected or displaced as a result of this project receive the necessary assistance in their efforts to improve their livelihoods and standards of living.

The specific objectives of the RAP are as follows:

(i) To identify persons within the project site that reside, operate businesses or own property within the project area;

(ii) To assess all social and economic impacts and risks likely to be associated with the project;

(iii) To develop appropriate corresponding measures to avoid or mitigate the risks and impacts;

(iv) To develop an implementation and monitoring plan for the activities related to resettlement due to involuntary resettlement;

(v) To maximise the involvement of project affected persons (PAPs) in all stages of implementation; and

(vi) To define and deliver the required entitlements to project affected persons

(vii)

3.3.3 *Property Impact Assessment*

The EPC Contractor shall complete a property impact assessment, which shall address the following issues:

i. An inventory of all affected properties including land, permanent structures and temporary structures.

ii. a list of all properties and interests affected by the design that can be acquired by the State Lands Act (Act 125 of 1962) and estimate the amount of compensation required for each in consultation with the Lands Valuation Division

Environmental Impact Statement and Environmental Management Plan (EMP)

The EPC Contractor shall update the Environmental Impact Assessment Report, which fully meets the requirements of the Environmental Protection Act (Act 490) of 1999 and LI 1652. The Contractor shall address all issues raised by the EPA in relation to the submission. Appropriate recommendation shall be made in the report to mitigate all negative impacts. Positive impacts shall be highlighted.

3.5 Design and Reports

The following Designs and Reports shall be presented according to the following schedule:

Design/Report	Quantity (No)
Preliminary Design and Report	10
Update of ESIA Report	10
Preparation of Resettlement Action Plan	10
Detail Engineering Design and Report	10

Consultation with Stakeholders

The Contractor will establish consultative channels with the respective Metropolitan/Municipal Assembly within which the roads fall, Town and Country Planning Department, utility agencies and other identifiable stakeholders during the services and at identifiable stages.

A major consultation with stakeholders will also take place within the period for the Preliminary Design. The Contractor will be expected to make a Powerpoint presentation. He is also expected to take note of various comments made during the forum for further discussion with the Employer and major stakeholders prior to the Detailed Design. The Contractor shall be responsible for all arrangements and logistics for the forum and stakeholder consultations. Adequate provision should be made for these in the proposals.

4 PROPOSED FORM OF CONTRACT

The proposed form of contract for this Contract shall be the **"Conditions of Contract for EPC/Turnkey Projects"** First Edition 1999 published by the Federation Internationale des Ingenieurs-Conseils (FIDIC), subject to any variations and additions set out in the Particular Conditions of Contract.

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

FIDIC Secretariat

P. O. Box 86

CH-1000 Lausanne 12
Switzerland

Fax: +41 21 653 5432

Telephone: +41 24 654 4411
Email: fidic@pobox.com
URL: http://www.fidic.org

5 QUALITY OF WORKMANSHIP FOR THE WORKS

5.1 Standard Specifications

The Standard Specification that shall apply for the Works is the:

"Standard Specification for Road and Bridge Works"

published by the then Ministry of Transportation dated July 2007.

Work shall be carried out in accordance with the Standard Specification except as supplemented, modified or revised in the Special Specifications attached to these Employer's Requirements. Where the Special Specifications are silent, the Standard Specification remains fully applicable where relevant.

The numbering of clauses within the Special Specifications follows that of the Standard Specification. However, all revisions made to the Standard Specification are denoted with the letter 'S'.

A copy of the specifications may be purchased from the Ministry of Roads and Highways, P.O. Box M 57, Accra, Ghana.

5.2 Special Specifications

1. GENERAL

SCOPE OF WORKS

1.1S Project Location and Extent of the Works

The project is located in the Greater Accra Metropolitan Area. The scope of works shall be as specified in paragraph 3.1 of this Employer's Requirements..

1.3.S Definition of Terms

Add the following:

"Engineer" in these Specifications means the "Employer" or the "Employer's Representative" under the EPC Contract.

1.5.S Submissions to the Engineer

Add the following:

The Contractor shall deposit with the Engineer samples of materials and manufactured articles when requested and where appropriate, manufacturer's certificates of recent tests carried out on similar materials and manufactured articles.

1.6.S Programme

Amend Paragraph 1 as follows:

(i) Replace "….. within 28 days after receiving notice of the Commencement Date ….." with "….. within 28 days after the date of coming into full force and effect of the Contract…."

(ii) The programme shall include but not limited to the following:
- The Order of work
- Planned rate of progress
- Amount and type of equipment proposed
- Details of labour strength, skilled and unskilled
- Details of supervision arrangements
- Details of methods to be employed

– Details of Temporary Works

Amend Paragraph 3 as follows:

(iii) Replace ".... without prejudice to his rights in terms of the relevant clause of the Conditions of Contract, require the Contractor to submit within seven days of the date on which he has received a notice to this effect ...." with ".... require the Contractor to submit ...."

Add the following as Paragraphs 4 and 5 before the last paragraph:

"The order in which it is proposed to execute the permanent works shall be subject to adjustment and approval by the Engineer. The Contractor shall carry out the Contract in accordance with the programme agreed with the Engineer but he shall in no manner be relieved by the Engineer's acceptance of the programme of his obligations to complete the Works in prescribed order and by the prescribed completion date, and he shall from time to time review his progress and make such amendments to his rate of execution of the Works as may be necessary to fulfil these obligations.

Once the proposed programme is accepted by the Engineer, the Contractor shall not depart from the programme without the written consent of the Engineer. In the event of unforeseen difficulties or disturbance arising which cause the Contractor to depart from the accepted Programme of Works, he shall advise the Engineer in writing of such occurrences without delay and submit proposals for any necessary remedial measures, for which he shall obtain the Engineer's approval before putting such measures into effect".

1.8.S Method of Construction

Amend Paragraph 1 by inserting the words ".... for approval ...." after "..... the Engineer ...." in the first sentence.

1.10.S Site

Amend Paragraph 10 of Sub-Clause 1.10 as follows:

The Contractor will be given possession of site for the entire stretch of works covered in the Contract.

1.12.S Protection from Water

Add the following:

On cessation of the works each day the surface of each completed layer shall be trimmed so that ponding and concentration of surface run-off does not occur. Should any water accumulate on any part of the Works either during construction or after construction until the end of the Defects Notification Period, giving rise to soaking or eroding conditions, the Engineer may order the Contractor to remove and replace at no extra cost to the Employer any material or Works that has been so affected.

1.15.S Diversion of Services

Add the following to Clause 1.15 of the Standard Specification:

"The Contractor shall carry out civil works as instructed by the Engineer. Any cost involved shall be reimbursed to the Contractor".

1.17.S Storage of Materials and Manufactured Articles

Add the following to Clause 1.17 of the Standard Specification:

"This method of storage does not relieve the Contractor of his responsibilities as far as the quality of the materials is concerned".

1.18.S Progress Photographs

Add the following to Clause 1.18 of the Standard Specification.

"Progress Photographs as specified in the Standard Specifications shall be approximately 175mm x 125mm in colour".

1.19.S Signboards

Amend Paragraph 1 of Clause 1.19 of the Standard Specification by inserting the words "..... at his own cost ....." after "..... Drawings" in the first sentence.

1.21S Facilities for the Engineer and His Staff

Supplement Clause 1.21 of the Standard Specification with the following:

(a) Engineer's Offices

The Contractor shall provide, erect and maintain for the duration of the Contract, a site office for the Engineer of weatherproof construction, with windows and doors suitably insulated against heat, all to the satisfaction of the Engineer in respect of the condition, design and sitting. The offices shall be well partitioned, or as otherwise directed by the Engineer, with a clear inside height of 2.7 m. The floor shall be of adequately damp and ant proofed.

The Contractor shall provide sufficient carports, to be located as directed by the Engineer, to accommodate the Engineer's vehicles.

If required for security purposes, the offices for the Engineer shall be fenced with a 2 m high chain link fence and gate, with padlock and chain. In addition, day and night security guards shall be provided, to the satisfaction of the Engineer. External security lights shall be provided and maintained.

Each office shall be provided with electric lighting and 2 double power points, to be sited and to the satisfaction of the Engineer.

A potable water supply shall be provided with at least one outside water tap Latrines shall have a water-borne sewage disposal system. The Contractor shall furnish and equip the

Engineer's Offices for the proper and efficient running of the Engineer's office.

Telephone lines shall be provided for the use of the Engineer and his staff. In addition, the Engineer's office and laboratory shall be provided with internet access, inclusive of all connections.

(b) Engineer's Laboratory

The Contractor shall provide, erect and maintain for the duration of the Contract, a laboratory within the premises of the Engineer's office. The laboratory shall be of similar construction to the Engineer's office. The layout requirements of the Engineer's laboratory shall be as agreed. A sample store shall also be provided, with shelves along one wall.

The laboratory shall be wired for mains electricity and connected to the mains supply or a generating plant of an approved type and power rating that shall be located to the satisfaction of the Engineer.

The permanent fixtures in the Laboratory shall include 3 No. double stainless steel sinks with draining boards, a piped potable water supply to each sink and waste water outlets.
Workbenches, comprising a working surface with a full length and width shelf underneath shall be provided. This shelf shall be of seasoned timber, 1 m wide and 0.9 m wide and of a total length of approximately 5 m. Concrete plinths, suitable for mounting the cube crusher

and CBR load frame, shall also be provided. Soaking tanks for CBR specimens and concrete cube curing tanks of adequate size shall be provided. Both the CBR specimen tanks and concrete cube curing tanks shall have in-built drainage pipes.

The Contractor shall provide and maintain in a good state of repair for the duration of the Contract, the laboratory equipment necessary for the efficient carrying out of the Works. Such equipment shall be of approved manufacture and shall be made available to the Engineer for his use throughout the Contract, not later than 3 (three) months of the Commencement Date. All equipment shall be ready to use and complete to perform the tests. The equipment shall be purpose-made for use in highway materials testing laboratories and shall comply with the relevant British (BS) or American (AASHTO) Standard or standards of a similar nature acceptable to the Engineer. All equipment to be supplied shall be subject to the prior approval of the Engineer.

The Contractor shall also make provision for the occasional use by the Engineer, as and when required, of any of the scheduled equipment during the Defects Notification Period. Any delays to the Contractor or the Contractor's activities caused by the Engineer being unable to perform field or laboratory tests due to the Contractor's failure to supply the scheduled equipment in timely fashion and/or to keep it adequately maintained shall be deemed to have been caused entirely by the Contractor's own actions, and any consequences of such delays shall be interpreted with this.

(c) Radio Communications Network Mobile Phones

The Contractor shall provide mobile phones to the Engineer and his staff as given in the Bill of Quantities, including sim-cards from a provider which has the best coverage in the project area, including all call units for calls within Ghana on as required basis for the duration of the Contract. The mobile phones shall be suitable for use on-site.

For control of the usage of the mobile phones, the Contractor shall provide records of calls made to phone numbers which are not project related. Project related calls are between the phones provided by the Contractor, calls to the site office, to DUR and other numbers as designated from time to time. The users of the phones will be required to re-pay phone charges resulting from unauthorized calls.

A Provisional Sum has been provided for covering of mobile phone, fix line phone and internet usage plus an extra over percentage Item for the contractor's cost and profits.

(d) Safety Equipment

The Contractor shall allow in his rates and prices for the provision and replacement as necessary of approved personal safety equipment for the sole use of the Engineer and his staff for the duration of the Contract including reflective waistcoats and waterproof clothing, safety harnesses for working at heights, breathing apparatus, safety and tinted goggles, face masks, ear protectors and safety hats."

1.31.3.S Protection of Trees

Add the following as paragraph two:

The removal of trees and revegetation shall be kept to the minimum necessary to accommodate the permanent works. The Contractor shall be responsible for ensuring that exposed surfaces are revegetated as construction progresses. This shall be to the satisfaction of the Engineer.

1.31.5.S Fire Prevention

Add the following as paragraph two:

The Contractor shall ensure that fires, except for controlled fires for burning rubbish, do not start within the site or in the environs thereto as a result of the works or from the actions of his employees. The burning of waste such as vehicle tyres causing noxious emissions is prohibited. The Contractor shall have available at all times trained fire-fighting personnel provided with adequate fire-fighting equipment to deal with all fires. The Contractor shall additionally at all times provide sufficient fire protection and fighting equipment local to parts of the works which constitute particular fire hazard.

1.31.7.S Protection of Environmentally Sensitive Area

Add the following as paragraph two:

The Contractor shall take all reasonable measures, at all sites under his control, to prevent spillage, silting, flooding, erosion of beds and banks and leakage of materials likely to cause pollution of or interference in the supply of water resources. Such measures shall include, but not be limited to the provision of bunds around fuel, oil and bitumen storage facilities, and oil and grease traps in drainage systems associated with vehicle and plant washing bays, servicing and fueling areas. Prior to construction of such facilities, the Contractor shall submit details of pollution prevention measures to the Engineer for approval.

The Contractor shall provide, maintain and remove on completion of the Works, settling lagoons and other facilities to minimize pollution due to the Contractor's operations including, but not limited to quarrying, aggregate washing, concrete mixing and grouting.

1.32 Environmental Management and Monitoring

1.32.1 General

(a) **National and Provisional Legislation**

Further to the requirements of the Conditions of Contract and of the Specification Clause relating to the environment, the Contractor shall be responsible for familiarizing himself with all national and provisional legislation relating to environmental protection which is relevant to his activities.

(b) **Cost of Cleaning up**

The Contractor shall be responsible for the cost of cleaning up any environmental pollution resulting from his activities and payment of compensation for any damage caused thereby.

1.32.2 Waste Disposal

(a) **Maintenance of Sites**

The Contractor shall at all times maintain all sites under his control in a clean and tidy condition and shall provide appropriate and adequate facilities for the temporary storage of all wastes prior to disposal.

(b) **Transportation and Disposal of Waste**

The Contractor shall be responsible for the safe transportation and disposal of all waste generated as a result of his activities in such a manner as will not give rise to environmental pollution in any form, or hazard to human or animal health. In the event of any third party being employed to dispose waste, the Contractor shall be considered to have discharged his responsibilities under this clause from the time at which waste leaves the site under his control, provided that he has satisfied himself that the proposed transportation and disposal arrangements are such as will not give rise to pollution or health hazard.

(c) **Sanitary Facilities**

The Contractor shall be responsible for the provision of adequate sanitary facilities for his workforce and that of his sub-contractors at the base camp and at all construction

and ancillary sites. The Contractor shall not allow the discharge of any untreated sanitary waste to ground water or any surface watercourse. Prior to the mobilization of the workforce the Contractor shall provide details of sanitary arrangements to the Engineer for approval, such as to allow him to assess whether or not the proposed facilities are adequate and are unlikely to pollute water sources, if properly operated and maintained.

1.32.3 Storage of Top Soil

The Contractor shall make arrangements to store any top soil suitable for later re-use.

Where relevant, soil should be taken out in horizons and each horizon stored in a separate pile, the pile being grassed over to prevent erosion. This shall be to the satisfaction of the Engineer.

1.32.4 Noise and Air Pollution

(a) Vehicles and Plant

All construction activities shall be carried out using the best possible means to reduce environmental pollution such as noise, dust and smoke. All vehicles and plant operated by the Contractor or his sub-contractors shall at all times be maintained in accordance with the original manufacturer's specifications and service manuals, with particular regard to the control of noise and diesel particulate emissions. The Engineer shall have the right to require the Contractor to replace or temporary cease operation in order to rectify any vehicle or plant which in his opinion emits excessive noise or smoke within 24 hours of the Contractor being so notified.

(b) Asphalt Plant

All asphalt plants shall be operated and maintained in accordance with the original manufacturer's specifications and manuals, and in such a manner as to minimise emissions of hydrocarbons and particulates. If in the opinion of the Engineer, the operation of such plant is causing, or is likely to cause, nuisance or health hazard to site staff or the general public, the Contractor shall be required to carry out such work as is necessary to reduce emissions to an acceptable level within a timescale agreed with the Engineer.

1.32.5 Transport of Materials

The Contractor shall ensure that vehicles using the proposed borrow pits, quarry and asphalt plant do not cause any safety hazard, noise, dust, or disturbance to any local inhabitants. The Engineer shall have the right to require the Contractor to carry out improvement to the access road to the borrow pits and asphalt plant in consultation with any local inhabitants if necessary.

1.32.6 Restoration of Borrow Pits

The Contractor shall be responsible for ensuring that the gravel borrow pits are regarded and covered with topsoil to ensure their natural regeneration.

(i) For borrow pits, 150mm topsoil should be stripped and stockpiled for re-use. After completion of the use of borrows pits, the same shall be graded to avoid water stagnating on it and the topsoil shall be returned from the stockpile and spread in 150mm layer thickness.
(ii) The reinstatement of borrow pits as indicated in Clause 1.32.6 (ii) above, shall be one of the pre-conditions for issuing Substantial Completion Certificates to the Contractor.

1.32.9 Traffic Management during Construction

The Contractor shall take responsible precautions to keep all public and private roads clear of any spillage of material from his traffic to the satisfaction of the Engineer. All such spillage whenever they occur shall be cleared without delay.

The Contractor shall provide, erect and maintain on the site and at such positions on the approaches to the site, traffic signs and traffic control signals necessary for the direction and control of traffic. The signs shall be reflectorized or adequately illuminated by night in a

manner approved by the Engineer and kept clean and legible at all times. The Contractor shall reposition, cover or remove signs as required during the progress of the works.

The Contractor's operations throughout the Contract shall be so conducted as to maintain the flow of existing road traffic. The Contractor's method of working and traffic diversion plans within the existing road area shall be to the approval of the Engineer.

The Contractor shall construct and maintain temporary diversion ways wherever the Works will interfere with existing public or private roads or other ways over which there is a public or private right of way for any traffic, to the satisfaction of the Engineer and the approval of the Police.

The Contractor in preparing his diversion plan can refer to the Engineer's plan for diversion and make appropriate modifications to suit his work method and plan. The surfacing of the road diversion should be to a first seal of surface dressing.

1.34 **Engineer's Normal Working Hours**

The Engineer's normal working hours shall be from 7.00 a.m. to 5.00 p.m. on week days with Saturday and Sunday set aside for rest. If the Contractor wishes to execute Permanent Works outside these hours he shall obtain the written permission of the Engineer at least one full working day in advance in order to enable the Engineer to make provision for such work.

1.35 **Construction Generally**

The following general requirements shall apply: -

(a) The Contractor shall provide adequate lighting where work is being executed at night and shall provide and install any additional lighting which the Engineer may require in order to gain access to, watch and supervise the Works and carry out any testing and examination of materials.

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

(c) The Contractor shall ensure that access is provided to all properties adjacent to the Site for the duration of the Contract.

(d) The Contractor shall comply with the current Government regulations with regard to the transport, storage and use of explosives and radioactive materials.

(e) The Contractor shall provide, maintain and remove on completion of the Works appropriate security measures at the site and on access roads, but without prejudice to his obligations including maintenance of free access for the Employer, the Engineer, other contractors and any other persons entitled to such access.

(f) The Contractor shall be responsible for acquainting himself with and observing all current Statute Ordinance, Bye-laws or Regulations, both national and local. All buildings erected by the Contractor upon the Site and camp sites, and the layout of the buildings and the sites, shall comply with Laws of Ghana and all local Bye-laws in so far as they are applicable.

(g) The Contractor shall be absolutely and solely responsible for the adequacy, safety and security of Temporary Works including (but not limited to) all work yards, piling, staging, dams, cofferdams, trenches, fencing or other works and for the plant in connection therewith

which may be erected or provided for the carrying out of the Contract and for the execution of the Works. This provision shall be applicable to all Temporary Works and Constructional Plant. Whenever provided and erected by the Contractor and/or his sub-contractors for the Purpose of or in connection with the Works.

Examination and approval by the Engineer of the Contractor's and/or his sub-contractors' Temporary Work or of the drawings connected therewith shall not absolve the Contractor from any liability imposed upon him by the provisions of the Contract.

1.36 **Temporary Services**

The Contractor shall be responsible for the provision of clean, sufficient and continuous supply of potable water, electricity, telephone, sanitary and all other services necessary for constructional and domestic purposes for the duration of the contract. He shall undertake all arrangements including pipelines and meters for connection to local mains, and the provision of pumps, storage tanks or water conveyance where necessary, payment of all fees and charges and the satisfactory removal of all such arrangements and provisions on completion of the Works.

As in the case of any other supplies, a failure on the part of a supplier of these services will not relieve the Contractor of any of his duties or responsibilities under the contract, nor in respect of such failure shall the Contractor have any claim under the contract.

With regard to power supplies the Contractor shall be responsible for also maintaining the facility and take all reasonable precautions to ensure the safety of every person on the site. The Engineer may require the disconnection or alteration of any parts which he considers may be dangerous. Such installations shall comply with all appropriate statutory requirements and with the latest edition of the Electricity Supply Regulations. All costs incurred shall be deemed to have been included in the rate quoted for the provision and maintenance of the facilities which they serve i.e., Offices, Laboratories etc.

1.37 **Sufficiency of Specifications**

Where the Specifications describe a work in only general terms and not in complete detail, it shall be understood that the best general practice is to prevail. Materials and Workmanship of the best quality are to be employed and the instructions of the Engineer are to be fully complied with.

1.38 **Liaison with Government Officials**

The Contractor shall keep close contact with the Police and other Government officials in the area, concerning traffic control requirements and other matters. The Contractor shall provide for all reasonable assistance or facilities which may be required by such officials in the execution of their duties.

2. TESTING OF MATERIALS AND WORKMANSHIP

2.2.S **Testing by the Contractor**

Add the following to Clause 2.2.

2.2.1S **Testing**

Testing shall be carried out for three purposes, viz.:

– **Acceptance or Trial testing** - to demonstrate by means of the testing specified herein that the materials and/or methods of construction proposed are appropriate for the works and will result in a product fully in conformity with the requirements of this specification.

– **Production testing** - to ensure that the materials production and methods of working are producing materials and workmanship which are in conformity with the

requirements of this specification; and

– **Control testing or quality monitoring** - to demonstrate that the materials used and the resultant product is fully in conformity with the requirements of this specification.

The Contractor shall be responsible for all Acceptance and Production testing and the number and frequency of these tests shall be determined by the Contractor having regard to the number of sources of materials and the methods of working proposed. The amount of testing of this type undertaken by the contractor shall be sufficient to enable him to control the quality of the works without any reliance on testing carried out by the Engineer for other purposes. The Contractor shall report the results of all relevant tests to the Engineer before submitting materials and finished work to the Engineer for approval. All samples of materials proposed to be used shall be submitted to the Engineer for approval before use. Notwithstanding statements to the contrary elsewhere in the documents the Engineer will be responsible for carrying out Quality Assurance Test.

The type and approximate frequency of such testing is specified in clause 2.20 and elsewhere in this specification. The Contractor shall provide all such samples and assistance as is required by the Engineer in the execution of this testing. The Contractor shall not rely on the results of testing carried out by the Engineer for production control.

When the Contractor instructed by the Engineer shall submit to him Certificates of Test from the suppliers of materials and manufactured articles to be used for the Contract. Such Certificates shall certify that the materials and manufactured articles concerned have been tested in accordance with the requirement of the Specifications and shall give the results of all the tests carried out. The contractor shall provide adequate means of identifying the materials and manufactured articles delivered to the Site with the corresponding Certificates.

Where such Certificate is not available a representative sample of the material shall be tested by an approved laboratory or, subject to the approval of the Engineer, by the Contractor and a copy of the test result submitted to the Engineer's Representative who shall decide whether the material conforms to the required standard.

2.2.2.S Standards

Where the specification requires that testing, materials or goods shall be in accordance with a standard or code of practice then the relevant standard or code of practice shall be that current at the date 28 days prior to that set for submission of Tenders.

2.2.3.S Contractor's Laboratory.

The Contractor shall provide and maintain on the Site throughout the period of execution of the Works a laboratory for the combined use of both the Engineer and himself. The Contractor shall thus provide experienced engineers, foremen, surveyors, materials' technicians, and other competent technical staff together with all transport, instruments and adequate equipments at the appropriate time for the selection and control of the quality of natural and processed natural materials such as fill materials, natural gravel materials, crushed stone base materials, concrete chippings and asphalt to be incorporated to the Works and also for the control of the workmanship of the works.

No work shall be covered up prior to acceptance by the Engineer of the required test certificates and results of testing. Any delays to the works caused by provision of inadequate testing facilities will not be considered as justifiable grounds for an extension of time.

The Contractor shall within 30 days after the notice to commence the Works, submit a Quality Management System, including the Work Method Statements and Quality Audit for the major items of work to the Engineer for approval.

2.6.2.S Stone, Aggregate, Sand and Filler for Concrete

Add to Table 2.2 - Test Procedures Applicable to Stone, Aggregate, Sands and Fillers, the following:-

(Determination of)	(Test Procedure)
Stripping	ASTM D1644 – 80

2.20.S Frequency of Testing

- Add to list of tests under 2.20(i) the following:-
  Stripping

- Add the following additional Sub-Clause 2.20(k)
  2.20(k) **Concrete**

(a) **Coarse Aggregate**

The aggregate properties listed below, as appropriate to the type of mix specified, shall be determined on opening up of each new source of aggregate, also every second week and whenever the Engineer considers that the aggregate properties may have altered:- Grading

ACV or AIV
SSS

FI

Chloride Content
Sulphate Content
Water Absorption

(b) **Fine Aggregate**

The aggregate properties listed below, as appropriate to the type of mix specified, shall be determined on opening up of each new source of aggregate, also every second week and whenever the Engineer considers that the aggregate properties may have altered:- Grading

Chloride Content
Sulphate Content

SSS

Organic Impurities in Sands

(c) **Cement**

As per BS12. Frequency is one (1) set of tests per 200 tonnes from each cement plant and tested every month.

(d) **Water**

PH Value
Sulphate Content
Chloride Content

Frequency as instructed by the Engineer

(e) Slump/Cube Tests

Samples to be tested for each batch of not more than $20m^3$ or 1 day's production whichever is less or as instructed by the Engineer.

3. SETTING OUT, GEOMETRIC TOLERANCES AND RECTIFICATION

3.3.S Geometric Tolerances

Delete Table 3.1 of Clause 3.3 of the Standard Specification and substitute the following:-

Table 3.1S - Geometric Tolerances

LAYER	LEVEL mm	STRAIGHT EDGE mm	SLOPE OF CROSS FALL %
TRUNK & URBAN ROADS			
Bituminous Wearing Course (AC)	+ 10 − 10	6	
Bituminous Binder Course (AC)	+ 10 − 10	6	
Bituminous Surface Dressing	+ 15 − 15	8	
Gravel Wearing Course	+ 10 − 10	15	
Base	+ 15 − 15	12	±0.25
Sub-base	+ 20 − 20	15	±0.50
Formation	+ 25 − 25	20	±0.50
Footpath Paving Slabs	+ 25 − 25	6	
	15 15		

Add the following:-

3.3.3(i) In addition, the thickness of any pavement layer measured at any point shall not be less than 98% or more than 125% of the thickness specified or ordered by the Engineer. Should the completed surface of any sub grade, sub base, base or surfacing fail to comply with the appropriate tolerances specified herein, the sub grade, sub-base, or surfacing shall be corrected to the satisfaction of the Engineer in accordance with the relevant clauses of the Specification or as ordered by the Engineer's Representative.

3.5 Engineer's Approval of Method

Before commencing the construction of any layer of pavement construction including bituminous surfacing the contractor shall construct trial sections of the material to be used in order to demonstrate the adequacy of his proposed resources and techniques for achieving the Specification Standards. Each trial section shall extend over an area of not less than 300 square meters and shall be subjected to the approval of the Engineer and all costs shall be considered to be included in the Contractor's tendered rates and prices.

At the discretion of the Engineer a trial section may be incorporated within the permanent works. The techniques demonstrated in successful trials section construction shall be applied in general construction and in the event of a change of material or equipment or standard of performance the Contractor shall carry out such further trials as may be instructed by the Engineer. The contractor's proposals for any trial section shall include all necessary testing for an assessment directed by the Engineer.

4. SITE CLEARANCE

Add the following Sub-Clause 4.2.6 to Clause 4.2.

4.2.6 Removal of Anthills

All Anthills where encountered within the works shall be excavated to a depth to be determined on Site. The Queen shall be removed and the hole treated with a suitable chemical to the approval of the Engineer's Representative before backfilling in accordance with Clause 2.18.

4.4.S Removal of Structures, Fences and Obstructions

Add the following: -

The timing of the demolition by the contractor of existing bridge structures and culverts shall be subject to the approval of the Engineer. The Contractor's programme shall provide details of his proposals in this respect.

5. EARTHWORKS

5.2.S Definitions and Classifications

Delete Clauses 5.2(c) and substitute the following: -

(c) Formation Level:

Means the level at the completion of Earthworks for Roadwork's prior to the laying of the pavement. The Earthworks immediately below Formation Level is known as Sub grade.

(f) Add to Clauses 5.2(f) the following: -

The material shall have a CBR of not less than 15% measured after a 4-day soak on a laboratory mix compacted to a dry density fo 95% MDD (AASHTO), a swell of less than 1.5% and a Plasticity Index of less than 30%. The contractor has the responsibility to source for selected fill material to meet the requirement of this project.

5.5.S Construction of Embankments and Cuttings

Add the following:

The Contractor shall programme his operations such that, where substantial widening of the existing road is required and in marshy areas, the associated earthworks shall be completed to formation level at least 6 months prior to the construction of any of the pavement layers, unless otherwise instructed by the Engineer's Representative.

The Contractor shall so programme his operations such that embankments of fill height greater than 4 meters shall be completed to formation level at least 6 months prior to the construction of any of the pavement layers, in order to allow a reasonable time period for any settlement to take place. Notwithstanding the foregoing, the Contractor shall obtain the Engineer's Representative permission before commencing with pavement construction on such embankments. The Engineer's permission may be withheld if in his opinion settlement is still taking place.

5.6. S **Swamps**

Add the following: -

The contractor shall so programme his work so that where possible removable of unsuitable and compaction of material in swamps is carried out in the dry season.

Backfill of Swamps

The Contractor shall so programme his works so that any rock excavated in cuttings shall be available for filling in swamps when instructed by the Engineer.

5.7. S **Rockfill on Swamps and Soft Ground**

Add the following: -

In areas designated on the drawings as swampy or marshy, the Contractor shall, unless otherwise instructed by the Engineer, carry out the following:

– Drain the area, where practicable, by the excavation of ditches and, if necessary, the construction of temporary culverts or pipes through the existing road embankment.
– Remove vegetation and unsuitable material from the sites of embankments, to depths to be determined by the Engineer.

– If at this stage the embankment formation is:

a) Firm and dry: the Contractor shall construct the embankment of rock fill up to a level 500mm above the normal wet season standing water level.

b) Below standing water: the Contractor shall form the lower layer, up to standing water levels, of the embankment of free draining rock fill of maximum size not greater than 400mm and not less than 150mm.

Such material may be deposited below water without the associated use of compaction plant. The embankment shall then be completed up to 500mm above wet season standing water level with normal rock fill.

c) At or above standing water level: the Contractor shall place a geotextile separation membrane complying with the requirements of Clause 5.7S.1 transversely over the entire width of the embankment base with minimum overlaps of 300mm. The membrane shall then be covered by a layer of free draining granular material, complying with the requirements of Clause 5.7.S.2 of thickness not less than 500mm.

The embankment shall then be completed up to a level of 500mm above the normal wet season standing water level with rock fill.

– The embankments shall be completed to formation level with normal fill.

If no rock fill is available on site it shall, where instructed by the Engineer, be replaced by common fill material, except that the outer half meter (measured at right angles to the slope) of the embankment shall be formed of free draining granular material. Where directed a separation membrane shall be placed under the free draining granular material and between that material and the common fill.

5.7.2 Free Draining Granular Material

Free draining granular material shall be clean hard and durable with a minimum wet 10% fines value of 50KN when tested in accordance with the requirements of BS.812. The materials shall comply with the following grading requirements:

Sieve Size	% Passing
75mm	100
20mm	60-100
5mm	30-100
2mm	20-60
600 micron	0-25
75 micron	0-5

5.11.S Proof rolling

Replace ".... Minimum axle load of 8tonnes ....." with "..... minimum axle load of 13 tonnes .....".

5.13.S Topsoil and Grassing

Add the following:

No bushes of any sort whatsoever shall be planted on earthworks slopes.

5.15 Filling to Structures - Structural Backfill

Filling to structures - structural backfill, (including backfill material behind abutments and wing walls), shall be selected granular material equivalent of Class 6P Table 6/1 of UK DTp Specification for Highway Works, in horizontal layers, not exceeding 150 mm loose depth, moistened or dried as required and thoroughly compacted with mechanical tampers for a distance away from the structure as specified on the drawings or directed by the Engineer.

The structural backfill shall be carried out and compacted as follows: -

The structural backfilling shall be deposited in layers not exceeding 150 mm loose thickness, evenly spread and each layer thoroughly compacted before the addition of other layers

The Contractor shall restrict the compaction plant used on structural backfill, within 2m of a structure to the following items: -

i) Vibratory roller having a mass per metre width of roll not exceeding 1300 kg with a total mass not exceeding 1000 kg.
ii) Vibrating plate compactor having a mass not exceeding 1000 kg.
iii) Vibro-tamper having a mass not exceeding 75 kg.

The finally compacted density of all backfill behind and around structures shall not be less than 95% of the maximum obtained from BS 1377 Test 13.

In placing structural backfill, the material shall be placed simultaneously in so far as possible to approximately the same elevation on both sides of a pier or wall. If conditions require placing backfill appreciably higher on one side than on the opposite side, the additional material on the higher side shall not be placed until permission has been given by the Engineer and after tests made in the laboratory under the supervision of the Engineer establishes that the concrete has attained sufficient strength to withstand pressures created by the methods used and materials placed without damage.

5.16 Structural Excavation

This work shall include all necessary bailing, pumping, draining, sheeting, bracing and the necessary construction of cribs, and cofferdams, and furnishing the materials therefor, and the subsequent removal of cribs and cofferdams in a way, which will not hinder the construction of subsequent work.

The Contractor shall notify the Engineer sufficiently in advance of the beginning of any excavation, so that cross-sections and measurements can be taken of the undisturbed ground. The natural ground adjacent to the structure shall not be disturbed without permission of the Engineer.

Trenches of foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the Drawings or as directed by the Engineer. The elevations of the bottoms of footings, as shown on the Drawings, shall be considered as approximate only and the Engineer may order, in writing, such changes in dimensions or elevations of footings as may be deemed necessary to secure a satisfactory foundation.

When the footing is on material other than rock, the excavation to the final grade shall not be made until just before the footing is to be placed.

After each excavation is completed, the Contractor shall notify the Engineer to that effect, and no footing or bedding material shall be placed until the Engineer has approved the depth of excavation and the character of the foundation material.

Any over excavation for structural foundation or base slabs below the levels indicated on the Drawings or directed by the Engineer shall be backfilled with Grade NS15 concrete at the Contractor's expense.

All bases for structural foundation or base slabs shall be compacted to a density not less than 95% of the maximum dry density as determined by BS 1377 Test 13.

Beneath all reinforced concrete foundation slabs there will be a 75 mm thick concrete Grade NS15 blinding as specified in Section 18.

Structures with Foundation Problems

In cases where the specified density at foundation level is not achieved or the material is classified by the Engineer as unsuitable the Engineer shall direct to extend the depth of the structural excavation as necessary and backfill with Concrete Grade NS15 as specified in Section 18.

All rock or other hard foundation material shall be cleaned of all loose material and be cut to a firm surface either, level, stepped or serrated as directed by the Engineer. Where it is necessary to use dewatering devices to lower the water table during the construction, the Contractor shall lower and maintain the water table at least 300 mm below the formation level of the structural excavation. All temporary drain pits shall eventually be backfilled and compacted to the same density as the surrounding material.

6. QUARRIES, BORROW PITS, STOCK PILES, SPOIL AREAS AND EXISTING LAYERS

6.2.S General

Add the following:

Information relating to the locations of trial pits and other geotechnical investigations, together with the records and results of tests carried out on various samples is summarized

in the Materials Report.

The Contractor may examine the information and carry out such further tests as he may consider necessary in order to fully acquaint himself with any aspect which will influence his satisfactory performance of the Contract at the rates and prices stated by him in the Bill of Quantities. No claims from the Contractor for additional payment for sampling and testing will be considered by the Engineer on the grounds that the above information is insufficient.

6.4.S **Provision of Land**

Add the following as the last paragraph to Clause 6.4:

Where it is necessary for the Employer in fulfilling his obligations to acquire land which he is expected to give out to the Contractor as mentioned above, during the Contract for any additional work, the Employer shall determine theownership of the land and the Contractor shall pay any compensation as required and valued by the Land Valuation Board. Any expenses arising out of this acquisition shall be considered additional to the contract and the Contractor shall, accordingly be reimbursed for it.

Although the Contractor may, in the first instance provide the money for the purchase of the land, all such land shall be the property of the Employer, as the Contractor shall be duly reimbursed for all expenses incurred in its acquisition.

7. EXCAVATION AND FILLING FOR STRUCTURES

7.3. S **Excavation of Foundations for Structures**

In Paragraphs 17 and 18 of Sub-Clause 7.3.2, replace "..... 93% MDD (GHA S1) ... " with "..... 95% MDD (GHA S1) ....."

7.5. S **Backfilling and Filling against Structures**

In Paragraphs 3 and 5 of Sub-Clause 7.5, replace "..... 93% MDD (GHA S1) ... " with "..... 95% MDD (GHA S1) .....".

8. CULVERT AND DRAINAGE WORKS

8.1.S **Scope of Section**

Add the following Sub-Clause 8.1(e):-

8.1(e) The drainage works comprise the construction of intercepting ditches, turn-outs, stream channels, and ancillary works, together with rehabilitation of existing drainage systems as directed by the Engineer.

8.5.4.S **Excavation in Hard Material**

In Sub-Clauses 8.5.4(a)(iii) and 8.5.4(b)ii), replace ".....93% MDD (GHA S1) ... " with "..... 95% MDD (GHA S1) .....".

8.6.S Bedding and Laying of Pipe Culverts

In Sub-Clause 8.6(e), replace "Class C20/25." with "..... Class C25/20."

8.8.S **Backfill**

In paragraph 1 replace ".....93% MDD (GHA S1) ... " with ".... 95% MDD (GHA S1) .....".

8.10.S **Sub-soil Drains**

8.10(a)S **Filter Material**

The stone filter material shall be free-draining notwithstanding anything stated herein, and the Engineer's Representative may reject any material which he considers unsuitable for the purpose.

The ACV of the stone filter material shall be not greater than 35%. The Engineer's Representative shall provide the Contractor on site with details of the outfall of each subsoil drain, depending on its precise locational circumstances.

8.10(b)S **No-Fines Concrete**

No-fines concrete shall comply with the provisions of Section 18 of the Specifications subject to the following amendments. The aggregates shall be of 40mm single size. Batching shall be by weight in the proportions of 50kg of cement to the weight equivalent of 0.28m of the aggregate approved for this material.

The free water/cement ratio shall be not greater than required to coat all the aggregate particles without forming excess grout, or as otherwise directed by the Engineer' Representative'. The minimum cube strength at seven days shall be 4.0N/mm^2.

The no-fines concrete shall be placed as soon as possible after mixing; any concrete which has dried out between mixing and placing will be rejected.

No pumping, ramming or mechanical vibration shall be permitted, but the placed concrete shall be lightly rodded into position.

8.10(c)S **Stone Drainage Layer Behind Concrete Retaining Walls**

The stone used for the stone drainage layer behind concrete retaining walls shall be of ACV not greater than 40%.

The 40mm nominal single size stone shall be such that 100% by weight shall pass the 50mm sieve and be retained on the 28mm sieve.

The 100mm nominal single size stone shall be such that no dimension of any individual piece of stone shall be less than 80mm or greater than 120mm.

The 100mm size stone shall be hand-packed in such a way as to produce a stable structure to the satisfaction of the Engineer's Representative. In order to achieve the same objective the 40mm size stone shall be compacted using a light vibratory compactor until such time that visual consolidation of the stone layer has ceased.

8.21S **Scour Check**

Add the following to Clause 8.21.

The soil core of the scour check shall be constructed from selected fill material and compacted to 95% MDD (GHA S1) compaction.

8.23 **Surface Finish to In-situ Concrete Drainage Works**
Surface finish to in-situ concrete drainage works shall be as specified hereunder:-

(a) Formed Surfaces:
exposed: Class F2 (except as separately provided for hereunder) non-exposed: Class F1

The faces of pipe culvert headwalls and aprons which form part of the conduit; the conduit of the concrete channels; and the areas of concrete upon which precast concrete lids shall be seated, shall all be to Class F3 finish.

(b) Unformed Surfaces:
All unformed surfaces shall be to Class UF1 finish.

8.24 **Final Location of Box Culverts and Pipe Culverts**
Notwithstanding the information contained in the Drawings the final locations and invert levels of box culverts and pipe culverts shall be subject to confirmation or adjustment by the Engineer as he shall deem appropriate, prior to commencement of construction.

8.25 **Construction of Pipe Culverts**
Immediately after the preparation of the trench for pipe culverts including the excavation and replacement of any soft material a 75mm blinding layer of class NS15 concrete shall be laid to provide a firm support for the subsequent laying of pipes.

The pipes shall be laid true to line and level supported on hardwood or concrete wedges. The joints shall be properly seated and filled flush inside and outside with 1:3 cement mortar. The pipes shall be provided with a complete surround of class 20/25 concrete as indicated in the Drawings. No part of the surround shall be placed until the Engineer's Representative has approved the laying and jointing of the pipes.

The concrete shall be well compacted beneath the pipe but care shall be taken to ensure that the pipes are not displaced during the placing of the surround.

8.26 **Concrete Pipes**

a) Concrete pipes shall comply with the requirements of BS 5911 Parts 1 and 3.

b) Concrete for concrete pipes shall be Class C35/45.

c) The pipes shall have rigid 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.

e) All concrete shall be compacted either by spinning or vibrating.

f) All concrete pipes shall be cured by keeping them saturated with water for at least seven days after casting and protected from the sun and drying winds for at least fourteen days after casting. No pipe shall be used in the work until it is twenty-one days old. The date of casting shall be painted on the outside of the barrel.

A minimum of 10% (ten per cent) of the pipes, but not less than five, shall be tested from initial batches prepared by the Contractor and thereafter the frequency of testing shall be decided by the Engineer.

All pipes shall be capable of supporting the works proof loads set out in Table 2 of BS5911 Part 1 for Class M pipes when tested in accordance with Paragraph 25.4 of BS 5911 Part 1.

A set of six concrete cubes shall be made for each day's manufacturing of concrete pipes. Where the crushing strength does not reach the Class C35/45 requirement, or if pipes appear sub-standard, the Engineer may order the above load tests on a set of three pipes from the suspect batch.

g) Concrete pipes for use in subsoil drains shall be one of the following:

(i) Porous concrete pipes to BS 1194;

(ii) Concrete pipes to BS 5911 Parts 1 and 3 with a maximum length of 1.5m laid with open joints.

h) The Engineer's Representative shall reject any cracked pipes, which shall be destroyed or removed from the Site.

8.27 **Headwalls, Wingwalls and Aprons**

Culverts shall be provided with headwalls, wingwalls and aprons as shown in the Drawings or directed by the Engineer Representative.

8.28 **Miscellaneous Drainage**

8.28(i) **Concrete Inlet Chamber**

The back and front faces of all walls and the top and bottom of the base slab of the concrete inlet chamber shall be reinforced using 10mm dia. mild steel bars placed at 200mm centres both horizontally and vertically to form a mesh. The reinforcement

shall be fixed in accordance with, and shall comply with the requirements of Section 20 of the Specifications. The cover to the steel shall be 30mm.

8.28(ii) **Drainage Blanket**

The drainage blanket to earth retaining structures shall consist of precast hollow concrete blocks complying with the BS 6073: Part 1 laid in stretcher bond with dry joints in 225 mm thick walling with holes vertical.

8.30 **Riprap Protection**

This work shall consist of slope protection courses in accordance with these specifications and in conformity with the lines, grades and thicknesses shown on the drawings or as directed by the Engineer.

Riprap protection shall be hand-placed riprap with voids filled with sand-cement grout consisting of one part Portland cement and three parts of sand, thoroughly mixed with water to produce workable mixture.

Larger stones shall be placed first with close joints. Stones shall be placed with their longitudinal axis normal to the embankment face and arranged so that each stone above the foundation course has a three-point bearing on the underlying stones. The foundation course is the course placed on the slope in contact with the ground surface. Placing of stones by dumping will not be permitted.

Stones shall be thoroughly moistened with water after placement. Grout shall be applied while the stone is moist and shall be worked into the interstices to completely fill the voids.

Grout shall be placed only when the weather is suitable and the surface shall be cured by covering with curing blankets for at least 3 days after grout placement. Weep holes shall be provided through the riprap as directed by the Engineer.

9.S **PASSAGE OF TRAFFIC**

9.3.S **Improvements to Existing Roads**

Delete Clause 9.3.b of the Standard Specification and substitute the following:

(b) Scarifying, re-shaping, widening, watering and compacting the top 150mm of the existing road to 98% MDD.(GHA S1).

11. **SHOULDERS, FOOTPATHS, BICYCLE LANES AND BLOCK PAVING**

11.2.S **Materials for Construction of Shoulders**

Amend the list of materials for construction of shoulders by replacing with the following:

(a) Gravel wearing course or natural material in accordance with Sections 10 and 12 of the Specification.
(b) Graded crushed stone in accordance with Section 13 of the Specification.
(c) Cement or lime treated material or lean concrete in accordance with Section 14 or 15 of the Specification.
(d) A bituminous mix in accordance with Section 16 or 17 of the Specification.

(e) Concrete paving Blocks in accordance with Clause 11.5.S of this Specification.
(f) A combination of (a) to (e) above

11.8.S **Paving Blocks for Footpaths and Bicycle Lanes**

In paragraph 3, replace ".....95% MDD (GHA S1) ... " with "..... 98% MDD (GHA S1) .....".

12. NATURAL MATERIALS FOR SUB-BASE AND BASE

12.2.2.S **Sources of Materials**

Add the following as an additional last paragraph:

The Contractor has the responsibility to source for Subbase material to meet the requirement of this project.

Delete Sub-Clause 12.3.2 and substitute with the following:

12.3.2.S **Material Requirements for Natural Gravel Base Course**

Material for base course (including mechanical stabilisation shall comply with Class G80 of Table 12.1.

Delete Sub-Clause 12.3.3 and substitute with the following:

12.3.3.S **Material Requirements for Natural Gravel Subbase**

Material for subbase layers shall comply with Class G60 of Table 12.1.

13. GRADED CRUSHED STONE SUB-BASE AND BASE

13.2.S **Definitions**

The stone class shall be "A" and the nominal size 0/40mm.

13.4.1.S **Compaction**

Delete paragraph 5, sub-sections (i) and (ii) of the Standard Specification and substitute with the following:-

(i) Base: average dry density not less than 100% MDD with no result less than 98% MDD.
(ii) Sub-base : Average dry density not less than 98% MDD with no result less than 96% MDD.

16. BITUMINOUS SURFACE TREATMENTS

16.1.S **Scope**

Add to last sentence of Sub-section 16.1 of the Standard Specification the following:

The Contractor must therefore obtain a copy of this document and should refer to it

accordingly when carrying out Bituminous Surface Treatment on this project

17. BITUMINOUS MIX BASES, BINDER COURSES AND WEARING COURSES

17.2.1S **Asphalt Concrete Mixtures**

Delete paragraph one of Clause 17.2.1 of the Standard Specification and substitute the following "Asphalt Concrete for surfacing shall be designed according to the Marshall Method of mix design; outlined in the Asphalt Institute Manual MS-2 Sixth Edition".

17.2.11.S **Compaction**

Add the following to the last sentence of Sub-Clause 17.2.11.

The Contractor shall establish his Compaction method during the site trials, such Compaction method shall not be varied in any form or shape without the approval of the Engineer.

Should the need arise for the Contractor to change compaction equipment, the Engineer shall be informed immediately and a new Compaction method through a new site trial shall be established.

Rolling in the FIELD shall continue until the AIR VOIDS CONTENT OF THE LAYER OF BINDER AND WEARING COURSE IS:

BETWEEN 6% - 8% of the DAILY Gmm at the Optimum bitumen content.

Note that any Layer, which fails this field air voids content shall be removed, replaced at no cost to the Client.

17.3.1S **Scope**

The asphaltic concrete shall be Type 1 (High Stability).

17.3.2 **Materials for Asphaltic concrete**

(a) Bitumen shall be AC-20 Viscosity Grade.

(b) All aggregate shall be Class A.
The Binder and Wearing Course mixes shall have maximum of 10% by weight of Total Aggregate as Natural Sand.

17.3.3S **Grading Requirements**

The surfacing shall be a wearing course with a maximum stone size of 14mm. The binder course shall have a maximum stone size of 20mm. The gradings must be within the envelope given in Table 17.3 for wearing course, use column under 0/14 and for binder course, use column under 0/20.

17.3.4S **Requirements for Asphalt Concrete**

For Wearing Course use type 1 of table 17.5
For Binder Course use type 1 of table 17.5

The nominal binder content shall be 5.5% for wearing course and 5.0% for binder course.

The Contractor shall be responsible for designing the mix and shall be **approved by the Engineer.**

The proportions by weight of Total Mixture shall be determined for all constituents of the mixture and shall constitute the nominal constituents.

This new grading shall be called the Job Mix Formula (JMF) and at no instance shall the mix be accepted if any part of grading curve falls outside the limits of the JMF.

If any works are executed with an unacceptable mix, the Engineer shall order their removal and be replaced at the cost of the Contractor.

With the exception of the Natural Sand, all aggregate constituents of the Asphalt Concrete shall be fully crushed.

18. CONCRETE WORKS

18.3.3S Aggregate

Add the following to the last sentence of paragraph 2:

Under no circumstances shall Quartzite, Granite-gneiss, Andesite, Graywackes, Dacites, Argillite, Chalcedony, Opaline-shale and Chalcedonic-chert aggregates (Coarse or fine) shall be permitted on site or included as aggregates for concrete for all works either in-situ or precast under this contract.

23.S ROAD FURNITURE

23.2.S Road Reserve Boundary Posts

Delete paragraph 5 of Clause 23.2 of the Standard Specification and substitute the following:-

The posts shall be maintained in position and kept in a clean and legible state until the issuance of the Taking-over Certificate.

24. MISCELLANEOUS BRIDGE WORKS

24.5.1.S Materials

Delete Sub-Clause 24.5.1(d) and substitute with the following:

24.5.1(d) Bedding Mortar

Bedding mortar shall satisfy the following performance requirements:

i) Bedding mortar shall have a compressive strength not less than 50 N/mm^2.

ii) The flow characteristics shall be such that the volume of the bed or plinth as shown on the Drawings is completely filled with homogeneous material when placed within the range of ambient temperature between 5 C and 25 C.

iii) The physical and chemical properties shall be compatible with those of all adjoining surfaces

Where the mortar is required to resist stress before attaining its 28-day strength the compressive strength shall be confirmed by tests on mortar cubes stored under conditions or by a method approved by the Engineer. The assessment of the strength of the

bedding mortar and the stresses produced by the loads shall be subject to the agreement of the Engineer.

Materials

The minimum thickness of bedding mortar shall be 10 mm and the maximum thickness without reinforcement shall be 30 mm.

i) The maximum aggregate size in bedding mortar shall be 2.36 mm.

ii) Proprietary materials shall be stored as follows:

a) The materials shall be stored in a dry environment at a temperature of between 10°C and 27°C.

b) The containers shall be damp-proof, leak-proof and readily emptied of their contents.

c) Containers shall be marked with the batch reference number, component identification, manufacturer's name, net weight and such warnings or precautions concerning the contents as are required.

iii) The material shall not be removed from the store for use in the Works until immediately prior to mixing.

iv) Material shall not be used more than six months after the date of manufacture or any lesser period specified by the manufacturer or supplier.

v) The Contractor shall supply with each batch or part of a batch of the material delivered to the Site, certificates furnished by the supplier or manufacturer stating the following:

a) Manufacturer's name and address.

b) Manufacturer's agent's name and address where applicable.

c) Description of material and brand name.

d) Batch reference number, size of batch and number of containers in the delivery order.

e) Date of manufacture.

f)The chloride ion content, expressed as a percentage by mass of cement.

vi) Calcium chloride or admixtures containing chloride salts shall not be used and the total chloride ion cement shall not exceed 0.1% of the mass of cement.

vii) Portland cement shall comply with BS 12.

viii) The total acid-soluble sulphate content of the mix expressed as SO_3 shall not exceed 4% of the mass of cement in the mix. The sulphate content shall be calculated as the total from the various constituents of the mix.

ix) If water for the Works is not available from a water company's supply, the Engineer's approval shall be obtained regarding the source of supply and manner of its use. When required by the Engineer, the Contractor shall arrange for tests of the water to be carried out in accordance with BS 3148. Water from the sea or tidal rivers shall not be used.

x) Resinous bedding mortars shall be based on thermosetting organic polymers consisting of stable fluid and/or solid components, which on mixing react chemically to form a hardened solid mass. Products shall be formulated from epoxide, polyester, polyurethane or acrylic resin systems or such other formulation as is approved by the Engineer. Fillers or aggregates to be incorporated in accordance with the manufacturer's recommendations, to extend or modify the properties of the resinous composition, shall be pre-bagged, dry and factory proportioned. The addition of other fillers or aggregates shall not be permitted.

Site Mixing, Placing and Curing

i) Mixing, placing and curing of proprietary bedding mortar shall be carried out in accordance with the manufacturer's written instructions together with the following:

(a) The material shall not be mixed or placed in the Works at ambient temperatures of less than 5°C. If for 24 hours before, during or after placing, the ambient temperature falls below 5°C the Contractor shall maintain the temperature of the substrate and other adjoining surfaces at not less than 5° C for the duration of the curing period recommended by the manufacturer.

(b) For cementitious bedding mortars the water/cement ratio shall not exceed 0.4. The water content shall be confirmed during the approval tests and maintained within ±1 per cent of quantity approved by the Engineer in mortars placed in the works.

(c) Only full packs of mortar as supplied shall be mixed. On-site proportioning shall not be permitted.

(d) The temperature of the mortar on completion of mixing shall be between 5°C and 25°C.

ii) For cementitious bedding mortars, the substrate shall be flushed clean with water two hours before placing and maintained wet until placing commences. Any free water on the surface of the substrate shall be removed before placing the mortar.

The underside of the base plate shall be clean and free from loose rust and loose mill scale at the time of bedding. The mortar shall be placed in its final position within 25 minutes of commencement of mixing. Immediately after casting, the mortar shall be protected to prevent evaporation for at least three days.

iii) For resinous bedding mortars the substrate shall be dry, free from loose dirt and dust and shall meet the conditions specified by the manufacturer. The underside of the base plate shall be clean and free from loose rust and loose mill scale at the time of bedding. The mortar shall be placed in its final position within one hour, or lesser period specified by the manufacturer, of commencement of mixing.

iv) The mortar shall be poured in one corner of the plinth. The addition of mortar to the sides of the plinth shall only be permitted after the mortar has flowed completely under the plinth.

v) When the mix proportions have been approved by the Engineer no variations shall be made in the manufacture, supply, mix proportions or method of mixing of the material without the consent of the Engineer.

Laboratory Approval Tests

i) General

Mortar shall not be used in the Works until it has been approved by the Engineer. Every batch of mortar to be used in the Works shall be tested by the Contractor.

Where more than one batch of mortar is to be used in the Works the Elastic Stability Test may be omitted, with the consent of the Engineer, from the testing regime subsequent to the initial laboratory approval tests.

The Contractor shall state the water content to be used, expressed as a percentage by weight of the material. Mixing shall be carried out in accordance with the manufacturer's written instructions.

ii) Flow Cone Test, Calibration of Flow

a) The flow characteristics of the mortar shall be determined by the Flow cone Test method described in ASTM Standard C939-87.

b) Tests shall be conducted at ambient temperatures of 5°C and 20°C within 15 minutes of commencement of mixing.

c) For the test at 5°C the temperature of the flow cone and the mixer shall be 5° C, the temperature of the dry material 10°C and the temperature of the water where required 20°C.

d) For the test at 20°C the temperature of the flow cone, the mixer, the dry material and the water where required shall be 20°C.

e) For each temperature at least two tests having times of efflux within ±5% shall be made and the average time of efflux to the nearest 0.2 second shall be reported.

iii) Flow Between Glass Plates

a) The flow characteristics of the mortar between glass plates shall be determined using the apparatus shown in Drawing Number K2 of Volume 3 of the UK DTp Manual of Contract Documents for Highway Works.

b) Tests shall be conducted at ambient temperatures of 5°C and 20°C.

c) The mortar shall be poured in one corner of the apparatus commencing between 18 minutes and 20 minutes after commencement of mixing.

d) A satisfactory flow shall be achieved when the mortar flows under the glass plate and rises at least 10 mm above the underside of the top plate at all positions, without signs of segregation, bleeding, effervescence or air inclusions.

iv) Compressive Strength (Cementitious)

a) The compressive strength of cementitious bedding mortars shall be carried out on six 70 mm cubes at an age of 28 days.

b) The temperature of the mixer, the dry material, the water and the moulds shall be 20°C.

c) The 70 mm cube moulds shall comply with BS 1881: Part 108. Test specimens shall be made by filling the moulds carefully through a funnel to produce a void-free mortar. The moulds shall be covered by a steel plate to prevent expansion of the mortar.

d) There shall be no compaction. Specimens shall be damp-cured for the first 24 hours removed from the moulds and then water cured. Curing shall comply with BS 1881: Part 111.

e) Testing shall comply with BS 1881: Part 116.

the Works.

Storage and installation of joints, jointing materials, sealants and other associated items shall be in accordance with the manufacturer's recommendations.

The same joint system, seal or sealant shall continue across the full width of the deck including footway, verge, hard strip, hard shoulder and central reserve. Different joint systems shall not, except with the approval of the Engineer, be combined at one end of a deck.

Installation of Bridge Deck Expansion Joints

Where the surfacing and bridge deck waterproofing are to be removed to accommodate the bridge joint these shall be cut to a clean straight line for the full depth of the surfacing without damage to the concrete substrate.

Before installation of the joint, the concrete surfaces shall be free from laitence, sound, clean and comply with the manufacturer's requirements.

The expansion joint and the bridge deck waterproofing shall be formed so that a watertight seal is provided.

Expansion joints shall be of uniform width and straight alignment and shall be accurately set and finished and aligned with the finished surface.

During the placing and hardening of the bedding and bonding materials, movement between the joint and the substrate shall be prevented.

Where shown on the Drawings, subsurface and below joint drainage systems shall be provided and installed in accordance with the requirements therein, and the joint manufacturer's recommendations. On completion of the joint, the drainage system shall be checked and cleared of any obstructions.

Before vehicles traffic the joints, temporary covers capable of withstanding vehicular loading shall be provided over expansion joints during and after their installation for a period to be agreed by the Engineer.

Joint Filler Board

Joint filler board for expansion joints shall be as shown in the Drawings, within a tolerance of ±1.5 mm. It shall be a self-expanding cork seal or a firm compressible material or a bonded combination of compressible and rigid materials.

The joint filler board shall meet the requirements given when tested in accordance with the procedures in the following clauses:

i) **Weathering Test**

a) Three specimens, each 115 mm square ±2.5 mm, shall be placed in a ventilated drying oven maintained at a temperature of 55°C ±5°C for 7 days, after which they shall immediately be immersed in water at room temperature of between 16°C and 21°C for 24 hours. They shall then be subjected to five cycles of freezing and thawing in the following manner.

b) The specimens shall be placed in a watertight weathering test pan having a ribbed bottom and a fitted slotted lid designed to hold the three specimens vertically on edge. The pan shall be filled with water to half the depth of the specimens and then frozen to minus 7°C or below, for at least four hours after the initial freezing of the water. The pan shall then be placed in a water bath maintained at 18°C to 38°C without disturbing the specimens and shall

remain there for one hour after thawing has completed. The pan and specimens shall then be returned to the refrigerator and freezing and thawing shall be repeated in precisely the same manner until five cycles of the process have been completed. The specimens shall be removed from the pan and air dried at room temperature for 48 hours before examination.

c) The material shall be deemed to have passed the weathering test if the specimens show no signs of disintegration or shrinkage.

ii) **Compression and Recovery Test**

a) Two of the specimens which pass the weathering test, and two new specimens, each trimmed to 100 mm square ±0.5 mm shall be subjected to three applications of load at 24 hour intervals in a compression test machine complying with BS 1610, with auxiliary platens 100 mm^2, minimum 13 mm thick. During each application of load each specimen shall be compressed to 50% of its original thickness at a rate of strain of 1.3 mm per minute. The load required to achieve this amount of compression shall be not less than 0.07 N/mm^2 and not more than 10 N/mm^2 for material to be used in pavements and not less than 0.07 N/mm^2 and not more than 0.4 N/mm^2 for material to be used in bridge joints. The load shall be released immediately the required degree of compression is reached and after the third application a recovery period of 30 minutes shall be allowed after which the thickness of the specimen shall be measured.

b) This thickness, expressed as a percentage of the original thickness, is the "recovery" value of the specimen. The thicknesses shall be measured to an accuracy of 25 micron. The two new specimens shall be weighed before and after testing. The difference in mass shall be determined with an accuracy of 0.1% and shall be expressed as percentage of the original mass of the specimen.

c) The material shall be deemed to have passed the test if all four specimens have recovery values of at least 70% and the two new specimens have not suffered a reduction of mass in excess of 1%.

iii) **Extrusion Test**

a) The third sample which passes the weathering test shall be trimmed to 100 mm square ±0.5 mm and be subjected to the following extrusion test.

b) The extrusion mould shall be 100 mm x 100 mm tolerance of (-0.5 mm to 0) internally, of sufficient depth to test the sample as received, open on one side only and fixed rigidly to a base plate. The mould shall be provided with a closely fitting pressure plate which shall fit without binding, and with an accurate horizontal measuring dial gauge or measuring device accurate to 25 microns. The specimen shall be mounted in the extrusion mould and loaded once as described in the compression and recovery test.

The extrusion at the open side of the mould shall be measured with the gauge when the specimen is compressed to 50% of its original thickness and before release of the load.

c) The material shall be deemed to have passed the test if the extrusion of the free edge does not exceed 6mm.

iv) **Immersion Test for Cork Filler Board**

a) Two specimens each 115 mm x 115 mm ±2.5 mm shall be prepared and the thickness of each specimen shall be determined to the nearest 25 microns before the specimens are immersed in boiling water for one hour. After removal from the water the specimens shall be allowed to cool to room temperature and after 15 minutes at this temperature their thickness shall be re-measured to the nearest 25 microns.

b) The material shall be deemed to have passed the test if both specimens have a thickness of not less than 140% of their thickness before immersion.

v) **Acid Test for Cork Filler Board**

a) Two specimens each 115 mm x 115 mm ± 2.5 mm shall be immersed in hydrochloric acid of a specific gravity of 1.18 at room temperature, which is then brought to the boil and maintained thus for one hour when the specimens shall be removed and rinsed in water.

b) The material shall be deemed to have passed the test when after examination the specimens show no evidence of serious disintegration, friability or lack of resilience. Discoloration or minor swelling shall not be considered as failure.

Sealing of Gaps

Sealant materials shall be as described on the Drawings.

Joint filler board and sealant materials shall be compatible and the Contractor shall submit to the Engineer for approval the manufacturer's specification for these materials.

Gunned of poured sealants shall be placed when the temperature of the structure is such that any movements which may take place will not cause the strain in the sealant to exceed the maximum value recommended by the manufacturer.

Immediately before sealing, the Contractor shall ensure that the sides of the joint gap are clean, dry and free from loose material. Any concrete projections into the gap shall be removed.

Where a bond breaker in the form of a compressible strip is placed between the filler board and the sealant it shall be compatible with both materials and agreed by the Engineer.

All seals shall, where practicable, be poured or fixed on one continuous length. The position and details of a joint in a seal shall be agreed by the Engineer and the joint shall be formed in accordance with the manufacturer's instructions unless otherwise directed by the Engineer.

Where gunned or poured sealants are visible, the concrete shall be masked on either side of the joint with suitable tape prior to the placement of the sealant to prevent its adherence to the exposed concrete surface. The tape shall not stain the concrete surface.

Add the following Sub-Clauses 24.9 and 24.10.

24.9 **Contractor's Submittals**

The Contractor shall submit, for the approval of the Engineer, complete details and information concerning the method, materials, equipment and procedures that the Contractor proposes to use in the construction of the bridge.

The submittals shall include, but shall not be limited, to the following information: -

(a) Complete details of the Contractor's organization for the management of the

construction of the bridge. The details shall cover the operation of the casting area.

(b) Method Statement giving complete details of the proposed method of the foundations, abutments and columns including full details of any proposed dewatering method.

(c) Method Statement giving complete details of beams casting, transportation and placing.

24.10 **Composite Deck Bridge**

The manufacturing tolerances for the precast members shall nowhere exceed those given for length, cross section straightness in BS 8110. In addition, where beams are laid side in a deck:

i) The width of the deck shall be within ±6mm of that described in the Contract.
ii) In adjacent spans, the continuity of line of the outside beams shall be maintained.
iii) The ends of the beams shall be placed to within 6mm of their correct positions as shown on the Drawings.
iv) The alignment of transverse holes shall permit the reinforcement or prestressing tendons to be placed without distortion.

The in-situ concrete shall be placed in such a sequence that the advancing edge of the freshly deposited concrete over the full width of deck or between longitudinal construction joints is approximately parallel to the deck supports.

Beams shall be prevented from moving laterally during the placing of the in-situ concrete. The gaps between beams shall be suitably caulked or shuttered to the satisfaction of the Engineer before the in-situ concrete is placed.

5.2 Equivalency of Standards and Codes

Wherever reference is made in the contract to specific standards and codes to be met by the materials, plant and other supplies to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the contract.

Where such standards and codes are national, or relate to a particular country or region, other authoritative standards which ensure a substantially equal or higher performance than the standards and codes specified will be accepted, subject to the Employer'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 Employer at least 28 (twenty-eight) days prior to the date when the Contractor desires the Employer's approval. In the event the Employer determines that such proposed deviations do not ensure substantially equal performance, the Contractor shall comply with the standards specified in the documents.

6 TRAINING

Training shall be expected to be conducted for the Employer's Personnel as captured in the Conditions of Contract.