GOVERNMENT OF THE REPUBLIC OF TRINIDAD AND TOBAGO

MINISTRY OF AGRICULTURE, LAND AND FISHERIES

2022/2023

TENDER DOCUMENT FOR CATEGORY GROUP A – INFRASTRUCTURE WORKS

CONTRACT 1:

ED22/23 – OGFCP: RECONSTRUCTION OF ROAD CROSSING AND RAISING OF ROAD LEVEL LEADING TO THE SLUICE GATE SITE AT ORANGE GROVE PROJECT

APRIL 2023

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INSTRUCTIONS TO TENDERERS

INSTRUCTIONS TO TENDERERS

Tenderers are advised to read all instructions carefully – since failure to comply may result in the rejection of their offer.

1. GENERAL

The Ministry of Agriculture, Land and Fisheries (MALF) is desirous of undertaking this tender as indicated in the Invitation Letter and has invited contractors to tender according to the Invitation Letter and all the documents attached.

2. SUBMISSION OF TENDER

2.1 Tenderers must provide the following in their tender:

a) the full name, signature, office and business address of the tenderer in block letters as well as the company's official stamp;

b) signature of the person making the offer, or in the case of a company, partnership or business firm, by a duly authorized officer or employee of such company, partnership or the business firm;

c) the **initials** of the person making any offer, must be inserted next to any alterations or erasures made or in the case of a company, partnership or business firm, by a duly authorized officer or employee of such company, partnership or business firm;

d) all information requested in the tender documents should be submitted in the format requested.

2.2 The tenderer must submit in the Financial Tender Proposal the following documents:

a) The Form of Tender (completed)

b) Bills of Quantities (completed) as required in this tender document

2.3 The tenderer must submit in the Technical Information Package the following documents:

a) The following mandatory documents:

- Value Added Tax Clearance Certificate dated not more than six (6) months prior to closing date of tender;
- Income Tax Clearance Certificate dated not more than six (6) months prior to closing date of tender;
- NIB Certificate of Compliance dated not more than six (6) months prior to closing date of tender;
- Certificate of Incorporation/Letter of Continuance/Certificate of Registration.
- Audited financial Statements for one (1) year within the last three (3) year period.

b) All information requested in the Technical Information Package that will facilitate assessment of a tenderer's capability and capacity to undertake the works. This information falls under the main categories of Human Resource Capacity, Past Experience, Equipment Capability and Financial Capability.

c) All other information that the Tenderer may deem relevant for the purposes of this tender.

2.4 During the evaluation process the Ministry reserves the right to request any clarification from any contractor without modifying the contents of the submission.

2.5 Documents are not transferable. They shall be completed, signed and submitted by the person, company or firm in whose favour they have been issued. In case of a company or firm, the person who is authorised by its

Board of Directors, or governing body, shall sign the submissions on behalf of the Company or Firm. In such a case, an extract of the relevant minutes or resolution of the Board of Directors, authorising the person to sign the submissions on behalf of the company or firm, signed and attested by the chairman of the company or firm and duly notarized, shall be enclosed in the submission.

2.6 Two (2) soft copies (each on a separate USB Flash drive in PDF format) of each tender submission must be placed in a sealed envelope and addressed to the Administrative Officer IV – Procurement Unit, Ministry of Agriculture, Land and Fisheries, Corner Narsaloo Ramaya Marg Road and Soogrim Trace, Chaguanas and clearly marked on the outside:-

TENDER GROUP ……

……

(On this line you will indicate which contract/s are being tendered on)

Note 1: **Each Flash drive must be individually labelled/tagged with the Tenderer's Name and Tender Group.**

Note 2: **Separate envelopes and Flash Drives are to be submitted for each Tender Group.**

ii Also to be included in the envelope is the **hard copy** of the completed form titled "**Summary of Tenders Enclosed**" which shall be forwarded with the tender documents.

iii. Tenders are to be deposited in the Tender Box labelled for that Category, in the Lobby and addressed to:

Administrative Officer IV – Procurement Unit
Ministry of Agriculture, Land and Fisheries
Corner Narsaloo Ramaya Marg Road and Soogrim Trace,
Endeavour, Chaguanas

iv. Tenders must be submitted no later than the time and date specified in the Tender Notice.

3. COST OF BIDDING

The tenderer shall bear all costs associated with the preparation and submission of his bid and the Employer will in no case be responsible or liable for these costs regardless of the conduct or outcome of the tendering.

4. CONTENT OF TENDER DOCUMENTS

4.1 The set of tender documents issued for the purpose of soliciting tenders includes:

a) Instruction to Tenderers

b) Appendix to Tender

c) General Conditions of Contract,

d) Special Conditions of Contract

e) Form of Agreement,

f) Tender Forms/Scope of Works/Bill of Quantities

g) Specifications and Drawings, if any

h) Technical Information Package

4.2 The tenderer is expected to examine carefully all instructions, conditions, forms and terms. Failure to comply with the requirements of bid submission will be at the tenderers own risk.

5. TENDER CLARIFICATION and SITE VISIT

Tenderers are required to attend an Online Clarification Meeting and visit the site and ascertain the nature of the work to be done, means of access and egress, the availability and positions of essential services, viz, electricity, water etc. conditions of the site, necessity for and extent of sleeper roads, temporary crossing, temporary drainage, working and space and storage for materials and allow in this tender for all such factors which may affect the execution of the work.

Attendance at Tender Clarification Meetings and Site Visits are Mandatory. Failure to attend either will result in disqualification and rejection of your bid.

6. AMENDMENT OF TENDER DOCUMENTS

6.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by the issuance of an Addendum.

6.2 The Addendum will be sent in writing, by letter or email to all prospective tenderers who have been issued the tender documents and will be binding upon them. Prospective tenderers shall promptly acknowledge receipt thereof by letter or email to the Employer.

6.3 In order to afford a prospective tenderer reasonable time in which to take an Addendum into account in preparing their bids, the Employer may, at his discretion, extend the deadline for the submission of bids.

7. PRICING/RATES TO BE INCLUSIVE

7.1 Prices inserted shall be deemed to include for the payment of customs and other duties, import levies and the like, for the provision of all labour, materials and plant, for transport, for deliveries to Site (where not specifically mentioned in the description) and for temporary storage of materials and for all other things necessary for the completion of the Works in accordance with bills of quantities and specification to the reasonable satisfaction of the Employer.

7.2 The rates inserted shall be deemed to be in Trinidad & Tobago currency.

8. CORRECTION OF TENDERS

8.1 Tenders determined substantially responsive will be checked by the Employer for any arithmetical errors in computation and summation. Errors will be corrected by the Employer as follows:

a) Where there is a discrepancy between the amounts in figures and in words in the tender form , the amount in words will govern, and

b) Where there is a discrepancy between the amounts in the tender form and the Bill of quantity , the amount in the Form of tender will govern, and

c) Where the unit rate against any item is not identified in the Bill of Quantity, the tender shall be rejected, and

d) If it is found on examination of a Tender there is any discrepancy as to the amount inserted in the bill of quantities and the amount arrived at by valuing the quantities set out at the rates set against, the corrected amount will govern.

e) Where corrections are made with respect to the total amount tendered, the Tenderer shall be directed to alter the total amount of his Tender to

the amount so arrived at and if the Tenderer shall refuse to make such alteration; such tender shall be deemed to be rejected.

f) The Tenderer shall not alter or otherwise qualify the text of this Bill of Quantities. Any alterations or qualification made without the written approval of the Employer shall be ignored and the text of the bill of Quantities as printed shall be adhered to.

9. FLUCTUATIONS IN LABOUR AND MATERIALS

9.1 The Contract sum shall not be subject to adjustments for changes in market prices on materials and goods contained in the Bills of Quantities or for any items added thereto by the contractor when tendering or subsequently included by the Engineer.

9.2 The contract sum shall not be subject to adjustment for any wage increase from those applicable at the date of tender.

10. ACCEPTANCE

10.1 The Permanent Secretary reserves the right to reject any or all Tenders, without limiting the generality of the foregoing, **a tender will be summarily rejected if it is conditional, if it is incomplete; obscure or irregular; if it has erasures or corrections not initialed** in the Form of Tender and Bill of Quantities; or if it has unit rates that are obviously unbalanced.

10.2 The Permanent Secretary reserves the right to reject any Tender which does not provide satisfactory evidence that the Tenderer has the technical, physical and financial resources, to complete the works within the specific contract period.

10.3 The Permanent Secretary reserves the right to accept or reject any Tender, and to annul the Tendering process and reject tenders at any time prior to Award of Contract, without whereby incurring any liability to the affected Tenderer or Tenderers or any obligation to inform the affected Tenderer or Tenderers of the grounds for the action.

10.4 The Permanent Secretary may declare the Tendering void when none of the Tenders meet the intent of the Specifications or when it is evident that there has been a lack of competition and/or that there has been collusion. In addition, all Tenders may be rejected if they are substantially higher than the official budget approved by the employer.

10.5 The Employer does not bind itself to accept the lowest of any offer or to reimburse tenderers for any expenses incurred in tendering.

11. CANCELLATION OF TENDERS

The Government of the Republic of Trinidad and Tobago reserves the right to cancel the bidding process in its entirety or even partially without defraying any costs incurred by any firm.

12. TENDER VALIDITY

12.1 Tenderers must provide in their tender an assurance that prices will remain valid for an initial minimum period of ninety (90) days from the closing date of the tender.

12.2 In exceptional circumstances, prior to expiry of the original offer validity period, the Employer may request the tenderer for a specified extension in the period of validity. The request and responses thereto shall be made in writing.

13. COLLUSION

Each tenderer shall submit only one Tender. A tenderer who submits or participates in more than one Tender shall cause all tenders with their participation to be disqualified.

14. CLARIFICATIONS

14.1 Tenderers requiring a clarification of the tender documents must notify the Employer in writing, or email. All queries should be referred to

Administrative Officer IV (Procurement Unit)
Ministry of Agriculture, Land and Fisheries
Corner Narsaloo Ramaya Marg Road and Soogrim Trace,
Endeavour, Chaguanas Telephone No. 220-6253 Ext. 4252
Email: malf-procurement@gov.tt

14.2 Requests for clarification shall be raised not later than 12:00 noon five (5) days before the deadline for submission of tenders to permit the circularizing of the replies to all tenderers, but without identifying the source.

14.3 Such answers as are necessary shall be given as a matter of assistance to the tenderer but that shall not be construed as adding to, or taking away from, or otherwise altering the meaning and intent of the Tender, and/or the Tenderers' obligations there under, which can be varied only by letter signed by the Permanent Secretary, Ministry of Agriculture, Land and Fisheries.

15. DEADLINE FOR SUBMISSION OF TENDERS

Bids shall be delivered at the address specified not later than the date and time specified in the Invitation to Tender Letter.

16. LATE TENDERS

Any Tender received after the deadline prescribes in the Invitation Letter will be rejected and returned to the Tenderer.

17. EVALUATION PROCESS AND CRITERIA

17.1 Attendance at Clarification Meeting and Site Visits

Tenderers that did not attend the Clarification Meeting and the Site Visit shall be disqualified without further consideration.

17.2 Mandatory submissions

All submissions with omissions or invalidity with respect to the mandatory documents will be eliminated. Contractors should therefore pay particular attention to submitting the following:-

- Income Tax Certificate, Value Added Tax Clearance Certificate and NIB Certificate of Compliance dated not more than six (6) months prior to closing date of tender
- Firm's Certificate of Registration/ Certificate of Incorporation/ Notice of Directors
- Audited financial Statements for one (1) year within the last three (3) year period.

17.3 Financial Bid

a) The bids of only the Tenderers that have satisfied all the requirements as outlined in **17.1 and 17.2** above, would be considered for further evaluation
b) Contracts will normally be awarded to the lowest responsive bidder.
c) Where a tenderer is being considered for more than one contract, this tenderer must show that it has the Human, Equipment and Financial Resources to execute more than one contracts simultaneously.

17.4 Technical Evaluation

Tenderers that have been ranked as having qualifying tenders that fall within the five (5) lowest prices for the particular tender, shall be further evaluated based on their submissions in the Technical Information Package. To pass the Technical Evaluation, a tenderer must have attained at least 50% of the passing mark on each of the criteria and an overall 60% of the total marks.

17.5 Consideration of Past Performance

In evaluating bids, the past performance of contractors, for up to two (2) years prior to the close of tender, may be taken into consideration.

18. AGREEMENT

The successful tenderer will be required to enter into an agreement with the Permanent Secretary, Ministry of Agriculture, Land and Fisheries. The clauses in the draft Agreement contained herein with the Tender Documents shall be finalized prior to Contract Execution.

19. COMMENCEMENT OF WORK

The commencement of work shall be by the mutual agreement between the Permanent Secretary, Ministry of Agriculture, Land and Fisheries and the Contractor upon signing of the formal agreement.

20. INSURANCE OF VEHICLES AND EQUIPMENT

20.1 Only units which are insured in accordance with the laws of the Republic of Trinidad and Tobago must be used in the performance of this Contract. Evidence of insurance must be produced to the Ministry on demand. The use of uninsured units will be a breach of Contract justifying termination. The vehicles must also insure the passengers.

20.2 The contractor must submit to the Ministry within three (3) days after the expiry of the insurance of the vehicle, documentary evidence that the said Insurance Policy has been renewed.

APPENDIX TO TENDER

APPENDIX TO TENDER

ITEM	REVELANT-CLAUSE	DATA
Employer's Name and Address	G.1	Government of the Republic of Trinidad and Tobago.
Employer's Representative	G.1	Permanent Secretary, Ministry of Agriculture, Land and Fisheries, Narsaloo Ramaya Marg Road Endeavour, Chaguanas
Engineer's Name and Address	G.1	Engineering Division, Mausica Road, Centeno.
Time of Completion of the Work	G. 17, S 1	As indicated in the Special Conditions Table S1
Defects Liability Period	G.24	Three (3) months
Electronic Transmission System		E-Mail
Retention Percentage	G.7	10%
Works Delay Damages for Work	G. 20 & G. 21	$1,000.00 per day
Maximum Amount of Delay Damages	G. 20 & G. 21	10% of Accepted Tender Sum
Minimum Amount of Interim Payment Certificate	-	Refer to Clause (H) Form of Agreement

Initials of Signatory of Tender …… Date: ……

ITEM	REVELANT-CLAUSE	DATA
Periods for Submission of Insurance		
a) Evidence of Insurance	G. 8	14 days
b) Relevant Policies	G. 9 & G. 10	28 days
Minimum Amount of Third Party Insurance	G. 11	$1,000,000.00 per occurrence or 50% Whichever is greater (contract sum)
Time for submission of work programme to engineer	G. 13	7 days
Arbitrator (if agreed by both parties)	G. 34	
Arbitrator (if no agreement by parties) law of	G. 34	Refer to arbitration ordinance Trinidad and Tobago.

Initials of signatory of Tender …… Date: ……

GENERAL CONDITIONS OF CONTRACT

General Conditions of Contract

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GENERAL CONDITIONS OF CONTRACT

G1.
Definition and Interpretation

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires.

(a) **"Employer"** means Government of Trinidad and Tobago and includes the Employers successors and permitted assigns.

(b) **"Employer's Representative"** means the employee of Employer designated by Employer in writing to administer the Contract on behalf of Employer and as named in 'Appendix to tender'.

(c) **"Contractor"** means the person or persons, firm or company whose tender has been accepted by the Employer and includes the Contractors personal representatives, successors and permitted assigns.

(d) **"Engineer"** means the Engineer or any other Engineer appointed from time to time by the Employer's Representative and notified in writing to the Contractor to act as Engineer for the purposes of the Contract.

(e) **"Engineer's Representative"** means a person being the resident Engineer or assistant of the Engineer or Inspector of Works appointed from time to time by the Engineer and notified in writing to the Contractor by the Engineer to perform the functions set forth by the Engineer.

(f) **"Contract"** means the Agreement, Tender, Performance Bond General Conditions of Contract, Instruction to Tenderers, Standards and Specifications and Addenda (if any issued).

(g) **"Specification"** means the specification referred to in the Tender and any modification thereof or addition thereto as may from time to time be furnished or approved in writing by the Engineer.

(h) **"Tender Total"** means the total of the priced schedule in the Tender at the date of acceptance on the Contractor's Tender for the Works.

(i) **"Contract Price"** means the sum named in the "Notice of Award of Contract", subject to such additions thereto or deductions therefrom as may be made under the provisions hereinafter contained for the execution, completion and maintenance of the works in accordance with the Contract.

(j) **"Site"** means the lands and other places on, under, in or through which the Works are to be executed and any other lands or places provided by the Employer for the purposes of the Contract.

(k) **"Approved"** means approved in writing by the Engineer, including subsequent written confirmation or previous verbal approval.

(l) **"Days"** means calendar days unless specifically stated otherwise.

(m) **"Singular or plural"**. Works importing the singular also include the plural and vice versa where the context requires.

G2.
Engineer's Duties

The **Engineer** shall administer the Contract on behalf of the Employer's Representative and shall exercise general supervision and direction of the Works. He shall be responsible for the inspection and testing of the Works and the materials, the conduct of the Works, the compliance by Contract, the specification and all ordinances, regulations etc. affecting the works. The Engineer's staff shall include suitably qualified engineers and other technical personnel who are competent to carry out these duties.

The Engineer has authority to stop the work whenever such stoppage may be necessary to ensure the proper execution of the Contract. He shall also have authority to reject all work and materials which do not conform to the Contract, to direct the application of forces to any portion of the works, as in his judgment is required and to order the force increased or diminished and to decide questions which arise in the execution of the works.

The Engineer shall have the authority to issue change orders, the computation of quantities and certification of payments. He is authorized to revise the Specifications as may become necessary and to revise the design as may be required by changed conditions encountered in the field. He shall, however, obtain the concurrence of the Employer's Representative before instituting or approving major changes involving time delays or substantial increases in Contract Cost.

G3.
Engineer's Representative Duties

The duties of the **Engineer's Representative** are to watch and inspect the works and to test and examine any materials to be used or workmanship employed in connection with the works. He shall have no authority to relieve the Contractor of any of his duties or obligations under the Contract or, except as expressly provided thereunder, to order any work involving delay or any extra payment by the Employer, or to make any variation of or in the works.

The Engineer, from time to time, in writing, delegates to the Engineer's Representative such of the powers and authorities vested in the Engineer as may be necessary for the efficient execution of the works and shall furnish to the Contractor a copy of all such written elevations of power and authorities. Any written instruction or written approval given by the Engineer's Representatives to the Contractor within the terms of such delegations (but not otherwise) shall bind the Contractor and the Employer as though it had been given by the Engineer.

Provided always as follows:

(i) Failure of the Engineer's Representative to disapprove any work or materials shall not prejudice the power of the Engineer thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.

(ii) If the Contractor shall be dissatisfied by reason of any decision of the Engineer's Representative, he shall be entitled to refer the matter to the Engineer who shall thereupon confirm, reverse or vary such decision.

G4. Observance of Standards and Specification

The **contractor** is to carry out the works covered by this contract strictly in accordance with the relevant standards and specification and relevant drawings or as may be ordered by the Engineer.

G5. Contractor's understanding of nature of work and type of equipment needed

(1) It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to:

(a) the nature and location of the work,
(b) the conformation of the ground,
(c) the character, quality and quantity of materials to be encountered,
(d) the character of equipment and facilities needed preliminary to and during the execution of the works.
(e) The general and local conditions, and all other matters which can in any way affect the works under this Contract. No verbal agreement or conversation with any officer, agent and employee of the Employer, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations contained in the Contract Documents.

Contractor satisfaction of tender price and rates

(2) The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his Tender for the works and of the rates and prices stated in the Schedule which rates and prices shall except, in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution, completion and maintenance of the works.

Claim for physical conditions and artificial obstruction other than climatic conditions

(3) If, however, during the execution of the works the **Contractor shall encounter physical conditions or artificial obstructions other than climatic conditions** on site, which in the opinion of the Engineer could not have been reasonably foreseen by an experienced Contractor and if the Contractor has given prompt notice in writing

	to the Engineer of an intention to claim for additional payment, the Engineer shall certify and the Employer shall pay such additional sum as may be claimed by the Contractor to cover the additional expenses which the Engineer has certified as expenses reasonably incurred. Immediately following the written notice given by the Contractor, the Contractor shall provide the Engineer with full details including daily records of all measurements taken in support of his intended claim. Receipt of the Contractor's written notice and details of his claim by the Engineer is not an indication of the acceptance of liability.
G6. **Retention fee**	The **Retention payment** shall be retained until the contract is completed to the satisfaction of the Employer and may be used to defray any expenditure in excess of the contract price which may be incurred by the Employer in the event of the contractor failing to carry out the contract satisfactorily. The retention percentage shall be as indicated in the 'Appendix to tender'
G7. **Time and requirement for entering into agreement and performance bond**	
Time for entering into agreement	(1) **Within seven (7) days of receiving notification from the employer** that the formal contract agreement has been prepared for the contract, the successful tenderer referred to in this contract as the "Contractor" must create a binding contract between the Employer and himself.
Performance bond	(2) Where specified in the "Appendix to tender" the contractor shall Pay to the employer or other authorized agency indicated in the appendix to tender, by cash or certified cheque a performance deposit of ten percent (10%) of the contract sum or alternatively provide a Bond in the same amount within seven (7) days of the date of the letter of award as a guarantee for the proper performance of the contract. The Performance Bond of the contractor will be retained until the contract is completed to the satisfaction of the Employer and may be used to defray any expenditure in excess of the contract price which may be incurred by the Employer in the event of the contractor failing to carry out the contract satisfactorily.
Release of performance bond	(3) This bond will be released upon satisfactory completion of the contract and at the expiration of the maintenance period.

G8.
Insurance by Contractor

(1) Upon execution of the Agreement, the Contractor (but without limiting his obligations and responsibilities under Clause G10 hereof) shall **insure in the joint names** of the Contractor, Engineer and Employer against any damage, loss or injury which may occur to any property or to any person by or arising out of the execution of the Works or in carrying out of the Contract otherwise than due to the matters referred to in provision to Clause G10 (1) hereof.

(2) The terms shall include a provision whereby, in the event of any claim in respect of which the contractor would be entitled to receive indemnity under the policy being brought or made against the Employer, the insurer will indemnify the Employer against such claims and any costs, charges and expense in respect thereof.

G9.
Insurance for loss or damage from whatever cause

(1) Without limiting his obligations and responsibilities under Clause G43 hereof, the Contractor shall, upon execution of Agreement, insure, in the joint names of the Employer, Engineer and the Contractor, against all loss or damage from whatever cause arising (other than 'Force majeure") for which he is responsible under the terms of the Contract and in such manner that the Employer, Engineer and Contractor are covered during the period of the works and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations hereof:-

(a) The works to the full value of such works executed from time to time.
(b) The materials and other things brought on to the Site by the Contractor to full value of such materials and other things.

(2) Such insurance shall be effected with an insurer and in terms approved by the Employer and the Contractor shall produce, to the Engineer, the policy or policies of insurance and the receipts for payment of the current premiums. The contractor shall execute this at his own cost.

G10.
Indemnification of employer against loses, injury……..

(1) The Contractor shall (except if and so far as the Specification provide otherwise) indemnify and keep indemnified the Employer against all losses and claims for injuries or damage to any person or property whatsoever (including surface or other damage to land being or crops being on the Site suffered by tenants or occupiers) which may arise out of or in consequence of the execution and maintenance of the Works and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto. Provided always that nothing herein contained shall be deemed to render compensation or damages for or with respect to:-

(a) The permanent use or occupation of land by the works or any part thereof or (save as hereinafter provided) surface or other damage as aforesaid.
(b) The right of the Employer to execute the Works or any part thereof on, over, under, in or through any land.
(c) Interference, whether temporary or permanent, with any right or light, airway or water or other easement or quasi-easement which is the unavoidable result of the execution of the Works I accordance with the contract.

Provided further that for the purpose of this Clause, the expressions "the Site" shall be deemed to be limited to the area defined in the Specifications or shown on the Drawings in which lands and crops will be disturbed or damaged as an inevitable consequence of the carrying out of the Works.

G11. Indemnification of employee and effect insurance for such

1. The Employer shall not be liable for or in respect of any damage or compensation under the compensation for injuries and Workmen's Compensation or any statutory re-enactment extension or modification of these Ordinances or any Common Law or in consequence of any accident or injury to any workman or other person whether in the employment of the Contractor or of any Sub-Contractor and the Contractor shall indemnify and keep indemnified the employer against all such damages or compensation and against all claims, demands, proceedings, costs charges and expenses whatsoever in respect thereof or in relation thereto.
2. The Contractor shall effect a policy of insurance against all liability to pay damages or compensation as aforesaid in respect of all workmen and other persons who may be employed on the Works with a company approved by the Employer (which approval shall not be unreasonably withheld). He shall continue such insurance during the whole of the time that any persons are employed by him on the Works and shall produce to the Engineer such policy of insurance and the receipt for payment of the current premium. Provided always that in respect of any persons employed by the Sub-Contractor, the Contractor's obligation to effect a policy of insurance as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have effected such a policy of insurance in respect of such persons, but the Contractor shall require such sub-contractor to produce to the Engineer such policy of insurance and the receipt for payment of the current premium.

G11.B Value of Insurance

The Contractor shall execute at his own cost all insurance referred in Clause G8, G9, G10 and G11 hereof or any other insurance which he may be required to effect under the terms of the contract, then and in such case the Employer may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from any time to time deduct the amount so paid by the Employer, as aforesaid, from any monies due to or which may become due to the Contractor or recover the same as a debt due from the Contractor.

G12. **Consequence of failure to effect insurance by contractor**	If the Contractor shall fail to effect and keep in force the Insurance referred to in Clause G8, G9, G10 and G11 hereof or any other Insurance which he may be required to effect under the terms of the Contract, then and in any such case the Employer may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the Employer, as aforesaid, from any monies due to or which may become due to the Contractor or recover the same as a debt due from the Contractor.
G13. **Submission of work programme for approval**	1. Within seven (7) days after acceptance of his Tender, the Contractor shall submit to the Engineer for his approval a program showing the order of procedure in which he proposes to carry out the works and a general description of the arrangements which the Contractor proposes to adopt for the execution works and thereafter shall furnish such further details and information as the Engineer may reasonably require in regard thereto.
Form of Work Programme	2. The programme shall be in the form acceptable to the Engineer. No work shall commence on the Contract until the Contractor's programme, in the form acceptable, has been received and accepted by the Engineer. The submission to and approval by the Engineer of a programme or the furnishing of particulars shall not relieve the Contractor of any of his duties or responsibilities under the Contract.
Information Required in Work	3. The Contractor's programme shall provide the following basic information for maintaining the rate of progress and completion of the work in all respect within the times stipulated in the Agreement. a) The Contractor's analysis of the essential components of the Contract. b) The Contractor's analysis of the sequential relationship of each of the components. c) The Contractor's estimate of the resources allocation and time required for completion of each of these components. d) Such other information as may be required to prepare a network by the Critical Path Method (CPM). e) The details of all salient job features including construction activities, procurement of materials, testing, traffic diversions, etc. f) A network programme, CPM or PERT. The network shall reflect resources allocation. g) A series of bar graphs of major items showing the expected rate of completion of each item or group. The anticipate rate of progress, in percent, of each item or group shall be shown for ever two-week interval until the completion of the works.
G14. **Material to be used by the contractor**	Within seven (7) days of receiving notification of the award of contract, the successful tenders referred to in this contract as the "contractor" must submit a detailed laboratory test report of the materials to be used on each road layer for approval by the Engineer. Only laboratories approved by the Highways Division, Ministry of Works and Transport shall be used. Only materials that are in conformity with the specification given in the relevant

Standard Specification will be accepted. Delays incurred in obtaining the samples or permission to start with shall not prejudice the time to commence work by the contractor.

G15.
Time to start work

The contractor must start work on the contract within three (3) days of a written order to proceed to be issued by the Engineer.

G16.
Termination of the contract

G16.1
Termination of the contract by the Employer

The Employer shall be entitled to terminate the contract if the contractor:

a) Fails to comply with Clause 7 [time for entering into agreement and performance bond)]
b) Abandons the Works, or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,
c) Without reasonable excuse fails:
   (i) To proceed with the Works in accordance with Clause 15 [Time to start works] or,
   (ii) To comply with a notice issued under Clause 53 [Rejection and Remedial Work], within 7 days after receiving it.
d) Subcontracts the whole of the Works or assigns the Contract without the required agreement.
e) Becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events, or
f) Gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward:
   (i) For doing or forbearing to do any action in relation to the Contract, or
   (ii) For showing or forbearing to show favour or disfavour to any person in relation to the Contract,

   Or if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person such inducement or reward as is described in this sub-paragraph (f). However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination.

In any of these events or circumstances, the Employer may, upon giving 7 days' notice to the Contractor, terminate the Contract and expel the Contractor from the site. However, in the case of sub-paragraph (e) or (f). The Employer may by notice terminate the Contract immediately.

The Employer's election to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so. The Employer and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

As soon as practicable after a notice of termination under Clause 16.1 [Termination by Employer] has taken effect, the Engineer shall proceed to determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

After a notice of termination under Clause 16.1 [Termination by Employer] has taken effect, the Employer may:

a) Withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or
b) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor under Sub-Clause 15.3[Evaluation at Date of Termination]. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor.

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 14 days after the later of the dates on which the Contractor receives this notice or the Employer returns the Performance Security. The Employer shall not terminate the Contract under this Sub-clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor

After this termination, the Contractor shall proceed in accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause 16.4 [Optional Termination, Payment and Release].

G16.2. Termination of the contract by the Contractor

The Contractor shall be entitled to terminate the Contract if:

a) The Engineer fails, within 90 days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,
b) The Contractor does not receive the amount due under an Interim Payment Certificate within 90 days after the expiry of the time stated in Sub-Clause 23 [Payment] within which payment is to be made (except for deductions with respect to the Employer's Claims).
c) The Employer substantially fails to perform his obligations under the Contract,
d) The employer fails to comply with Clause 7 [time for entering into agreement and performance bond)] A prolonged suspension affects the whole of the Works as described in Clause 56 [Suspension], or
e) The Employer becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.

In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Employer, terminate the Contract. However, in the case of sub-paragraph (d) or (e, the Contractor may by notice terminate the Contract immediately.

The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

G16.3 Cessation of work and removal of equipment

After a notice of termination under sub Clause 16.1 [Termination by the employer], sub Clause 16.2 [Termination by Contractor] or Clause 44 (Force Majeure) has taken effect, the Contractor shall promptly:

a) Cease all further work, except for such work as may have been instructed by the Engineer for the protection of life or property or for the safety of the Works,
b) Hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and
c) Remove all other Goods from the Site, except as necessary for safety, and leave the Site.

G16.4 **Payment on termination**	After a notice of termination under Sub-Clause 16.2 [Termination by Contractor] has taken effect, the Employer shall promptly: a) Return the Performance Security if any to the Contractor, b) Pay the Contractor in accordance with Sub-Clause 44.6 [Optional Termination, Payment and Release], and c) Pay to the Contractor the amount of any loss of profit or other loss or damage sustained by the Contractor as a result of this termination.
G17. **Time for completion of the work**	Subject to any requirement in the Contract as to the completion of any section of the Works before completion of the whole, the whole of the Works shall be completed (duly maintaining the rate of progress indicated in the Agreement) within the time stated in the 'Special Conditions of Contract', calculated from the date of the Engineer's written "Notice to Proceed" or such extended time as may be allowed under Clause G18 hereof.
G18. **Extension of time**	Should the amount of extra or additional work or other special circumstance which may occur, other than through a default of the Contractor, be such as fairly to entitle the Contractor to an extension of time for the completion of the Works, the Engineer shall determine the amount of such extension. Provided that the Engineer is not bound to take into account any extra or additional work or other special circumstance unless the Contractor has within five (5) days after such work has commenced or such circumstances have arisen, notified the Engineer in writing of his intention to file or claim for extension of time. As soon thereafter as is practicable, the Contractor shall deliver to the Engineer full and detailed particulars of any claim to extension of time to which he may consider himself entitled in order that such claim may be investigated.
G19. **Steps to be taken when work is not in accordance with approved schedule**	(1) Should the rate of progress of the Works or any part thereof be, at anytime, in the opinion of the Engineer, not in accordance with the approved progress schedule and/or too slow to ensure the completion of the Works by the prescribed time or extended time for completion of the Works, the Engineer shall notify the Contractor in writing and the Contractor shall thereupon take steps as the Engineer may think necessary to expedite progress so as to complete the Works by the prescribed time or extended time for completion. The Engineer has the right to order the Contractor to employ more men and to increase his plant, and the Contractor shall forthwith comply with these orders. The Contractor shall not be entitled to any additional payment for taking such steps.
G19.2 **Approval for work on nights, weekends and public holiday**	(2) If, as a result of any notice given by the Engineer under sub-clause (1) of this Clause, the Contractor shall seek the Engineer's permission to do any work at night or on Sundays or on Saturdays or on Public Holidays, such permission shall not be unreasonable refused.

(3) All such night or Sundays or Saturdays or Public Holidays work shall be carried out without unreasonable noise and disturbance. The Contractor shall indemnify the Employer from and against any liability for damages on account of noise and other disturbances created while or in carrying out the Works and from and against all claims, demands, proceedings, costs and expenses whatsoever in regard or in relation to such liability.

Work done after sunset shall be lighted adequately by lights mounted on towers or tripods or by other means that will illuminate the Works. The use of automobile or truck headlights will not be considered satisfactory. Equipment used for excavating, hauling, placing and compacting shall be equipped with sufficient light to give effective illumination. The Engineer shall be the sole judge of adequate or effective illumination. Where preparations are not made prior to dusk for adequate or effective illumination, night work will not be permitted. Works in progress at night without adequate and effective lighting will be stopped and the Contractor shall make no claim for any delay or loss resulting therefrom.

G20.
Payment of liquidated damages

(1) If the Contractor shall fail to achieve the rate of progress and/or to complete the Works within the time prescribed by Clause G17 hereof or extended time, then the Contractor shall pay to the Employer a maximum of up to the sum of 10% of the contract price as liquidated damages for such default. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies in his hands, due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligations to complete the Works or from any other of his obligations and liabilities under the Contract.

(2) If before the completion of the whole of the Works, any part of the Works has been certified by the Engineer as completed pursuant to Clause G25 hereof and occupied or used by the Employer, the liquidated damages for delay shall for any period of delay after such certification be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works.

(3) The contractor must complete the work within the completion period specified by him in his tender or such extended period as may be approved by the Employer. Should he fail to do so, he will **be liable to pay liquidated damages at the rate of one thousand dollars ($1,000.00) per day** for each day in excess of the original or extended completion time the work remains unfinished

G21.
Measurement of works

The Works shall be measured, and valued for payment, in accordance with this Clause.

Whenever the Engineer requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

(a) promptly either attend or send another qualified representative to assist the Engineer in making the measurement, and
(b) supply any particulars requested by the Engineer.

If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) the Engineer shall be accepted as accurate.

Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured from records these shall be prepared by the Engineer. The Contractor shall, as and when requested, attend to examine and agree the records with the Engineer, and shall sign the same when agreed. If the Contractor does not attend, the records shall be accepted as accurate.

If the Contractor examines and disagrees with the records, and/or does not sign them as agreed, then the Contractor shall give notice to the Engineer of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Engineer shall review the records and either confirm or vary them. If the contractor does not so give notice to the Engineer within 3 days after being requested to examine the records, they shall be accepted as accurate.

Except as otherwise stated in the Contract and notwithstanding local practice:

(a) measurement shall be made of the net actual quantity of each item of the Permanent Works, and
(b) the method of measurement shall be in accordance with the Bill of Quantities or other applicable Schedules.

G22.
Payment to Contractor

(1) The Contractor will be paid at intervals on work certified complete by the Engineer. The Engineer shall, based on actual measurements and levels, prepare the detailed bill (in the standard form prescribed for the purpose) for the quantities of the Permanent Works executed by the Contractor since the last certificate as per the Agreement and shall certify the amount due to the Contractor on account of their estimated contract value;

(2) The Engineer shall as soon as possible after measurement of the Works prepare and deliver his certificates for payment to the Employer.

(3) Payment upon each of the Engineer's certificate shall be made by the Employer within ninety (90) days after such certificate has been delivered to the Employer by the Engineer.

(4) Upon completion of the Works, the Engineer will make final inspection expeditiously and notify the Contractor of acceptance. Such final acceptance, however, shall not preclude or stop the Engineer from correcting any measurement, estimate or certificate made before or after completion of the Works, nor shall the Engineer be precluded or stopped from recovering from the Contractor or his surety, or both, such over-payment as the Employer may have sustained by failure on the part of the Contractor to fulfil his obligation under the Contract. A waiver on the part of the Engineer of a breach of any part of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor without prejudice to the terms of the Contract shall be liable to the Employer for defects; fraud or such gross mistakes as may amount to fraud.

(5) Whenever under the Contract any sum of money shall be recoverable from or payable by the Contractor, such sum may be deducted from or reduced by the amount of any sum or sums then due or which at anytime thereafter may become due to the Contractor under the Contract or any other contract with the Employer.

G23.
Payment

The Employer will make payment to the Contractor on account of the contract as specified in the contract agreement on work satisfactorily completed, as confirmed by the Engineer. Payments will be made only on contracts for which all activities have been completed and accepted.

G24.
Maintenance Period

The contractor shall guarantee the workmanship of the work actually completed in accordance with the standard specification for the period stated in the Appendix to tender, calculated from the date stated in the completion certificate as the completion of the contract. The employer shall not release the retention payment unless the maintenance period has expired.

G25.
Steps to be taken on completion of work

1. As soon as, in the opinion of the Engineer, the Works shall have been substantially completed and shall have passed any final test that may be prescribed by the Contract, the Engineer shall issue an itemized list of incomplete and unsatisfactory items. Upon the completion and/or correction of such items, the Engineer will issue a Certificate of Completion and the Contractor's Period of Maintenance for the Works shall commence as of the date of such certificate of completion.

   Provided that the Engineer may give such certificate with respect to any part of the Works before the completion of the whole of the Works and shall give such certificate with respect to any substantial part of the Works which has been both completed to the satisfaction of the Engineer and occupied or used by the Employer. When any such certificates are given in respect of a part of the Works, such part shall be considered complete and the Period of Maintenance of such part shall commence from the date of such certificate.

The payment of the retention shall only become due upon the expiration of the maintenance period of the entire contract.

2. The Employer shall have the right from time to time or at any time before the completion of the Works to take possession of and use any part or parts of the Site or of uncompleted Works and in such case the Contractor shall completely finish the said uncompleted part or parts of the work as and when the Engineer shall direct whether before or after the respective prescribed time or extended time or times (if any) for the completion of the Works and if required by the Engineer while the Employer is in possession of the said part or parts of the Site or of the Works.

Provided always that if such possession or occupation or use by the Employer interferes, in the opinion of the Engineer, with the completion of the said part or parts of the Works generally due allowance shall be made by the Engineer by way of extension of time under the provisions of Clause G18 hereof and he may exclude such part or parts of the Works from the provision as to time as he may think reasonable for the completion of the said part or parts. Should the Contractor be involved in extra expense by reason of the operation of this sub-clause the amount of such expenses duly certified by the Engineer shall be paid to the Contractor by the Employer.

G26.
Certification of completed work

The contract shall not be considered completed until the Engineer has certified that the work has been done to his satisfaction and issue a Certificate of Completion to the Contractor.

G27.
Calculation of maintenance period

1. The Contractor shall, for the period stated in the 'Appendix to tender' (referred to in these Conditions as the Period of Maintenance) calculated from the date of completion of the Works certified by the Engineer in accordance with Clause G25 (1) hereof (or in the event of more than one certificate having been issued by the Engineer in accordance with the said Clause, from the respective dates so certified) maintain the Works in such a manner that at expiration of the Period of Maintenance they shall be in as good and perfect order, repair and condition (fair wear and tear excepted) as that which they were at the commencement of the Period of Maintenance. The Contractor shall, at the expiration of such period, deliver the Works in a condition satisfactory to the Engineer.

Repair and rectification of defects

2. The Contractor shall, at his own cost, repair rectify and make good to the satisfaction of the Engineer, all defects, imperfections, shrinkage and other faults arising from or out of the use of materials or workmanship which may appear, arise or become manifest during the retention periods. The Engineer shall give the Contractor written notice during the Period of Maintenance concerning those defects and if the Contractor shall fail to repair, rectify and make good as aforesaid, the Employer may execute the necessary work by his own workmen or by other agencies and recover the cost of the same plus certain percentage charges as determined by the Engineer towards expenses involved in the supervision and administration

of the Works from monies due or that may become due to the Contractor or from the forfeiture of the Performance Bonds provided always that:

(a) If the Contractor shall be required to carry out any work or repair, rectification or making good which he is not expressly liable to do at his own cost under the provisions of this Clause, the value of such work shall be ascertained and paid to the Contractor as it were additional work.

(b) The Employer shall indemnify the Contractor against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any use of the Works by others, always providing that the Contractor shall be liable for damage to the Works, or for damages or injury to any persons or property in consequence of materials or workmanship not in accordance with the Drawings or Specifications, or failure of the Contractor to comply with any obligations or requirements of Contract Documents.

G28.
Assignment of works

The Contractor **shall not** assign the Contract or any part thereof or any benefit or interest therein or thereunder without the written consent of the Employer.

G29.
Subletting

Except where otherwise provided by the Contract, the **Contractor shall not sub-let any part of the work without the written consent of the Engineer** and such consent, if given shall not relieve the Contractor from any liability or obligations under the Contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor or his agents, servant or workmen. Provided always that the execution of any part of the work on a piecework basis shall not be deemed to be sub-letting thereof.

Upon written consent of the Engineer, the Contractor will be permitted to sub-let parts of the works but must perform with his own company or organization, work valued at not less than sixty percent (60%) of the total Agreed Tender Price, except that the cost of any items designated as "Specialty Items" will be deducted from the total price before computing the amount of work that must be performed by the Contractor with his own forces. The "Specialty Items" are defined and listed in the 'Special Conditions of Contract'. The contractor shall be responsible for the observance of the stipulation of this contract by any permitted sub-contractor.

G30.
Variations of work

(1) The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be desirable, shall have power to order the Contractor to do and the Contractor shall do any of the following:-

a) Increase or decrease the quantity of any work included in the Agreement,
b) Omit any such work,

c) Change the character or quality or kind of any such work,
d) Change the levels, lines, position and dimensions of any part of the Works, and
e) Execute additional work of any kind necessary for the completion of the Works and no such variation shall in any way vitiate or invalidate the Contract, but the value, if any, of all such variations shall be taken into account in ascertaining the amount of the Contract Price. Any claim for extension of time cause thereby shall be adjusted at the time of ordering such variation.

(2) **No such variations shall be made by the Contractor without an order in writing of the Engineer**. Provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of any order given under this Clause but is the result of the quantities exceeding or being less than those stated in the Agreement. **Provided also that if for any reasons, the Engineer shall consider it desirable to give any such order verbally, the Contractors shall comply with such order and confirmation in writing of such verbal order given by the Engineer**, whether before or after carrying out of the order, shall be deemed to be an order in writing within the meaning of this Clause. All confirmations shall not be unreasonably delayed by the Engineer.

(3) The Contractor may, at any time, submit to the Engineer a written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Employer of executing, maintaining or operating the Works, (iii) improve the efficiency or value to the Employer of the completed Works, or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Contractor.

If a proposal which is approved by the Engineer, includes a change in the design of part of the Permanent Works, then unless otherwise agreed by both Parties:

a) The Contractor shall design this part,
b) If this change results in a reduction in the contract value of this part, the Engineer shall determine a fee, which shall be included in the Contract Price. This fee shall be half (50%) of the difference between the following amounts:

   (i) Such reduction in contract value, resulting from the change, excluding adjustments
   (ii) The reduction (if any) in the value to the Employer of the varied works, taking account of any reductions in quality, anticipated life or operational efficiencies.

However, if amount (i) is less than amount (ii), there shall not be a fee.

G31.
Variation of the contract sum and payment for such variation

1. The Engineer shall determine the amount, if any, to be added to or deducted from the sum named in the Agreement in respect of any extra or additional work done or work omitted by his order. All such work shall be valued at the rates set out in the Agreement if, in the opinion of the Engineer, the same shall be applicable. If the Agreement does not contain any rates applicable to the extra or additional work, reasonable rates shall be fixed by the Engineer.

2. Provided that, if the nature or amount of any omission or addition relative to the nature or amount of the whole of the Works or to any part thereof shall be such that, in the opinion of the Engineer, the rate or price contained in the Agreement for any item of the Works is by reason of such omission or addition rendered unreasonable or inapplicable, the Engineer shall fix such other rate or price as, in the circumstances, he shall think reasonable and proper.
   Provided also that no increase of the Agreement Amount under sub-clause (1) of this Clause, or variation of rate or price under this sub-clause (2) of this Clause shall be made unless, as soon after the date of the order as is practicable, and, in the case of extra or additional work before the commencement of the work or as soon thereafter as is practicable, notice shall have been given in writing:-
   (a) By the Contractor to the Engineer of his intention to claim extra payment or a varied rate; or
   (b) By the Engineer to the Contractor of his intention to vary a rate or price as the case may be.

3. When the accepted quantities of work vary from the quantities in the Agreement, the Contractor shall accept as payment in full insofar as Agreement unit rate items are concerned, payment on the following basis:-
   (a) If the total pay quantity of any item of work, which has a total value of five percent or more of the total Contract Price, varies from the Agreement quantity thereof by twenty five percent or less, payment for the item of work will be made at the original Agreement unit rate. If the total pay quantity of such an item of work varies from the

   Agreement quantity by more than twenty-five percent, such items shall be eligible for negotiation of rate adjustment.

   Adjusted unit rates will be applicable only to that portion of the overrun or under-run which differs by twenty-five percent from the original Agreement quantity.

   An adjustment as determined by the Engineer will be made to credit the Employer with any reduction in cost or to compensate the Contractor for any increase in cost resulting from such change in quantity.

(b) Payment for any item of work which has a final total value of less than five percent of the total Contract Price will be made at the original Agreement unit rate regardless of increased or decreased quantities.

(c) The Engineer may order omitted from the work any items or portions of the work found unnecessary to the improvement and such omission shall not operate as a waiver of any conditions of the Contract or invalidate any of the provisions thereof, or shall the Contractor have any claim for anticipated profit.

(d) Except as specified herein, no allowance will be made for any increased expenses, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor resulting either directly or indirectly from such increased or decreased quantities or from unbalanced allocation, among the contract items or overhead expense on the part of the Contractor and subsequent loss of expected reimbursement therefore, or from any other cause.

4.

(a) The Engineer may, if, in his opinion, it is necessary or desirable, order that any additional or substituted work be executed on a day work basis.

The day work shall be carried out only on the written instructions of the Engineer and the Contractor shall then be paid for such work under the stipulations and at the rates set out thereunder. These rates shall only apply when the Engineer is of the opinion that the rates in the Agreement are inapplicable.

b) The payment for labor shall be for the actual hours worked at the basic wage set out in the 'Special Condition of Contract' which shall exclude allowances and employees benefits. To such basic wage, the Contractor shall be allowed to charge a percentage addition to cover allowances, employees' benefits, profits, overhead charges, supervision, subsistence, temporary scaffolding, staging, checking, light, insurance, transportation, small tools and other operational and incidental items. This percentage addition will be inserted in the Tender by the Tenderer at the time of tendering and no further increase will be admitted on any grounds or cause whatsoever.

c) The payment for materials delivered on the Site shall be the net cost of materials including transportation costs to the Site as listed out in the 'Special Condition of Contract'. Payment for materials not listed shall be the net cost of materials (less discounts) paid by the Contractor plus the actual transportation cost incurred by him. The Contractor shall furnish to the Engineer such receipts or vouchers as evidence to prove the amounts so paid and before ordering materials, the Contractor shall submit to the Engineer quotations for the same and obtain his approval. To such net cost, the Contractor will be allowed to charge a percentage addition to cover overheads, supervision, handling, profits, insurance and

other incidental items. This percentage addition will be inserted in the Tender by the Tenderer at the time of tendering and no further increase will be admitted on any grounds or cause whatsoever.

d) Payment for Plant shall be at the rates set out in the 'Special Condition of Contract'. Payment shall be made for actual "operating time" only. "Standing time" and "brake-down periods" shall not be paid for. Rates for Plant shall include for wages of all drivers, operators, attendants etc., all fuel, oil and other consumable items, maintenance, transportation etc. To such rate, the Contractor will be allowed to charge a percentage addition to cover overheads, supervision, profits and other incidental items. This percentage addition will be inserted in the Tender by the Tenderer at the time of tendering and no further increase will be admitted on any grounds or cause whatsoever.

e) In respect of all work executed on a day work basis, the Contractor shall during the continuance of such work deliver each day to the Engineer an exact list in duplicate of the names, occupation and time of all workmen employed on such work and a statement also in duplicate showing the description and quantity of all materials and plant used thereon and therefore. One copy of each list and statement will, if correct, be signed by the Engineer and returned to the Contractor. At the end of each month the Contractor shall deliver to the Engineer a priced statement of the labor material and plant (except as aforesaid) used and the Contractor shall not be entitled to any payment unless such list and statements have been fully and punctually rendered. Provided always that, if the Engineer shall consider that for any reason the sending of such list and statements by the Contractor in accordance with the forgoing provision was impracticable, he shall nevertheless be entitled to authorize payment for such work either as day work (on being satisfied as to the time employed and materials and plant used on such work) or at such value therefor as he shall consider fair and reasonable.

5. The Contractor shall send to the Engineer every two (2) weeks from the date of commencement of the contract a written account giving full and detailed particulars of all claims for additional expense to which the Contractor may consider himself entitled and of all extra and additional work ordered by the Engineer which he has executed during the preceding month and no claim for payment for any such work or expense will be considered which has not been included in such particulars. Provide always that the Engineer shall be entitled to authorize payment to be made for any such work or expense, notwithstanding the Contractor's failure to comply with this condition, if the Contractor has, within two (2) days of the happening of the events giving rise to the claim, notified the Engineer in writing that he intends to make a claim for such work or expense.

G32.
Language

The language in which the Contract Documents are drawn up is English and the Contract is to be construed and interpreted in English.

G33
Settlement of disputes of meaning of Terms & Conditions

In case of any dispute arising between the contractor and any officer of the Employer to the intention or meaning of any of the terms and conditions of this contract, such matter must be referred to an arbitrator to be agreed upon between the parties or, failing agreement, to be nominated on the application of either party by the President for the time being of the Association of Professional Engineers of Trinidad and Tobago and any such reference shall be deemed to be a submission to arbitration within the meaning of the Arbitration Ordinance or any statutory re-enactment or amendment thereof for the time being in force.

G34.
Settlement of disputes

1. If any dispute of any kind whatsoever shall arise between the Employer or the Engineer and the Contractor in connection with or arising out of the Contract or the carrying out of the Works (whether during the progress of the Works or after their completion and whether before or after the termination, abandonment or breach of the Contract) it shall in the first place be referred to and settled by the Engineer who shall promptly state his decision in writing and give notice of the same to the Employer and the Contractor. Save as hereinafter provided such decision in respect of every matter so referred shall be final and binding upon the Employer and the Contractor until the completion of the Works and shall forthwith be given effect to by the Contractor, who shall proceed with the Works with all due diligence whether or not he or the employer requests arbitration as provided.

2. If the Contractor be dissatisfied with any such decision of the Engineer then and in any such case the Contractor shall within seven (7) days after receiving notice of such decision appeal such decision in writing to the Employer's Representative who shall review the dispute and state his decision in writing and give notice of the same to the Contractor and the Engineer within seven (7) days after receipt of such appeal from the Contractor.

3. If the Contractor be dissatisfied with any such decision of the Employer's Representative upon appeal then, in any such case, the Contractor may within seven (7) days after receiving notice of such decision require that the matter shall be referred to an arbitrator to be agreed upon between the parties or failing agreement, to follow the procedure described in the Arbitration Ordinance Law of the Republic of Trinidad and Tobago.

4. Such arbitrator shall have full power to open up, review and revise any decision, opinion, direction, certificate or valuation of the Engineer and neither party shall be limited in the proceeding before such arbitrator to the evidence or arguments put before the Employer's Representative for

	the purpose of obtaining his decision above referred to. The Award of the Arbitrator shall be final and binding on the parties.
G35. **Content of Contract Document**	The Contract Documents, cover with explicit provisions, all matters relating to the works which the Contractor undertakes to execute, complete and maintain, providing all labor, materials and everything, whether of temporary or permanent nature, in full compliance with such provisions or reasonably to be inferred from them.
G36. **Settlement of ambiguities or discrepancy of**	The several documents forming the Contract are to be taken as mutually explanatory of one another and in case of ambiguities or discrepancy; the same shall be explained and adjusted by the Engineer who shall thereupon issue to the Contractor instructions, in writing, thereon. Provided always that if, in the opinion of the Engineer, compliance with any such instruction shall involve the Contractor in any expense which by reason of any such ambiguity or discrepancy the Contractor did not and had reason not to anticipate, the Engineer shall certify and the Employer shall pay any such additional sum as may be reasonable to cover such expense.
G37. **Ownership and custody of contract document**	All Standards, Specifications and any other Contract Documents are the property of the Employer and shall remain in the sole custody of the Engineer. They are not to be used on other work.
G38 **Further instruction required by contractor**	The Contractor shall give adequate notice, in writing, to the Engineer for any further specifications or orders, including directions, instructions or approval that may be required for the execution of the works under the Contract. The notice shall include details of the specifications or orders required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late. If, by reason or any failure or inability of the Engineer to issue within a time reasonable in all the circumstances any such specifications or orders requested by the Contractor; the Contractors suffers delay and or incurs costs then the Engineer shall take such delay into account in determining any extension of time which the Contractor is entitled and the Contractor shall be paid the amount of such costs as shall be reasonable.
G39. **Work satisfaction and adherence**	1. Save in so far as it is legally or physically impossible, the Contractor shall execute , complete and maintain the works in strict accordance with the Contract to the satisfaction of the Engineer, and shall comply with an adhere strictly to the Engineer's instruction and directions or any matter therewith, whether mentioned in the Contract or not. 2. The materials used in the work under this Contract shall be the best of their several kinds, suitable for the service required and subject to the approval of the Engineer. 3. The workmanship shall be of the best quality and shall be subject to the approval of the Engineer as equal to the best standard practice. All work shall be neatly finished. The Contractor shall take instructions and

directions only from the Engineer or (subject to the limitations referred to in Clause G3 hereof) from the Engineer's Representative.

G40.

Approval of superintendent

1. The Contractor shall give or provide all necessary superintendents during the execution of the works and as long thereafter as the Engineer may consider necessary. The Contractor or a competent authorized agent or representative approve of, in writing by the Engineer (which approval may at any time be withdrawn) is to be constantly on the works and shall give his whole time to the superintendent of the same.

Replacement of superintendent

2. It such approval shall be withdrawn by the Engineer, the contractor shall as soon as is practicable (having regard to the requirements of replacing him as herein after mentioned) after receiving written notice of such withdrawal remove the agent from the site and shall not thereafter employ him again on the Site in any capacity and shall replace him by another agent approved by the Engineer.

Receiving of instruction by superintendent

3. Such authorized agent or representative shall receive on behalf of the Contractor directions and instructions from the Engineer or (subject to the limitations of Clause G3 hereof) the Engineer's Representative.

G41.

Maintenance of competent staff and removal of staff by order of Engineer

The Contractor shall employ in and about the execution and maintenance of the works only such persons as are careful, skilled and experienced in their several trades and callings and the Engineer shall be at liberty to object to and require the Contractor to remove from the works any person employed by the Contractor in or about the execution and maintenance of the works who, in the opinion of the Engineer, misconduct himself or is incompetent or negligent in the proper performance of his duties and such persons shall not be again employed upon the works without the permission of the Engineer.

G42

Protection of public

The Contractor shall be responsible for the protection of the public in and about the area of the works and wherever else his operations are being conducted. He shall comply with all statutory requirements and make good safety deficiencies as directed by the Engineer. The Contractor shall provide guards, barricades, fencing, lighting, watching and all else necessary as a subsidiary obligation and no direct payment will be made therefore.

G43.

Contractors responsibility to take care of wok

1. From the commencement to the completion of the works, the Contractor shall take full responsibility for the care thereof; and in case any damage, loss or injury shall happen to the works or to any part thereof from any cause whatsoever (save and except under Clause 44 (Force Majeure) shall, at his own cost, repair and make good the same so that, at completion, the works shall be in good order and condition and in conformity, in every respect, with the requirements of the Contract and the Engineer's instructions. In the event of any such damage, loss or injury happening from any of the excepted risks, the Contractor shall, if and to the extent required by the Engineer repair and make good the same as aforesaid at the cost of the Employer. The Contractor shall also be liable for any damage to the works occasioned by him in the course of any operations

carried out by him for the purposes of complying with his obligations under Clause G27 hereof.

Preservation of property and property works

2. The Contractor shall be responsible for the preservation of all private and public property and shall protect carefully from disturbance or damage all land monuments and property marks until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.
When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the work or in consequence of non-execution thereof by the Contractor, he shall restore, at his own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, rebuilding or otherwise restoring as may be directed by the Engineer. He shall make good such damage or injury in an acceptable manner. Failure of contractor to make good the said damages or injury, the Engineer will deduct all expenses incurred in making good same from the contract sum.

Protection of utilities

3. The Contractor shall satisfy himself as to the exact locations of utility lines and shall protect and support in a suitable manner all utilities encountered in his excavating and trenching operations. The Contractor shall make good any damage to these lines caused by his operations. If the nature of the damage is such as to endanger the satisfactory operation of the utilities and the necessary repairs are not made immediately by the Contractor under the direction and supervision of the respective utilities, the work may be done by the respective owners or agents and the cost thereof charged against the Contractor.

Employers right to let other contract/contractors in area of the work

4. The Employer reserves the right to let other contracts in the area of the works. Whenever work being done by the Employer's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer, to secure the completion of the various portions of the work in general harmony. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.
If any part of the Contractor's work depends for proper execution or results upon the work of any other contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results. His failure so to inspect and report shall constitute an acceptance of the other contractor's work as fit and proper for the reception of his work, except as to the defects which may develop in the other Contractor's work after the execution of his work.
To insure the proper execution of his subsequent work, the Contractor shall measure work already in place and shall at once report to the Engineer any discrepancy.

Compliance with the law:
OSHA Act 2004

5. The contractor shall comply in every respect with all applicable lease, regulations and building and construction codes of the Republic of Trinidad and Tobago. Particular attention should be paid to the Occupational Safety and Health Act 2004(6).

First aid requirements

6. The Contractor shall provide such equipment and facilities as are necessary or required, in case of accidents, for first aid service to any who may be injured in the progress of work, and he shall have standard arrangements with local hospitals for the removal and hospital treatment of any employee who may be injured or who may become ill.

Reporting of accident to the Engineer and other authorities

7. The Contractor shall, within twenty four (24) hours of the occurrence of any accident at or about the Site or in connection with the execution of the works, report such accident to the Engineer. The Contractor shall also report such accident to the competent authority whenever such report is required by law.

G44.
Force Majeure

G44.1
Definition of Force Majeure

In this Clause, "Force majeure" means an exceptional event or circumstance:

a) Which is beyond a Party's control,
b) Which such Party could not reasonably have provided against before entering into the Contract,
c) Which, having arisen, such Party could not reasonably have avoided or overcome, and
d) Which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

(i) War, hostilities (whether war be declared or not), invasion, act of foreign enemies,
(ii) Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war,
(iii) Riot, commotion, disorder, strike or lockout by persons other than the contractor's Personnel and other employees of the Contractor and Sub-contractors,
(iv) Munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
(v) Natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

G44.2 **Notice of force majeure**	If a party is or will be prevented from performing any of its obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstances constituting Force Majeure. The Party shall, having given notice, be excused performance of such obligations for so long as such force Majeure prevents it from performing them. Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.
G44.3 **Duty to Minimise Delay**	Each Party shall at all times use all reasonable endeavors to minimize any delay in the performance of the Contract as a result of Force Majeure. A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.
G44.4 **Consequences of Force Majeure**	If the Contractor is prevented from performing any of his obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 44.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to to: a) An extension of time for any such delay, if completion is or will be delayed, under Clause 18 [Extension of Time], and b) If the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 44.1 [Definition of Force Majeure] and, in the case of sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost.
G44.5 **Force Majeure Affecting Subcontractor**	If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.
G44.6 **Optional Termination, Payment and Release**	If the execution of substantially all the Works in progress is prevented for a continuous period of 28 days by reason of Force Majeure of which notice has been given under Sub-Clause 44.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in

accordance with Sub-Clause 16.3 [Cessation of Work and Removal of Contractor's Equipment].

Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include:

a) The amounts payable for any work carried out for which a price is stated in the Contract;
b) The Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;
c) Any other Cost of liability which in the circumstances was reasonable incurred by the Contractor in the expectation of completing the Works
d) The Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and
e) The Cost of repatriation of the Contractor's staff and labour employed wholly in connection with the Works at the date of termination.

G44.7 Release from Performance under the Law

Notwithstanding any other provision of the Clause, if any event or circumstances outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil it's or their contractual obligations or which, under the law, governing the Contract, then upon notice by either Party to the other Party of such event or circumstance;

a) The Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and
b) The sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 44.6 [*Optional Termination*, *Payment and Release*] if the Contract had been terminated under Sub-Clause 44.6.

G45. Indemnification of employer by contractor

1.

a) All operations of the Contractor necessary for the execution of the Works shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with the convenience of the public, or the access to, use and occupation of the public or private

roads and footpaths to or of properties whether in the possession of the Employer or of any other person.

b) The Contractor shall save harmless and indemnify the Employer in respect of all claims, proceedings, damages, costs, charges, expenses whatsoever arising out of, or in relation to, any such matters in so far as the Contractor is responsible therefore.

Maintenance of traffic

2.

a) The proper maintenance of continuous traffic adjacent to and in the vicinity of the Works is of extreme importance. The Contractor is required to liaise with the traffic authorities and submit to the Engineer any detour Engineer before restricting the flow of traffic.

Removal of dirt or other material that interfere with drainage and traffic

b) The Contractor shall provide for prompt removal of all dirt and other materials spilled from his or his sub-contractor's trucks on existing public or private highways over which such materials are hauled or onto which such materials are washed or otherwise deposited by reason of his work whenever the accumulation is sufficient to cause dust or the formation of mud so as to interfere with drainage or create a traffic hazard.

Dust control operations

c) Whenever the operations on the Works cause traffic or the Contractor's equipment to create dusty conditions, the Contractor shall take steps, including applying water, furnishing and spreading calcium chloride or using other adequate methods subject to the approval of the Engineer, to prevent or mitigate, to the maximum extent possible, all dust, dirt, fine sand etc. resulting directly or indirectly from the Contractor's operations. The Contractor's attention is called to the fact that dust control may be an hour to hour operation in order to satisfy his obligations under the dust control requirement.

Roads used by the contractor

d) All roads used by the Contractor shall be maintained by the Contractor and left satisfactory to the Engineer.

e) Payment for maintenance of existing roadways and traffic as provided above will not be made under any specific item, but the cost thereof shall be considered a subsidiary obligation under this Contract and no direct payment will be made therefore.

G46.

Cost for maintenance of existing roadway

1. The Contractor shall, except where otherwise provided, be responsible for all claims, demands, proceedings, damages or injury to highways and bridges caused by extraordinary traffic arising out of each intersection of the Works; and he shall make good all such damage or injury to the entire satisfaction of the Authority or Authorities having the control and maintenance of such highways and bridges, providing that, if such Authority or Authorities shall prefer to make good the same time themselves, the Contractor shall be responsible for so much of the cost so incurred as may be referable to extraordinary traffic arising out of the execution of the Works. The Contractor shall indemnify and save harmless the Employer from and against all claims which may be brought or made against the Employer and from and against all demands,

	proceedings, damages, costs charges and expenses whatsoever arising there out of or in connection therewith. 2. All roads used by the Contractor for transportation of equipment and materials shall be maintained in a condition equal to existing conditions prior to this Contract by the Contractor at his own expense.
G47. **Contractor to keep site free of obstructions**	1. During the progress of the Works the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall or dispose of any surplus materials and clear away and remove from the Site any wreckage rubbish or Temporary Works no longer required. 2. On completion of the Works, the Contractor shall clear away and remove from the site all surplus materials, rubbish and Temporary Works of every kind and leave the whole of the Site and Works clear and in a workmanlike condition to the satisfaction of the Engineer.
G48 **Contractor responsible for his servants negligence**	The Contractor shall be responsible for the negligence on the part of his servants which may result in injury to persons or damage to materials, the property of the Employer or any member of the public. The cost of the damage or injury so done, to property or persons shall be deducted from any monies due to the contractor or otherwise recovered from him.
G49. **All vehicles used by contractor must be licensed & insured**	Only vehicles which have been licensed and insured for the contract period are to be used in the performance of this contract. The use of unlicensed and uninsured vehicles will be a breach of contract.
G50. **Quality of material supplied**	If the specifications required the contractor to supply materials for the contract, such materials must not be inferior in quality to any accepted sample and must be acceptable to the Employer.
Rejected material	Rejected materials must be removed from the site by the contractor at the time of delivery failing which the Employer may arrange for their removal at the expense of the contractor. The contractor must identify the source of materials to be used on the contract. Samples must be provided on request from the Engineer.

G51.
Inspection of equipment

The Employer may arrange for the equipment to be or being used by a contractor on a project to be examined and the Contractor must afford the Employer adequate facilities for the examination and must replace any equipment which is deemed by the Employer as unacceptable.

G52.
Material testing

1. All materials and workmanship shall be of the respective kinds described in the Specification and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests as the Engineer may direct at the place of manufacture or fabrication or on the Site or at all or any such places specified by the Engineer. The Contractor shall provide such assistance, instruments, machines, labor and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used and shall supply samples of materials before incorporation in the Works for testing as may be selected and required by the Engineer. Samples of all materials that the Contractor proposes to use on the Works, shall be submitted by the Contractor and the Engineers approval obtained, before commencement of work. One set of such approved samples in sealed transparent containers shall be exhibited in the Contractor's field office.

2. All samples that may be required by the Engineer for testing or any other purpose shall be supplied by the Contractor at his own cost, unless otherwise specified in the Contract.

3. The cost of making all tests required by the Engineer shall be borne by the Contractor unless otherwise specified in the Contract.

G53.
Rejection and remedial works

1. The Engineer shall during the progress of the Works have power to order in writing from time to time.
    a) The removal from the Site, within such time or times as may be specified in the order, of any materials which, in the opinion of the Engineer, are not in accordance with the Contract.
    b) The substitution of proper and suitable materials, and
    c) The removal and proper re-execution, notwithstanding any previous test thereof or interim payment therefor, of any work which in respect of materials or workmanship is not, in the opinion of the Engineer, in accordance with the Contract.

2. In case of default on the part of the Contractor in carrying out such order, the Employer shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the Employer, or may be deducted by the Employer from any monies due or which may become due to the Contractor.

3.
    a) Neither observations by the Engineer nor inspections, tests or approvals by persons other than the Contractor shall relieve the

Contractor from his obligations to perform the work in accordance with the requirements of the Contract.

b) Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is not discovered, nor shall it obligate the Engineer for final acceptance.

G54.

Rates and wages

The Contractor shall pay rates of wages that are not less favorable than:

1.

a) The rates of wages established under any collective agreement between employers or employers' association and organization representative respectively of substantial proportions of employers and workers engaged in the trade of industry, whether or not the Contractor is a party to such agreement.
b) The rates established in the absence of or subsequent to any collective agreement, under any arbitration award for work of the same character in the trade or industry, whether or not such award is binding on the Contractor.
c) The minimum rates of wages established by any law.
d) Such rates of wages as per paid by Government for work of the same character in the trade or industry, in the absence of any collective agreement, arbitration award or provision of law.

Notice of rate of pay to workers

2. The Contractor or sub-contractors shall post notices in conspicuous Places at the establishments and work-places concerned informing the workers of the rates of pay and other conditions of work.

Record of rates and wages

3. The Contractor or his sub-contractors shall keep wages and time books and, in the event of work being paid for by results, work sheets shall be kept showing wages paid to, the time and/or the amount of work performed by workmen in and about the execution of the contract, and the Contractor or his sub-contractors shall be bound whenever required to produce such wages and time books and/or work sheets for the inspection of any person authorized by the Government.

Notification of workers by contractors

4. The contractor shall, before commencing work under the Contract notify the employer's representative of the following:
   a) The number and categories of workers he proposes to employ;
   b) Their rates of pay;
   c) The date of commencement of the work; and
   d) The addresses of the workers he proposes to employ.

Limitations

5.

a) The contractor shall be prohibited from transferring or assigning directly or indirectly to any person or persons whatever, any part of his contract without the written permissions of a person authorized by the Government.
b) The contractor shall be responsible for the observance of these stipulations of this contract by any permitted sub-contractor.

Freedom of workers to join trade union

6. The Contractor shall recognize the freedom of his workers to be members of registered trade unions.

Deputies

7. In the event of any question arising as to whether the requirements of these stipulations of this contract are being observed that question shall, if not otherwise dispose of, be referred to an arbitrator to be agreed upon between the parties or, failing agreement, to be nominated on the application of either party by the President for the time being of the Association of Professional Engineers of Trinidad and Tobago and any such reference shall be deemed to be a submission to arbitration within the meaning of the Arbitration Ordinance or any statutory re-enactment or amendment thereof for the time being in force.

8. Any contractor or sub-contractor who is found to be in breach of these stipulations of this contract shall cease to be approved as a contractor or sub-contractor for such period as the Government may decide.

G55.
Increase in rates

The contractor will not be granted any increase in the contract rates based on an Increase in the price of goods, labour or any other input to the works, retroactive or otherwise.

G56.
Suspension of work by Engineer

1. The Contractor shall, on the written order of the Engineer, suspend the progress of the Works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Engineer. The extra cost incurred by the Contractor in giving effect to the Engineer's instructions under this Clause shall be borne and paid by the Employer unless such suspension is:
    a) Otherwise provided for in the Contract, or
    b) Necessary by reason of some default on the part of the Contractor, or
    c) Necessary by reason of weather conditions on the Site, or
    d) Necessary for the proper execution of the Works or for safety of the Works or any part thereof insofar as necessity does not arise from any act or default by the Engineer or the Employer or from any of the excepted risks defined in Clause G44 (2) hereof.

    Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice of his intention to claim to the Engineer within twenty-eight days of the Engineer's order. The Engineer shall settle and determine such extra payment and/or extension of time under Clause G18 hereof to be made to the

Contractor in respect of such claim as shall, in the opinion of the Engineer, be fair and reasonable.

2. If the progress of the Works or any part thereof is suspended on the written order of the Engineer and if permission to resume work is not given by the Engineer within a period of twenty-eight days from the date of suspension then, unless such suspension is within paragraph (a), (b), (c) or (d) of sub-clause (1) of this Clause, the Contractor may serve a written notice on the Engineer requiring permission within twenty-eight days from the receipt thereof to proceed with the Works, or that part thereof in regard to which progress is suspended and, if such permission is not granted within that time, the Contractor by a further written notice so served may, but is not bound to, elect or treat the suspension where it effects part only of the Works as an omission of such part under Clause G31 hereof, or where it affects the whole Works, as an abandonment of the Contract by the Employer.

G57.
Quantities are estimated

The quantities stated in the Agreement are the estimated quantities of the work. They are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfillment of his obligation under the Contract. The Engineer shall, except as otherwise stated herein, ascertain and determine by measurement the value, in accordance with the contract of work done.

G58.
Inspection and testing by the Engineer

1. The Engineer and any person authorised by him shall at all times access to the Workshops and places where work is being prepared or from where materials, manufactured articles or machinery are being obtained for the Works and the Contractor shall afford every facility and the every assistance in obtaining the right to such access.

2. The Contractor shall give the Engineer timely notice to readiness of the work for all inspections, tests and approvals. If any such work required so to be inspected, tested or approved is covered without such written notice to the Engineer, it must, if requested by the Engineer, be uncovered for observation and such uncovering shall be at the Contractor's expense.

3. No work shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any work which is about to be covered up or put out of the view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Engineer whenever any such work or foundations is ready or is about to be ready for examination and the Engineer shall, without unreasonable delay, unless he considers it unnecessary and advises the contractor accordingly, attend for the purpose of examining and measuring such work or of examining such foundations.

4. The Contractor shall uncover any part of the works or make openings in or through the same as the Engineer may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Engineer. If any such part or parts have been covered up or put out of

view after compliance with the requirements of sub-clause (3) of this Clause and are found to be executed in accordance with the Contract, the expense of uncovering, marking openings in or thorough, reinstating and making good the same, shall be borne by the Employer, but in any other case, all such expenses shall be borne by the Contractor.

G59. Provisional Sum

The term "Provisional Sum" shall mean a sum provided for work or for costs which cannot be entirely foreseen, defined, or detailed at the time the tendering documents. Provisional sums shall be used in part or in whole as directed by the Engineer. In the event that the provisional sum is not used the contractor shall not claim or be entitled to loss of profit as a result of such.

For each provisional sum the Engineer may instruct:

(a) That the contractor make Payment for the supply of the Engineer's implementation resources such as, but not limited to, monitoring staff, transportation for staff, telecommunications and training. Payment to the contractor shall be the actual amount paid (or to be paid) by the contractor plus a sum for overhead charges and profit, calculated at ten (10) percent of these actual amounts. This is referred to as 'client reimbursables' in the 'bills of quantities'.

(b) Work to be executed (including plant, materials and services) by the contractor and valued under clauses 30(variations of Work) or at reasonable rates to be negotiated between the contractor and the engineer.

(c) Work to be executed (including plant, materials and services) by a sub-contractor selected by the Engineer. Payment to the contractor shall be the actual amount paid (or to be paid) to the selected subcontractor plus a sum for overhead charges and profit, calculated at ten (10) percent of these actual amounts.

G.60. Contingency

The term "Contingency" shall mean a percentage provided for work or for costs which cannot be entirely foreseen, defined, or detailed at the time the tendering documents. Contingency shall be used in part or in whole as directed by the Engineer. In the event that the Contingency is not used the contractor shall not claim or be entitled to loss of profit as a result of such.

SPECIAL CONDITIONS
OF CONTRACT

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(Special Conditions of Contract to accompany the Tender)

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S1. THE TIME ALLOWED FOR COMPLETION OF EACH CONTRACT IS AS SHOWN IN THE TABLE BELOW

Contract No.	Contract Name	Time to Completion (Days)
ED22/23 - OGFCP	**Reconstruction of Road Crossing and Raising of Road Level leading to the Sluice Gate Site**	90

(Note: * from the date of Engineer's written ("Notice to Proceed")

S2. ENVIRONMENT CONSIDERATIONS

1. The Exploitation of Quarries

   i. The Contractor will ascertain that the owner of the Quarry from which construction materials will be extracted has been granted the necessary permit or license of exploitation by the corresponding authority, municipal, departmental or national.

   ii. The topsoil organic layer removed to uncover the quarry or burrow-pit, will be piled up in storage at an approved and convenient location, so that when the exploitation is finished, the organic topsoil will be reincorporated to its original location.

   iii. Upon termination of the exploitation of a temporary quarry, the contractor will re-shape the excavation to its original superficial hydraulic characteristics to the extent possible, showing the area with grass whenever required.

   iv. The contractor shall not undertake the exploitation of a quarry without previous approval of the Resident Engineer. In addition, evidence must be produced, that the required permit or license has been granted by the pertinent governmental authority.

2. The Exploitation of Borrow -Pits

   i. The contractor shall not extract river run stone, gravel, sand or any other construction material from water course beds. In exceptional cases previous authorization from the Resident Engineer must be obtained, as well as the necessary permit or license by the pertinent governmental authority.

ii. The Contractor shall not excavate borrow ditches or pits on flat lands subject to water stagnation and/or with slow runoff drainage, and in proximity of villages or urban settlements. Whenever such exploitation becomes necessary, in addition to the pertinent permits, the contractor must prepare, and present for approval of the Resident Engineer, a drainage plan based on a topographic survey drawn up at a convenient scale.

3. Obstruction Removal

i. The Contractor shall not deposit surplus construction material neither on water courses nor on open spaces. To the extent possible, such surplus material shall be used in the backfilling of temporary quarries, or in embankment construction if the quality so warrantees.

ii. The Contractor shall dispose of surplus material in the places so d designated and authorized by the Resident Engineer.

iii. The dump trucks to be utilized in the transportation of surplus material shall be fitted with tarpaulins to prevent dust and/or material spilling while in haulage operation.

4. Existing Pavement Removal

i. The Contractor shall not disposed of material removed from existing pavements on the road or highway side, nor on water courses. The disposal of such material shall be carried out in places as far as possible from the road or highway, so designated or authorized by the Engineer.

ii. Whenever large amounts of asphaltic cement are to be removed from a highway, the material shall be disposed of by burial, at least at one meter depth, as far as possible from the project site and/or urban settlements. Exceptionally, old and out of service roads can be utilized as disposal area, provided they are so isolated that pollution risks are minimal, and with previous authorization of the Engineer.

5. Gravel or Rubble Surfacing

i. The Contractor shall utilize materials with a low silt content, thus to prevent dust generation.

6. Private Land Permit

i. The Contractor shall not dispose of any surplus material in private land, unless authorized by the owner in writing, authenticated before a Notary Public, and with previous authorization of the Resident Engineer.

7. Erosion and Siltation

i. The Contractor shall undertake all precautionary measures, either transitory or permanent in nature, to control and/or minimize erosion and/or siltation of rivers, permanent water courses, lakes and lagoons, during the execution of the project. Such measure shall include, but shall not be limited to, the use of beams, siltation basins, geotextile membranes, gabions, slope drains, establishment of vegetation and any other reasonable measure. The erosion and siltation control measures, permanent in nature, shall be applied to any erodible material exposed to any activity associated with the works, including sources of material supply and production, storage of raw materials, and disposal areas of surplus materials.

ii. The transitory measures will be coordinated with the construction of permanent installation of drainage and other activities contracted, to the extent of practical cost, in order to ensure an effective and continuous control of erosion and siltation. The transitory and permanent installation of drainage will be built wherever required, lining the sections subject to scouring, or at places where change of slope is required.

iii. After each heavy rainfall, and daily when intermittent rainfall occurs, the Contractor shall inspect the state of the erosion and siltation control works, in order to ascertain any deficiency, and take the corrective action as deemed suitable.

8. Water Pollution

i. The Contractor shall take all precautionary measures, throughout the duration of the project, aimed at preventing the contamination of rivers, water courses, lakes and lagoons, Pollutant wastes, such as chemical products, fuel lubricants, sewerage water, paints, silt and any other obnoxious material shall not be discharged onto rivers, water courses, lakes lagoons, or drainage channels leading to the foregoing.

9. Noise Level

i. The Construction equipment operation will be conducted in such a manner that, the level of noise produced will not be higher than 80 decibels during the operation activity, especially when the construction is being undertaken in proximity of hospitals, geriatric homes, churches, schools, parks and recreational areas.

ii. The Resident Engineer, at his discretion, will undertake to watch the level of noise as he deems appropriate. However, in the case exceeding the above-mentioned

level of noise during construction operations, the contractor shall undertake the necessary measure to bring it down to an acceptable level. The Contractor will be responsible for defraying the costs of noise level reduction of the construction equipment, as well as any cost associated with delays in execution of the works for non-temporary fulfillment of the above requirement.

iii. The Engineer shall authorize, at his discretion, the conducting of construction activities during the period between 10:00 p.m. to 6:00 p.m. especially those that may produce an objectionable level of noise.

iv. The construction equipment will be maintained in such a condition that, at all times, the level of noise produced while in operation, will be substantially similar to out of factory condition.

10. Treatment and Conservation of the Works

i. In order to protect slopes and backfills from erosion, the faces of such works exposed to inclement weather will be sowed with grass or vine type of plants. The selected species will be those adapted to ecological local conditions, especially or rapid growth and deep roots, thereby providing a cohesive element for soil retention.

ii. In the approaches to bridges, both upstream and downstream, the faces of embankments exposed to inclement weather, will be sowed, either with grass or plant species recommended to prevent erosion.

S3. 1 THE EMPLOYER PROVIDING ACCESS TO THE SITE

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the Appendix to Tender. The right and possession is not exclusive to the Contractor. The rights of access of approved users and stakeholders of the Site shall be maintained throughout the duration of the Works. A register of approved users and stakeholders of the Site shall be provided by the Engineer in writing within five (5) days of the Commencement Date. The Engineer is entitled to amend this register as may be required. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation structure, plant or means of access, the Employer shall do so in the time and manner stated in the Specification.

S3. 2 SECURITY OF THE SITE

The Contractor shall comply with all regulations and directions made by the Employer or the Engineer from time to time with regard to the security of the Site. The Contractor shall be responsible for keeping unauthorized persons off the Site, and assist the Employer and other sub-contractors in doing the same. Authorized persons shall be limited to the Contractor's Personnel, the Employer's Personnel, other sub-contractors' personnel and any other personnel notified to the Contractor, by the Employer or the Engineer. The Employer and the Engineer shall not be responsible for the security of the Contractor's Equipment or any Goods brought on the Site by the Contractor.

During the execution of the Works, the Contractor shall keep the Site free from all un-necessary obstruction, and shall store and dispose of any Contractor's equipment or surplus materials in the area so designated by the Engineer. The Contractor shall be responsible for and shall upon the request of the Engineer clear away and remove from the Site all wreckage, rubbish and temporary Works. The Contractor shall leave that part of the Site and the works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such goods as required for the Contractor to fulfil obligations under the Contract.

The Contractor shall obtain the approval of the Engineer for the proposed siting of all spoil heaps, temporary roads, rail and sleeper tracks, paths, hard standings, sheds and other structures.

S4. CONTRACTOR'S OBLIGATIONS IN RESPECT OF OCCUPATIONAL HEALTH SAFETY AND ENVIRONMENTAL REQUIREMENTS

S4.1 General Requirements

The Contractor will implement an HSE Management system in compliance with the Occupational Safety & Health Act 2004, as amended in 2006 and in and general conditions for the Works that will include risk assessment, management responsibility, training, provision of PPE, substance abuse testing and incident reporting. The Contractor shall pay particular attention in terms of HSE Management to the following

- Segregation of plant and people
- Equipment usage (certification, competence of operators, load certification of lifting equipment);
- Documentation – use of current drawings, establishment of control points;
- Temporary works;
- Competent operator personnel
- Daily Work Report

The Contractor shall provide temporary sanitary arrangements and accommodation for his staff and employees, in accordance with the requirements of the act and shall exercise control to prevent any nuisance or contravention of any specific directions of the Ministry of Health or the Employer's Representative in connection therewith

Adequate toilet and clean water washing facilities shall be provided. Siting of any temporary facilities shall be approved in writing by the Employer's Representative All standard regulations and any emergency regulations, which May be issued from time to time in connection with Sanitation and/or Public Health, shall be observed by the Contractor.

The Contractor shall not dispose of any surplus material in private land, unless authorized by the owner in writing, authenticated before a Notary Public, and with previous authorization of the Engineer. The Contractor shall take all precautionary measures, throughout the duration of the project, aimed at preventing the contamination of rivers, water courses, lakes and lagoons, Pollutant wastes, such as chemical products, fuel, lubricants, sewerage water, paints, silt and any other obnoxious material shall not be discharged onto seas, rivers, water courses, lakes, lagoons, or drainage channels leading to the foregoing.

S4.2 COVID-19 - Safety Protocols and Procedures

Before the initiation of works on the contract, the Contractor shall submit a formal, written COVID-19 prevention plan to the Engineer. The plan shall focus on reducing exposure and transmission of the Covid-19 virus, inclusive of all protocols and detailed procedures for the following:

i) Personal health awareness
ii) Hand sanitizing- Effectiveness and frequency
iii) Masking
iv) Social distancing- Maintenance of appropriate spacing.
v) Cleaning of the workspaces, tools and machinery
vi) Work planning to maximize social distancing
vii) Workplace health screening(temperature checking stations)
viii) Personal protective equipment
ix) Management of visitors to the site.

The contractor shall designate a site specific Covid-19 supervisor to enforce Covid-19 response practices on the Job site and perform regular site inspections.

S5 ENGAGEMENT OF STAFF AND LABOUR

The Contract shall employ a minimum of Twenty-five percent (25%) of unskilled labour and ten (10%) of semi-skilled and skilled labour from within the Project community and environs (within a Five kilometer radius). It is the responsibility of the Contractor to ensure that any labour employed from within the project community and environs are adequately qualified and/or experienced to undertake the work assigned to the standards herein defined.

S6 CO-ORDINATION OF WORK WITH OTHERS

The Contractor's attention is directed to the fact that he may be required to coordinate his operations with work being performed or to be performed on other Contracts in the area of the Works, with work of sub-contractors, utility companies and others as may be required. In particular, he will be required to co-operate when utilities are being installed.

A number of utilities must necessarily be relocated during the course of the Contract, and due allowance must be made for this in the scheduling of work.

The right is reserved by the Employer's Representative to do work by other contractors or by Government forces and to permit public utilities, companies and others to do work during the progress and within the limits of or adjacent to the Works.

The Contractor shall conduct his work and cooperate with such other parties so as to cause as little interference as possible with such other work as may be progressing at the same time.

In the case of a difference of opinion as to the respective rights of the various parties involved or an of interference between the operations of different Contractors, the Engineer shall be the sole judge of the rights of each Contractor in respect of the entire project and in all cases his decision shall be accepted as final and no cause for claim.

FORM OF AGREEMENT

Form of Agreement

TRINIDAD AND TOBAGO

THIS AGREEMENT (hereinafter together with all Appendices attached hereto and forming an integral part hereof called "**the Agreement**") is made in duplicate this……. day of……in the year of Our Lord Two Thousand and Twenty-Three between Permanent Secretary in the Ministry of Agriculture, Land and Fisheries, Narsaloo Ramaya Marg Road, Endeavour, Chaguanas acting herein for and on behalf of the Government of the Republic of Trinidad and Tobago which expression shall mean and include the officer or officers for the time being carrying out the duties of Permanent Secretary in the said Ministry (hereinafter referred to as "**the Employer**") of the One Part and a company duly registered under the laws of Trinidad and Tobago and having its registered office in the Island of Trinidad (hereinafter referred to as "**the Contractor**") of the Other Part.

WHEREAS

(A) The Employer is desirous that certain works be carried out under Engineering Division, namely for and on behalf of the Ministry of Agriculture, Land and Fisheries, (hereinafter referred to as "**the Works**") and that the Works be executed in accordance with the terms of this Agreement and the documents annexed hereto.

(B) The Contractor was invited to tender for the performance of the Works by Letter of Invitation to tender dated the (hereinafter referred to as **"Invitation to Tender"**) hereto annexed and marked "**A**".

(C) The Contractor offered to execute the Works at and for the total price or sum of which sum includes Value Added Tax as evidenced by its Tender dated the and the Bills of Quantities dated the (hereinafter referred to as "**the Tender Form**" and "**the Bills of Quantities**" respectively) hereto annexed and marked "**B**" and "**C"** respectively.

(D) By Letter of Award dated the (hereinafter referred to as "**the Letter of Award**") hereto annexed and marked "**D**" the Contractor was informed that the Employer had accepted its Tender to execute and complete the Works and had agreed to award the contract for the Works to the Contractor at the price or sum of (hereinafter referred to as **"the Contract Sum**") plus Value Added Tax in the sum of or such other sum as may be payable in accordance with the terms and conditions of this Agreement.

(E) The Contractor has agreed to abide by the General Conditions of Contract, Special Conditions of Contract, Standard Specifications and Drawings for the Works (herein after referred to and together called "**the Conditions of Contract**") hereto annexed in a bundle and marked "**E**".

(F) Prior to the execution of this Agreement the Contractor visited and examined the site of the Works and satisfied itself as to the nature of the same and of the physical and climatic conditions obtaining insofar as they affect the Works and execution of the same and satisfied itself as to where and in what manner the labour and materials required for the Works could be obtained and as to all matters which might have influenced it in making its tender and made every allowance it considered desirable in its own judgment in view of the information.

(G) Copies of the Contract Documents annexed hereto have been signed by the Contractor and the Employer for the purpose of identifying them as same, which together with these presents are descriptive of the extent and character of the Works.

(H) Payment claims may be processed on completion of:

- 30% of works by value
- 60% of works by value
- 100% of works by value

NOW THEREFORE IT IS AGREED as follows:

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

2. (a) The Contract Documents shall comprise the following documents which shall be deemed to form and to be read and construed as part of this Agreement.
   (i) The **Invitation to Tender** dated the hereto annexed and marked "**A**".
   (ii) The **Tender Form** dated the hereto annexed and marked "**B**".
   (iii) The **Bill of Quantities** dated the hereto annexed and marked "**C**".
   (iv) The **Letter of Award** of the Contract dated the hereto annexed and marked "**D**".
   (v) The **Conditions of Contract** hereto annexed in a bundle and marked "**E**".

   (b) In the event of any inconsistency or conflict between this Agreement and any other document hereinabove referred to, the provisions of this Agreement will take precedence.

3. The Contractor shall at all times and for all intents and purposes under this Agreement be an Independent Contractor and is not an Agent, Employee or Servant of the Government of the Republic of Trinidad and Tobago.

4. The Employer hereby engages the Contractor to execute and complete the Works and the Contractor hereby agrees to execute and complete same in conformity with the terms and effect of this Agreement and with the Contract Documents hereinabove referred to.

5. In consideration of the execution and completion of the Works by the Contractor as aforesaid the Employer hereby covenants to pay to the Contractor the Contract Sum of plus Value Added Tax in the sum of in accordance with the Letter of Award or such other sum as may become payable hereunder at the time and in the manner set out in the Contract Documents.

6. (a) The Ministry shall have the absolute right to abandon the Works or to amend its project or to change the general basis for the execution of the Works at any time and such action on its part shall in no event be deemed to be a breach of contract.

(b) The Ministry, in its sole discretion and for any reason whatsoever, shall also have the absolute right to terminate this Agreement and such action on its part shall in no event be deemed to be a breach of contract.

(c) In the event of such termination, the Ministry shall make payment to the Contractor for any portion of the Contract satisfactorily performed prior to the effective date of termination.

7. The Contractor for himself and his assigns and the Employer mutually covenant that they will respectively perform and observe the several provisions of the contract to be performed and observed by them respectively as set out in the Conditions of Contract hereinbefore referred to.

8. The Permanent Secretary in the Ministry of Agriculture, Land and Fisheries shall not be personally liable for anything arising out of this Agreement.

IN WITNESS WHEREOF the Permanent Secretary in the Ministry of Agriculture, Land and Fisheries, for and on behalf of the Government of Trinidad and Tobago has hereunto set her hand the……. day of……..2023 and…….. has hereunto set his hand the…… day of …… 2023.

SIGNED by)
Permanent Secretary)
in the Ministry of Agriculture, Land and
Fisheries for and behalf of the Government) _____
of the Republic of Trinidad and Tobago)
in the presence of: -)

THE COMMON SEAL OF
)
was hereunto affixed by)

its Secretary in the presence of)
)_____

one of its Directors by Order and Authority of the)
Board of Directors in conformity with the By-Laws of)
The Company in the presence of: -)

CONTRACTS

PREAMBLE TO BILL OF QUANTITIES

SCOPE OF WORKS

TENDER FORM

BILL OF QUANTITIES

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Bill of Quantities

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Bill of Quantities	ED22/23 - OGFCP	BOQ 8

PREAMBLE TO BILLS OF QUANTITIES

The following Preambles define the methods which will be used for the re-measurement of the Works. The Tenderer is to include within the rates and prices in the Bills of Quantities, for all the work both temporary and permanent in order to complete the Contract as shown on the Drawings or as detailed in the Specification, whether or not it is described in the Bills of Quantities or in the Preambles thereto. The Tenderer shall enter his prices under the columns in the Bills of Quantities in Trinidad and Tobago Dollars.

1. The Bills of Quantities herein, including all notes and instructions, form an integral part of the Contract Documents. However, the descriptions contained in the Bills of Quantities for each item are not necessarily complete. The Contractor is referred to the Conditions of Contract and other Documents, Specifications and Drawings as well as relevant Standards and Codes of Practice for further information as no claim or variation will be considered on account of the Contractor's failure so to do.

2. The Contractor is cautioned to familiarize himself with the full content of other sections of the Contract Documents including the Drawings and Specifications (or any other information that can be reasonably inferred from any of them) and all obligations contained in the documents shall be included in the Tender prices, even if specific items relating to them are not listed in these Bills of Quantities.

3. The Contractor will be held to have familiarized himself with all site conditions, all survey and site investigation records available, means of access and the location of existing services, in order to execute the works measured and described within the Bills of Quantities. No claim for want of knowledge in this respect will be considered.

4. The Contractor's unit rates are to be the fully inclusive value of the work described and must include all related work, accessory or consumable material, incidental labour, supervision, administration, tools construction equipment, overhead and profit and all costs and expenses which may be required in and for the completion of the work described together with all costs and expenses in complying with all general risks, liabilities and obligations set forth or implied in the Drawings, Specifications and Conditions of Contract.

5. Drawings, Specifications and Bills of Quantities and all other Contract Documents are complementary and if any item is included in any of them, it shall be deemed included in all.

6. Should an item be included or implied in any of the Contract Documents, then it shall be considered as necessary for the proper execution of the Works and deemed to be included in the Contract Sum. Should an item required for the proper execution of the Works not be included or implied in any of the Contract

Documents, then the items shall be considered as variations to the Contract requiring approval of the Employer.

7. The Contractor's bid for the entire work shall provide for supervision of any or all trades that is not intended to be performed with his own forces. No extra compensation for services as a General Contractor will be paid.

8. Some general items, provisional sums and allowances are to be tendered on a lump sum basis. For other work, the quantities shown in the Bills of Quantities are measured in accordance with the Specification.

9. The Works shall be measured for payment and will also be subject to adjustments as a result of changes in the scope of work through changes in Drawings and / or Specification in accordance with the Contract Documents as well as changes made in the field by the Engineer.

10. The Contractor shall verify quantities set out in the Bills of Quantities as being the quantities of the Works required to be executed by him in accordance with the Drawings and Specification. All unit rate items will be subject to re-measurement on completion.

11. In the event of there being any discrepancies between details on the Drawings, descriptions in Specifications and descriptions in the Bills of Quantities then the item shall be deemed to have been priced in accordance with the drawings

12. Any error in description or in quantity or in omission of items from the Bills of Quantities shall not vitiate this Contract nor release the Contractor from the execution of the whole or any part of the Works comprised therein according to the Drawings and Specifications or from any of his obligations or liabilities under the Contract.

13. The Bills of Quantities shall be used for evaluating variations and progress payments due to the Contractor.

14. The Contractor shall request written clarification from the Engineer of any point he considers to be a discrepancy or ambiguity. The Contractor is required to check the numbers of the pages of the Bills of Quantities and should any be found missing or in duplicate or the figures or writing indistinct, the Contractor must notify the Engineer at once and have the matter rectified before the Tender is submitted. No liability whatsoever will be entertained in respect of any claim for error in the Contractor's tender resulting from failure to comply with the foregoing.

15. The Contractor should allow against the items or in the prices for everything contained in these Bills of Quantities, which has a monetary value.

16. A price or rate shall be entered by the Contractor against each item in these Bills of Quantities whether quantities are stated or not. Items against which no price or

rate is entered will be considered as covered by other prices or rates in the Bills of Quantities.

17. Unit rates May be used reciprocally in the settlement of accounts. The Contractor is, therefore, to ensure that identical items occurring in separate bills are not priced at different rates unless this is his deliberate intention.

18. Amendment shall not be made to these Bills of Quantities without the authority, in writing, of the Engineer.

19. The Contractor shall not use these Bills of Quantities as a construction programme or for the purposes of ordering materials or arranging subcontracts. The references for these activities shall be the Drawings, Specification and instructions issued by the Engineer.

20. All costs associated with carrying out designs, preparing drawings, schedules and manuals, and submissions for the Engineer's approval where these are specified to be done by the Contractor, shall be deemed to be included in the rates and prices. Items for equipment and systems specified to be designed by the Contractor shall be deemed to include for all work necessary to ensure compliance with the performance requirements of the Specification.

21. Unless otherwise described or unless separate items have been measured, all prices for permanent works are to include for all the Contractor's facilities and services, materials, labour, Contractor's Equipment, transportation, all insurances, all taxation and duties, mobilization and demobilization, profit and overheads, etc. any temporary works and all else necessary to complete the activity.

22. Rates and prices are to include for all insurance and freight, customs duty, port dues and handling charges, the cost of transport from the port to site and all craneage, handling, storing and storage facilities. Where separate items have been measured for supply and for fixing or installation, the cost of the above shall be included in the prices for supply.

23. The works shall be measures "net" for payment and will also be subject to adjustments as a result of changes in scope of work through changes in drawings and/or specifications in accordance with the tender documents as well as changes made in the field by the engineer with no allowance for overbuild, working space, overbreak, bulking etc. The rates shall include for all laps, waste working space and trade and traditional allowances.

INTRODUCTION

The Ministry of Agriculture, Land and Fisheries, Engineering Division, is desirous of carrying out Water Management and Flood Control works at Orange Grove Food Crop Project as outlined on the following page.

Contract No.	Contract Name	Duration
ED22/23 - OGFCP	**Reconstruction of Road Crossing and Raising of Road Level leading to the Sluice Gate Site**	90 days

A brief scope of works for the Orange Grove Project are outlined on the following page.

TENDER No.: EDOGPR-22-23

SCOPE OF WORKS

The Site

These works relate to Contract No **ED22/23 - OGFCP**. The site of the work is in the Orange Grove Food Crop Project in the County of St. George West on the island of Trinidad.

The Works

The Works consist of the Reconstruction of Road Crossing and Raising of Road Level leading to the Sluice Gate Site on the South-Western End of Orange Grove Food Crop with the activities outlined as follows: -

1. Clearing and Grubbing
2. Construction of Embankment
3. Construction of Gravel Sub base
4. Construction of Road Base
5. Road Surfacing
6. Construction of New Ditches
7. Construction of Culvert/ Farmers' Crossing

TENDER FORM

Ministry of Agriculture, Land and Fisheries
Water Management and Flood Control at the Orange Grove Food Crop Project
Engineering Division
Contracts 2022 - 2023

CONTRACT NUMBER: ED22/23 - OGFCP

CONTRACT NAME: RECONSTRUCTION OF ROAD CROSSING AND RAISING OF ROAD LEVEL LEADING TO THE SLUICE GATE SITE

The Permanent Secretary
Ministry of Agriculture, Land and Fisheries
Narsaloo Ramaya Marg Road, Endeavour, Chaguanas

Madam,

I/We……
Having examined the Tender Documents and, visited the site of works, I/We do hereby offer to execute and complete the said Work in full conformance with the said Tender Documents for the sum of ……

…….

($.....) Trinidad and Tobago Dollars plus Value Added Tax…….

($.....)

I/We agree to commence work on the date specified in the "Notice to Proceed" from the Engineer and to complete the said works within the agreed completion period of **Ninety (90) days** or within such extended period as may be approved by the Engineer, failing which I/We agree to pay liquidated damages at the rate specified in the Tender Documents, until the work has been completed.

I/We agree to abide by the price quoted in this Tender for a period of ninety (90) days from the closing day of receipt of tenders

I/We understand that the Permanent Secretary is not bound to accept the lowest or any other tender.

_____ _____

Signature of Tenderer Name of Firm

_____ _____

Name of Signatory in Block Letters Address of Firm

In the capacity of _____

Date of Tender: _____

Telephone No: …….

Fax No: ……..

Cell No: ……..…

AGRICULTURAL ACCESS ROADS REHABILITATION PROGRAMME

CONTRACT : ED22/23 - OGFCP

ENGINEER'S ESTIMATE

Project : Installation of Flood Alleviation Infrastructure, Desilting, Clearing and Regrading of Internal Water Courses

Length : 0.16 km

Location : Orange Grove Project

No	ACTIVITY	COMPACTED LAYER HEIGHT DIMENSION	SPEC. NO.	QTY	UNIT	RATE	AMOUNT
						T. T.$	T.T.$
a.	**Clearing and Grubbing**		1				
	(i) Road Main (scarification of asphalt surface)			**160**	Metre		
b.	**Construction of Embankment**		3				
	(i) Embankment Fill (CBR 15 pitrun)	400 mm (Average thickness)		**290**	Cubic Metre		
c.	**Construction of Gravel Sub-Base**		4				
	(i) Pitrun	200mm		**145**	Cubic Metre		
d.	**Construction of Road Base**		5				
	Blue lime stone Crusher run	100mm		**70**	Cubic Metre		
e.	**Road Surfacing**		6				
	(i) Asphalt (Inclusive of Bituminous Prime Coat)	50 mm		**600**	Square Metre		
f.	**Construction of New Ditches**		8				
	(i) Earthen Drains	300mm		**1,288**	Metre		
g.	**Construction of Culverts/ Farmers' Crossing**		15				
	(i) Box Culvert (In accordance with the drawings)	2m x 2m X 5m Long		**1**	No. of Culvert		
	ii) Cylinder culverts (In accordance with the drawings)	900mm Diameter x 5 M long		**5**	No. of Culvert		
h.							
					SUB TOTAL		
	Contractor's Name (Block Letters)				**10% CONTINGENCIES**		
					TOTAL		
	Dated Initials of Tenderer				**12.5% VAT**		
					GRAND TOTAL		
	Date Signed						

SPECIFICATIONS

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1 ***CLEARING AND GRUBBING***

1.1 Clearing and Grubbing

1.11 Description

This activity consists of clearing and grubbing of the road reserve and preparing the road carriageway for base or sub base gravelling. The work to be performed under this Activity consists of the following:

1. Removal and satisfactory disposal from the site, of remnants of existing surfaces, landslides, shrubs, grass, trees and other vegetation including grubbing up of roots from the entire road reserve. It also includes the backfilling of resultant trenches, holes and pits and trimming or removal of trees that is overhanging on the road reserve and causing shade and as approved by the engineer. The resultant road surface after clearing and grubbing should be to sub grade formation.

2. All the excavation and backfilling necessary to bring the roadway to the required formation level as instructed by the engineer.

3. Subgrade preparation

4. Scarification of existing sealed road surfaces as instructed by the engineer

5. Blading and compaction of existing graveled road surfaces and road shoulders as instructed by the engineer

1.1.2 General

1. The Engineer shall establish the right-of-way and construction lines defining the limits of areas to be cleared.

2. No land monuments, property, markers or official data points shall be removed until an authorized agent has witnessed or otherwise referenced their locations and approved their removal.

3. The Contractor shall prevent all damage to pipes, conduits, wires, cables or structures above or below ground. The Contractor must consult with the appropriate Utility authorities to determine these locations and the extent of all affected services and take the necessary precautions and measures for their care, protection and diversion. The Contractor will be required to bear the cost of such precautions and measures. During the work or upon completion of the work, utilities or services shall be protected, capped or sealed in a manner required by the Utility Authority. The Contractor shall furnish the Engineer with the necessary compliance certificates.

4. The Contractor shall keep the approach roads, the works and all places occupied by him clear of refuse and rubbish that may accumulate from his operations and shall maintain such places in neat condition. When a local inconvenience is caused by dust, the Contractor when directed by the Engineer, shall sprinkle the premises with water.

5. No debris or other material required to be disposed of shall be dumped or placed within the limits or any existing projected public street or road nor shall any material be excavated without the written permission of the Engineer.

6. Removal of debris and rubbish is from within the road reserve of the site, it is at the Contractor's own cost as it forms part of this activity.

7. Where designated by the Engineer, all trees shall be uprooted and cut down as near to the ground level as possible. All felled timber, designated by the Engineer as useful shall be the property of the Employer. Such timber shall be cut and stacked in an orderly fashion at places within the site as indicated by the Engineer. All felled timber and other material designated by the Engineer as not suitable for use shall be the property of the Contractor to be disposed of, as approved by the Engineer, to a site at his own expense. Stumps and tree roots left after felling the trees shall be grubbed up scrupulously. The material arising thereof shall be the property of the Contractor and shall be removed off the site, as approved by the Engineer, at the contractor's expense. Holes left by the stumps and roots shall be filled with suitable excavated material and compacted in layers of not more than 150mm (compacted thickness).

1.1.3 Work Method

1. The work to be performed under clearing and grubbing consists of grubbing, cutting and removal of all trees, shrubs, grass, vegetation, organic sod, top soil, landslides, organic earth, roots and other objectionable material from the areas to be excavated, filled, graded, constructed on and other areas designated to be stripped, using a bulldozer or other equipment as approved by the Engineer.

2. The areas for clearing and grubbing shall be as designated by the Engineer. It includes the road reserve.

3. The depth to be cleared and grubbed shall be at least 300mm or as instructed by the engineer.

4. All grass, bush, debris and other trash shall be removed together with all roots, stumps; organic sod and other waste materials shall be the property of the Contractor and disposed of by him, as approved by the Engineer, at the Contractor's expense.

5. Other materials such as top soil, earth, sand and stone obtained in the operation of clearing and grubbing shall be carefully and separately stockpiled on site at places designated by the Engineer. These materials (other than those identified by the Engineer for reuse on the works) shall be spread on the ground to the grades and lines designated by the Engineer and sectioned neatly and the site left clean.

6. In areas designated by the engineer, materials identified for reuse shall be spread and compacted in layers not exceeding 150mm. This process shall continue until the entire road is bought to the required formation level.

7. The subgrade shall be prepared in accordance with Specification 4.2. The graded road surface area must be cambered in accordance with drawing **D1** and as approved by the Engineer. The graded shoulder must be in accordance with Specification 3.2.

8. Where blading and rolling of an existing gravel surface is required to improve the riding surface and remove irregularities, the following shall be adhered to:

    a. In areas indicated by the Engineer using a motor grader, grade shoulders down to a level approximately 5cm below the edge of the road's riding surface. All unwanted material from the grading operation shall be removed at the contractor's expense.

    b. Provide a 5% slope from the edge of the road down to the edge of the ditch using a motor grader.

    c. Using a motor grader cut materials from the road surface to below the bottom level of potholes, depressions and corrugations. Potholes that cannot be bladed out shall be cleaned out, filled with aggregate and compacted. The aggregate shall be approved by the engineer and shall be furnished, placed and compacted at the contractor's expense.

    d. Gather all loose material in a windrow near the centre of the road.

    e. Spread and compact material in accordance with specification # 4.4

9 Where the road surface requires scarification the following application must be adhered to:

    a. The contractor is instructed to use a motor grader preferably a 120G motor grader with the scarification apparatus connected just below the blade.

    b. The depth of the scarification should be given by the Engineer or deep enough to remove the total surface material, exposing the road base material.

    c. The desired camber must then be achieved.

    d. The resulting surface must then be compacted with a vibrator roller to achieve 98% compaction.

    e. The scarified material and vegetation shall be the property of the Contractor and disposed of by him, as approved by the Engineer, at his expense.

1.1.4 Measurement and Payment

1. The measurement for payment shall be the length of roadway measured in metres cleared and grubbed and approved by the Engineer.

2. Payment will be made at the prices tendered for the items under this Section as they appear in the Bill of Quantities. The prices and payment will constitute full compensation for all the materials, labour, tools, equipment and all else necessary to complete the works described herein, in strict conformance with these Specifications and as accepted by the Engineer. The prices tendered above will include disposal of useless and unsuitable material from site as approved by the Engineer.

3. The prices tendered will include the spreading neatly on the ground all the materials arising out of this work that are to remain on site and after reuse on works.

2. UNCLASSIFIED EXCAVATION

2.1 Description

1. Unclassified Excavation shall comprise excavation, grading and formation of road way and side slopes, in all soils other than rock and muck as defined below and depositing spreading and sectioning the excavated materials to the designated grades and lines, within the limits of Work.

2. It shall not include excavation for structures, culverts and any other excavation that can be classified as structural excavation.

3. Definition and classification of Earthworks material are as follows:

   (1) 'Top Soil' shall mean the top layer of soil that can support vegetation.

   (2) 'Suitable material' shall comprise all that which is acceptable in accordance with the Contract for use in the Works.

   (3) 'Unsuitable material' shall mean other than suitable material and shall comprise:

   - material from swamps, marshes and bogs;
   - peat logs, stumps and perishable materials;
   - material susceptible to spontaneous combustion;
   - clay of liquid limit (LL) exceeding 90 and/or plasticity index (PI) exceeding 65;
   - materials having a moisture content greater than the maximum permitted for such materials in the Contract.

   (4) 'Rock' shall mean those geological strata or deposits so designated in the Drawings and any hard natural or artificial material requiring the use of blasting or approved pneumatic tools for its removal but excluding individual masses having volumes or less than 0.2 cubic metre. Classification under 'Rock' shall be by decision of the Engineer.

   (5) 'Muck' shall consist of slush, soft mud or any material containing an excessive amount of water. Classification under 'Muck' shall be by decision of the Engineer.

2.2 Excavation

1. The Contractor shall submit to the Engineer not less than two (2) days in advance of the start of excavation, his proposed method of excavation and the type of equipment that would be used for carrying out the excavation and the Contractor shall not commence until the Engineer's approval has been given.

2. The Contractor shall employ only that plant which is suited to the soils to be handled. He shall not at any time use any plant which damages or reduces the natural strength

of the soil either in its in-situ state or during handling and placing or in its final compacted state.

3. The Contractor is required to excavate to levels, grades and slopes as described in the Contract and the finished cut surfaces shall be machine dressed and left with even surfaces.

4. Where any material below formation level in cuttings or below the natural ground level under embankments is required to be excavated, it shall be removed to such depth and over such areas as are described in the Contract or as directed by the Engineer and shall be paid for as Unclassified Excavation.

5. Excavation operations shall be conducted so that material beyond slope limits is undisturbed.

6. Naturally occurring unstable subgrade material shall be undercut below normal subgrade elevation when so indicated on the Drawings or as directed by the Engineer. It shall be replaced with approved material in accordance with 'Specification 12.2 Embankment' at the cost of Employer. If, in the Engineer's opinion, firm subgrade has become unstable because of the Contractor's poor practices e.g. failure by neglect to keep cut free of water, the Contractor shall, at his own expense, by repair or replacement, provide a subgrade satisfactory to the Engineer.

7 Construction plant shall not use the surface of the bottom of cutting at a level less than 300 mm above formation level. Any damage to the subgrade arising from such use of the surface shall be made good by the Contractor at his own expense with approved material in accordance with 'Specification 12.2 Embankment'.

8 Cut areas shall be maintained free of all water at all times during construction. The Contractor shall arrange for the rapid disposal of water off the earthworks or completed formation during construction which enters the earthworks from any source and when practicable the water shall be discharged into the permanent outfall for the drainage system. Adequate measures shall be taken to prevent the pollution of existing watercourses.

9. The Contractor shall provide where necessary temporary watercourses, ditches, drains, pumping or other means of maintaining the earthworks free from water. Such provision shall include carrying out the works in such a manner that their surfaces have at all times a sufficient minimum cross fall and where practicable a sufficient longitudinal gradient to enable them to shed water and prevent ponding. The Contractor shall construct all such ditches so as to avoid eroding adjacent banks. All ditches dug by the Contractor shall be maintained and kept free from debris by him until final acceptance of the Works.

10. Slope adjustments shall be made as shown on the Drawings or as directed by the Engineer to avoid injury to standing trees, to harmonize with landscape features or to arrive at a more stable condition. Gradual transitions shall be made to these adjusted slopes and at intersections between cuts and fills so that a pleasing effect results with no noticeable breaks in grade.

11. Material outside the planned roadway or ditch slopes (that is unstable and constitutes potential slides in the opinion of the Engineer), material from slides which has come into the roadway or ditches, and material which has slipped out of new or old embankments shall be excavated and removed. The material shall be excavated to designated lines or slopes either by benching or in such a manner as directed by the Engineer.

12. The Contractor shall be responsible for the location, care and protection of any underground piping, conduit or cables or any other subsurface lines or structures that may be encountered and for any damage caused to same by his operations.

2.3 Measurement and Payment

2.3.1 Measurement

The quantity of Unclassified Excavation to be paid for under this Section shall be the number of cubic metres excavated and deposited and stockpiled within the site or as directed and accepted by the Engineer. The material shall be measured in its original position. The payment limits of the excavation shall not exceed those shown on the Drawings. Original ground cross-sections, prior to the commencement of the unclassified excavation, shall be taken subsequent to actual excavation. The quantities shall be computed, using the original and secondary cross-sections, by the average end area method.

The quantity of 'Excavation in Rock' to be paid for under this Section shall be the number of cubic metres excavated and stockpiled within the site or as directed and accepted by the Engineer. Measurements of rock to be excavated shall be recorded by the Engineer in its original position before commencement of actual excavation and agreed upon by the Contractor. After completion of actual excavation and related operations to the satisfaction of the Engineer, certificate of excavation shall be recorded by the Engineer against such of the pre-measurements of rock as has been excavated and removed by the Contractor and the quantities thereof will be paid for.

The quantity of 'Excavation in Muck' to be paid for under this Section shall be the number of cubic metres acceptably excavated and disposed off the site at a location approved by the Engineer. In the case of muck that is in too fluid, pre-measurements of muck to be excavated shall be recorded by the Engineer in its original position before commencement of actual excavation and agreed upon by the Contractor. After completion of actual excavation and disposal of the excavated materials to a location approved by the Engineer, certificate of excavation shall be recorded by the Engineer against such of the pre-measurements of muck as has been excavated and removed by the Contractor and the quantities thereof will be paid off.

The quantity of surplus useful material ordered to be transported off the site to approved designated places to be paid for under this Section shall be the number of cubic metre kilometres acceptably transported and stockpiled carefully at the other end. Pre-measurements will be taken at site of the stockpile of such surplus materials ordered by the Engineer and agreed upon by the Contractor, who will then be permitted to transport it off site. After the material is transported to the designated places and stockpiled carefully at the other end to the satisfaction of the Engineer, certificate of such transportation shall be

recorded by the Engineer against such of the pre-measurements of surplus material as has been actually cleared from the Site transported to designated places and stockpiled at the other end to the satisfaction of the Engineer and the quantities thereof shall be paid for.

2.3.2 Payment

Payment for work done under this Section will be made at the prices tendered for the items as they appear in the Bill of Quantities. Payment for unclassified excavation shall include full compensation for furnishing all labour, material and equipment necessary to complete the excavation, depositing and stockpiling all the excavated materials separately as per each classification; removal and disposal of all unsuitable materials off the Site at a location which would not offer any objectionable view; spreading all materials (other than those identified by the Engineer for a certain use in the Works) to the grades and lines designated by the Engineer and sectioning neatly, in strict conformance with the Specifications and as directed by the Engineer. This rate does not include the cost of Clearing and Grubbing (300 mm deep), an operation immediately preceding the unclassified excavation, for which payment will be made separately under Section 3.2.3. In addition, this rate does not include the cost of removal of surplus useful excavated material from the site, for which a separate payment will be.

Payment for excavation in muck shall include full compensation for furnishing labour, material and equipment necessary to complete the excavation. This payment will include the cost of disposing of all the excavated materials off the site at an environmentally acceptable location approved by the Engineer.

3 CONSTRUCTION OF EMBANKMENT/CAPPING LAYER

3.1 Description

The work to be performed under this activity consists of furnishing, placing, shaping and compacting materials from approved borrow pits or other sources outside of the right-of-way required for the Works.

3.2 Specifications

1. Embankments shall consist of suitable material obtained from excavation or borrow, free from detrimental quantities of organic matter (leaves, grass, roots) topsoil and other debris. The material shall be readily spreadable, shaped and compacted. Embankments may or may not include a capping layer.

2. Generally embankments to within 300 mm of subgrade shall be constructed from material yielding a minimum soaked California Bearing Ratio (CBR) of ten percent (10%). Soils shall also conform to the following properties:

Liquid Limit	10% - 37%
Plasticity Index	3% - 20%

3. The upper 300 mm thickness of embankment shall be constructed from material yielding a minimum soaked California Bearing Ratio (CBR) of twenty percent (20%).

3.3 *Work Methods*

1. The embankment foundation shall be scarified to a depth of 150 mm and, at the proper moisture content, it shall be compacted to the following requirements:

   If the top of foundation is within 600 mm of pavement structure compacted - to a minimum of 95% of the maximum dry density for that material as determined by the Modified Proctor Test;

   If the top of foundation is not within the subgrade compacted - to a minimum of 93% of the maximum dry density for that material as determined by the Modified Proctor Test.

2. Material shall be spread over the entire embankment width, in layers of uniform loose thickness not to exceed 100 mm, and each layer shall be compacted using a vibrating roller more than fifteen (>15) tonnes to a density as follows:

   1. the top 500 mm of soil in any embankment shall be compacted to 95% of the maximum dry density at the optimum moisture content of that material as determined from the Modifier Proctor Test;

   2. the lower layers of soil in any embankment shall be compacted to 90% of the maximum dry density at the optimum moisture content of that material as determined from the Modifier Proctor Test.

   Compaction trials shall be carried out to determine the number of passes and best operating methods to be used with the available plant to achieve these levels of compaction. Proof rolling of finished layers shall be carried out as instructed by the Engineer prior to placing any overlying material. Costs of carrying out compaction trials and proof rolling shall be included in the rates for embankment construction and no additional payment will be made for these operations.

   If the material is too moist to permit suitable compaction, it shall be dried or allowed to dry. To assure the moisture content being uniform throughout the depth of the layer, it shall be disced, harrowed, bladed and aerated to reduce the moisture content. If the material as placed is too dry, water shall be added and uniformly mixed by discing the layer to its full depth. The moisture content of the material immediately before compaction shall not vary more than two percentage points plus or minus from the optimum moisture. The embankment shall be crowned at all stages of construction to permit ready run-off of rain water.

   As soon as the proper consistency and moisture content are obtained, the layer shall be thoroughly compacted before the condition of the materials is changed appreciably by either rain or evaporation. Embankments shall be made of sufficient height and width so that after shrinkage, sloughing of slopes, or subsidence of the foundation area the elevation and width will conform to cross-sections shown on the Drawings. When the embankments are to be constructed on hillsides or placed against existing embankments, the slopes of which are one vertically to three horizontally or steeper, they shall be benched as the fill is constructed in layers. The width and depth of the bench shall be as ordered by the Engineer. Suitable material from the benches shall be recompacted in the new

fill. Shoulders are an integral part of the embankment and shall be formed and compacted to the elevation of the top subgrade for the full width of the cross section.

3. Rock if approved for use by the Engineer, shall be placed to form the base of embankments for the full width of the cross section. Rock shall be placed in uniform loose layers not exceeding in depth the approximate average size of the larger rocks, but limited to a maximum depth of 750 mm. However, rock shall not be dumped in final position, but shall be distributed by blading or dozing in a manner that will ensure proper placement in the embankment so that voids, pockets, and bridging will be eliminated. The top layer in rock embankments shall be limited to a maximum depth of 300 mm with all voids, filled with smaller pieces of granular material or soil. All rock embankments shall be placed with care so that the larger pieces are well distributed and the voids filled to the extent that is practicable. Rock embankment shall not be placed in localized areas where piles are to be driven nor adjacent to masonry or brick structures or any pipe lines. At bridge abutments rock shall not be placed within 3 metres of any foundation. The finer material being incorporated within the rock shall be spread and compacted in lifts not to exceed those specified above.

4. No rock or boulders larger than 150 mm in its greater dimension shall be allowed within 600 mm of the pavement structure.

5. If embankments can be deposited on only one side of abutments, wing walls, piers or culvert head walls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning or excessive pressure against the structure. When an embankment is to be placed on both sides of a concrete wall or box type structure or multi plate structure, operations shall be so conducted that the embankment is always at approximately the same elevation on each side of the structure. Material placed adjacent to structures in areas inaccessible to the usual compaction equipment, shall be compacted with mechanical tampers of a type approved by the engineer

6. Where old pavement is encountered within 600 mm of the pavement structure, it shall be thoroughly broken up or scarified. No direct payment will be made for any extra work or expense which may be necessary to fulfill this requirement.

7. The Contractor shall prevent fill material from escaping beyond the embankment slope stakes by the construction of toe ditches or by the erection of rock, boulder, earth or log barriers at the toes of embankments or by other suitable means satisfactory to the Engineer.

8. All stump holes and surface irregularities caused by the Contractor in the area between the roadway slope lines and the outside boundary of clearing and grubbing shall be filled and otherwise corrected as directed by the Engineer.

9. Sufficient work shall be performed on the top surface and side slopes of the embankments that they will be left in a neat and workman like condition and in close conformity with the established lines and grades. The embankment shall be maintained in a completed condition until final acceptance.

3.4 *Measurement and Payment*

1. The quantity of Embankment to be measured under this Activity will be the number of cubic metres compacted to depth specified in the Bill of Quantities and accepted by the Engineer.

2. Payment will be made at the prices tendered for the items under this Activity as they appear in the Bill of Quantities. The prices and payments shall constitute full compensation for furnishing material (if borrowed), drying, watering, compacting and grading including labour, tools, equipment and all else necessary, to complete the work described herein in strict conformance with these Specifications and as approved by the Engineer.

4. CONSTRUCTION OF GRAVEL SUB-BASE

4.1 *Description*

This activity consists of fine grading, compacting, proof-rolling and finishing subgrade. It further includes furnishing, placing and compacting select material to form the sub-base.

4.2 *Work Method*

1. Preparation of Subgrade

The subgrade shall be shaped to a true surface conforming to the cross-section shown on the **Drawing #DI** and compacted in accordance with the provisions of Specification No. 1. All depressions and high spots shall be filled with suitable material or removed and such areas again compacted. Immediately before the placing of subbase, base or shoulder material on the subgrade, the surface of the subgrade to be covered shall be proof-rolled to the satisfaction of the Engineer, with at least four passes (producing at least two complete coverage) using a vibrating roller with 12 - 15 tonne capacity. During proof rolling the moisture content of the Subgrade shall be kept within two percentage points, plus or minus, of the optimum moisture content for a depth of 300 mm. If any soft or spongy spots are disclosed by this proof-rolling, they shall be excavated and reconstructed in accordance with the requirements of Specification No. 3 and then proof-rolled again.

2. Areas without Embankment

Where a subbase or base is to be constructed over an area of natural ground where there is no embankment, all clearing, grubbing, topsoil and unsuitable materials shall be removed and disposed of in accordance with the requirements of Specification No. 1.

Low areas and other damaged areas of the formation shall be made good by filling with fully compacted selected materials with CBR >10%, liquid limit <37% and plasticity index <6%. The resultant formation shall be shaped, treated and compacted in accordance with **Item (i)** above prior to placing overlying materials.

4.3 Specifications

Aggregate - Type1: Pitrun subbase

1. Select subbase material shall consist of inert, hard, durable stone and sand. It shall be free of loam and clay surface coatings and deleterious materials.

2. Gradation requirements will be determined in acceptance with ASTM422 with the following sieve designations.

Sieve		Percentage Passing
75 mm	3”	70 - 100
37.5	1.5”	50 - 85
19	0.25”	50 - 85
4.75	No.4	30 - 60
0.075	No. 200	5 - 25

3. The coarse aggregate shall have a percentage wear, as determined by the Loss Angeles Abrasion Test (ASTM C 131) of not more than 50.

4. The material shall have a Plasticity Index (PI) in the range 5% < PI<20% and a Plasticity Modules (PM) in the range 50<PM<200. As per ASTM D 4318

5. When tested in accordance with ASTM D 1833, the material shall have a dry California Bearing Ratio (CBR) of not less than 60% and a soaked CBR of 30%.

Type II - Blue or Yellow limestone

1. Select subbase material shall consist of inert, hard, durable stone and sand. It shall be free of loam and clay surface coatings and deleterious materials.

2. Gradation requirements will be determined in acceptance with ASTM D422 with the following sieve designations.

Sieve		Percentage Passing
125.0mm	5	100
75 mm	3”	65 - 100
37.5	1.5”	50 - 70
19	0.25”	30 - 70

9.5	0.375 “	20 - 50
4.75	No.4	15 - 40
0.600	No 30	10 - 35
0.075	No. 200	5 - 25

3. The coarse aggregate shall have a percentage wear, as determined by the Loss Angeles Abrasion Test (ASTM C 131) of not more than 50.

4. The material shall have a Plasticity Index (PI) in the range 5% < PI<20% and a Plasticity Modules (PM) in the range 50<PM<200.

5. When tested in accordance with ASTM D 1833, the material shall have a dry California Bearing Ratio (CBR) of not less than 60% and a soaked CBR of 30%.

4.4 Subbase Construction

1. Select material shall be placed on subgrade only after the subgrade has been inspected and approved by the Engineer immediately prior to proposed subbase start.

2. The subgrade shall be maintained in acceptable condition while subbase is being placed. Deformations, ruts, etc., caused by haulage vehicles or other plant and equipment shall be restored at Contractor’s expense. Where the subgrade is soft due to excessive moisture conditions the aggregate subbase shall be hauled and placed in such a manner that no rutting shall take place, this will normally involved reduced loads when hauling to the spreader.

3. The Contractor shall take care to load or haul the material to the Works so that it arrives in an unsegregated condition.

4. The material shall be spread in layers not exceeding 100 mm, compacted thickness, by a motor grader or D4/D6 bulldozer with adjustable blade. Ensure that the proper crown and cross slopes for surface drainage are provided as shown in **Drawing #D1** or as instructed by the Engineer.

5. When more than one layer is required, each layer shall be spread, shaped compacted and be approved prior to the placement of a succeeding layer. The surface of each layer shall be maintained in acceptable condition at all times. Deformation, ruts, etc., caused by hauling vehicles and other equipment or plant shall be restored at Contractor’s expense.

6. The material shall be brought to the proper moisture content and each layer shall be compacted to 95% of the maximum dry density when tested in accordance with AASHTO T -180.

7. Compaction shall continue until the surface is even and true to the proposed lines and grades as given in the Drawings. A minimum of ten (10) passes by a vibratory roller of 12 - 15 tonnes weight shall be acceptable. The material shall be rolled in a longitudinal direction from the sides to the center of the carriageway, overlapping on successive passes at least half the width of the rear roll. The finished layer shall be proof rolled using a fully loaded haulage vehicle as directed by the Engineer.

8. Any specific area of subbase that, after being compacted does not form a satisfactory, solid, stable foundation (regardless of test results) shall be removed, replaced and recompacted to the Engineer's satisfaction at the Contractor's expense.

9. In the event the roller/compactor cannot negotiate the side slope of the Carriageway, the contractor shall use a hand-operated plate compactor to ensure compaction of the said side slope.

10. When tested by a crown template, conforming to the typical road cross section indicated in the drawings and a 3-metre straight edge applied at right angles and parallel respectively to the centre line of the road bed, the variation of the surface from each testing edge between any two contacts with the surface shall at no point exceed 15 mm for crown template and 10mm for the straight edge.

4.5 *Measurement and Payment*

1. The quantity of Select Material Subbase to be paid for under this Activity will be measured as the number of cubic metres compacted in place to the depth as given on the Bill of Quantities and accepted by the Engineer.

2. Payment will be made at the prices tendered for the item under this Section as they appear in the Bill of Quantities. The prices and payments shall constitute full compensation for the select material, handling, hauling, placing, compacting and correcting, proof rolling, including all labour, tools, materials, equipment and Fine Grading and all else necessary to complete the work described herein in strict conformance with these Specifications and as approved by the Engineer.

5. CONSTRUCTION OF ROAD BASE

5.1 Description

The work to be performed consists of the supply, placement and compaction of select gravel or crushed stone to form a base course as shown in the **Drawing #D1.**

5.2 Specification

Road base material shall be pitrun gravel sourced from an approved quarry or blue limestone crusher run

5.2.1 *Pitrun Roadbase*

1. Gradation requirements will be determined in accordance with ASTM D 422 with the following sieve designations:

Sieve		Percentage Passing
37.5mm	1 ½"	90 - 100
20 mm	¾"	80 - 100
10 mm	3/8"	55 - 80
5 mm	#4	40 - 60
2.36 mm	#7	30 - 50
0.425mm	#40	12 - 27
0.075mm	#200	5 - 20

2. The coarse aggregate shall have a percentage wear, as determined by the Los Angeles Abrasion Test (ASTM C131), of not more than 50.
3. The material shall have a Plasticity Index (PI) in the range of 5% < PI< 12 %
4. The material shall have a Plasticity Modules (PM) in the range 50< PM< 200
5. When tested in accordance with ASTM D 1833, the material shall have a dry California Bearing Ratio (CBR) of not less than 80% and a soaked CBR of not less than 55%.
6. The camber of the road should have at least a 3.0% slope from center to edge of carriageway, but not exceeding 3.5%. The shoulder should have a 5% slope.

5.2.2 Blue limestone Crusher run

1. Gradation requirements will be determined in accordance with the following sieve designations:

Sieve		Percentage Passing
37.5mm	1 ½"	100
20 mm	¾"	80 - 100
12.5 mm	3/8"	55 - 80
5 mm	#4	35 - 60
2.36 mm	#7	25 - 30

0.425mm	#40	12 - 30
0.075mm	#200	5 - 15

2. The coarse aggregate shall have a percentage wear, as determined by the Los Angeles Abrasion Test (ASTM C131), of less than 40.

3. The material shall have a Plasticity Index (PI) of less than 6%

4. When tested in accordance with ASTM D 1833, the material shall have a soaked CBR of not less than 80%.

5. The camber of the road should have at least a 3.0% slope from center to edge of carriageway, but not exceeding 3.5%. The shoulder should have a 5% slope.

5.3 Work Methods

1. The base material shall be placed on the roadway only after the sub-base has been inspected by the Engineer immediately prior to the start of construction operations and it is found to be acceptable.

2. The roadway shall be maintained in acceptable condition while the material is being placed. Deformations, ruts, etc., caused by hauling vehicles shall be restored at the Contractor's expense. Where the subgrade is soft due to excessive moisture conditions the aggregate subbase shall be hauled and placed in such a manner that no rutting shall take place, this will normally involved reduced loads when hauling to the spreader

3. The Contractor shall take care to load and haul the material to the Works so that it arrives in an unsegregated condition.

4. Immediately after any course is placed and before rolling is started, the surface shall be checked and all defects and irregularities in alignment, grade or texture, corrected by the addition or removal of material.

5. Where the required thickness is 100mm or less, the aggregate may be spread and compacted in one layer. Where the required thickness is more than 100mm, the material shall be spread and compacted in two or more layers of approximately equal thickness, the maximum compacted thickness of any one layer shall not exceed 100mm. Each layer shall be spread and compacted in a similar manner.

6. Spread material with a motor grader, making sure to provide the proper crown and cross slopes for surface drainage. Avoid spilling material in side ditches.

7. When more than one layer is required, each layer shall be spread, shaped, compacted and be approved prior to the placement of a succeeding layer. The surface of each layer shall be maintained in acceptable condition at all times. Deformation ruts, etc., caused by hauling equipment or plant shall be restored at the Contractor's expense.

8. The material shall be brought to the proper moisture content and each layer shall be compacted to a minimum of 95% maximum density when tested in accordance with AASHTO T-180.

9. Material shall be compacted as soon as rolling can be effected without causing undue displacement of the mixed materials. The material shall be uniformly compacted by a vibratory roller of 12 – 15 tonnes weight using a minimum of ten (10) passes.
10. The material shall be rolled in a longitudinal direction from the sides to the center of the carriageway, overlapping on successive passes at least half the width of the rear roll.

11. Any specific area of base which, after being compacted, does not form a satisfactory, solid, stable foundation (regardless of test results) shall be removed, replaced and recompacted, to the Engineer's satisfaction at Contractor's expense.

12. In the event the roller/compactor cannot negotiate the side slope of the carriageway, the contractor shall use a hand-operated plate compactor to ensure compaction of the said side slope.

13. When tested by a crown template, conforming to the typical road cross-section indicated in the drawings and a 3-metre straight edge applied at right angles and parallel respectively to the centre line of the road bed, the variation of the surface from each testing edge between any two contacts with the surface shall at no point exceed 15 mm for crown template and 10mm for the straight edge.

5.4 Measurement and Payment

1. The quantity of material to be paid for under this Section will be measured as the number of cubic meters compacted in accordance to depth as specified in Bill of Quantities and accepted by the Engineer.
   Payment will be made at the prices tendered for the item under this Section as it appears in the Schedule. The prices and payment shall constitute full compensation for materials, hauling, handling, spreading, compacting, trimming, protecting and correcting, including labor, tools, equipment and all else necessary to complete the work described herein in strict conformance with these specifications, any Special Conditions of Contract and as approved by the Engineer.

6. ROAD SURFACING

6.1 Resurfacing with Oilsand

6.1.1 Description:

The work to be performed consist of sealing of prepared areas using freshly cut oilsand or oilsand and aggregate mix finished with a compacted thickness of 38mm. The oilsand material shall be placed on the roadway only after the road base has been inspected and approved by the Engineer immediately prior to the start of construction operations and it is found to be acceptable.

6.1.2 Specifications:

1. The aggregate if specified shall be 10 to 20 mm Blue Limestone chips and conform to the following minimum standards: Los Angeles Abrasion $\leq$ 36, and CBR $\geq$ 80.

2. The aggregate must be free from of silt and clay. It shall consist of hard, inert, clean, angular and durable blue limestone stone.

3. Bituminous binder used shall be either Colas or MCO and obtained from a recognized and approved source. Generally, this will be used only if the oil content of the oilsand is so low that the material does not adhere to the base.

4. Oilsand shall be derived from a source approved by the Engineer and shall be of the best quality available. It shall be free from deleterious materials such as humus, roots and decomposed inferior rock or shales.

5. The oilsand shall be fresh cut oilsand and not from a stockpile. If there is excess oil from the oilsand surface, material of sand or dust from crushing operations shall be used to absorb the excess.

6. The oilsand shall be placed within twenty-four hours of transportation.

7. The areas in which the oil sand is to be off-loaded shall be cleared of weeds, rubbish and all loose material. These temporary storage areas shall be chosen such that water will not collect under or near the oilsand.

6.1.3 Work Methods:

The oilsand material shall be placed on the roadway only after the base layer has been inspected by the Engineer immediately prior to the start of construction operations and it is found to be acceptable.

1. Sweep the area to be sealed with oilsand, removing all dust, loose particles and debris.

2. Apply the crushed oilsand evenly, taking care that workmen's boots and equipment do not remove the primer from the pavement surface. Oilsand should be crushed into small clods using appropriate hand tools. All unwanted materials such as clay lumps shall be removed at this point. Under no circumstances shall oilsand be spread with the blade of heavy mechanical equipment being used as a screed. The use of mechanical equipment shall be permitted only for the initial spreading and levelling of the oilsand. All final spreading operations should be carried out by manual means using appropriate hand tools.

3. Apply a single layer of aggregate if specified evenly onto the oilsand. The mixture of oilsand and aggregate shall have a ratio of 2 parts oilsand to 1 part aggregate by volume prior to compaction. The percentage of aggregate in the mix shall be 33 1/3 percent. The oilsand and aggregate shall be thoroughly mixed prior to compaction. Pre-mixing of the oilsand and aggregate prior to placement on the road is also acceptable.

4. Compact the oilsand and aggregate using a self-propelled smooth steel wheel roller of 10 tonnes using a minimum of five (5) passes.

5. Rolling shall be parallel to the road centerline and shall commence at the outer edges of the road.The roller shall overlap the previous pass by at least one-half the width of the roller. No turning movements shall be allowed on freshly laid oilsand.

6. The finished layers shall be substantially free from waves or irregularities and shall be true to the established crown and grade. At transverse construction joints, the surface of all layers shall not vary from 10 - foot (3m) straightedge, applied parallel to the centerline, by more than ¼ inch (6mm). Areas exceeding this tolerance shall be re-rolled, replaced or otherwise corrected in a manner satisfactory to the engineer.

6.1.4 Measurement and Payment:

1. The measurement for payment shall be the number of square meters of oilsand or oilsand and aggregate mix compacted in place and accepted by the Engineer.

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The prices and payment shall constitute full compensation for materials, hauling, handling, compacting, trimming, protecting and correcting, including labour, tools, equipment and all else necessary to complete the work described herein in strict conformance with these specifications, any special Conditions of Contract and as approved by the Engineer.

6.2 Resurfacing with Asphalt

6.2.1 Description

The work to be performed consist of finishing, placing and compacting hot plant mixed bituminous mixture (hot mix asphalt) to form a bituminous binder course (wearing surface) of 50mm compacted thickness unless otherwise stated in the bills of Quantities. The asphalt material shall be placed on the roadway only after the base has been inspected and approved by the Engineer immediately prior to the start of construction operations and it is found to be acceptable.

6.2.2 Specifications

1. Hot mix asphalt used shall conform to the National Highways Programme (NHP) year (3) volume II, 2004 specifications section 403.

2. Bituminous cement shall be of Penetration Grade 60/70 Bitumen and shall conform to the requirements of Section 407. NHP (year 3).

3. Aggregates shall be obtained by crushing fresh durable rock, boulders or gravel and sand that conforms to the requirements of Section 401.2. NHP (year 3).

4. The maximum aggregate size for the binder course layer shall be chosen to be consistent with the thickness to be laid as detailed in the table in clause 401.2 NHP (year 3).

6.2.3 Execution

1. Execution shall proceed in conformance with the requirements of Section 401. NHP (year 3).

2. A prime coat, in accordance with Section 408, Bituminous Prime Coat, shall be Applied to the surface of the under layer where the layer is a granular or cement stabilized. In addition to the prime, and where the surface is a bituminous mix a tack coat, in accordance with Section 409, Bituminous Tack Coat shall be applied before laying the binder course. (NHP) year 3

3. The completed thickness of the course shall be 50mm.

6.2.4 Measurement and Payment

1. The unit of measurement for payment shall be the number square metres asphalt compacted in place and accepted.

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The prices and payment shall constitute full compensation for materials, hauling, handling, repairing of areas to be patched, filling of holes, compacting, trimming, protecting and correcting, including labor, tools equipment and all else necessary to complete the work described herein in strict conformance with these specifications, any special conditions of contract and as approved by the Engineer.

7 CONCRETE

7.1 *Description*

This work shall consist of preparing, mixing and placing concrete structures, constructed in conformity with the lines, grades and dimensions shown on the drawing or ordered in writing by the Engineer and in accordance with this and other specification sections involved.

7.2. Materials

Concrete Aggregate

Material used as aggregate for plain or reinforced concrete shall, wherever possible, be derived from a source that normally produces aggregate satisfactory for concrete and if requested by the Engineer, the Contractor shall supply evidence to this effect.

Aggregate shall be chemically inert, strong, hard durable, of limited porosity, free from adherent coatings and shall contain no organic or other admixtures that may, in the opinion of the Engineer, cause corrosion of the reinforcement or impair the strength or durability of the concrete. The use of limestone for concrete aggregate shall not be permitted.

a. Coarse Aggregate

Coarse aggregate shall be clean hard natural gravel or crushed stone and its grading shall comply with B.S. 882:1983. Stone of a flaky or scalped nature shall

not be used as coarse aggregate. All coarse aggregate shall be washed clean and shall be free from dust, loam, silt, clay or any other material. Coarse aggregate, should have normal grading 5 mm – 20 mm B.S. 140 test sieve and containing no more finer material than is permitted for the various sizes in this specification.

Each grading shall be stored on site in separate areas, in such a way as to avoid contamination or the risk of picking up dirt, earth, clay etc. Any coarse aggregate that does not comply shall be removed from the site.

b. Fine Aggregate

Fine aggregate shall be clean sharp natural sand or crushed stone or gravel sand and its grading shall comply with B.S. 882:1983. If necessary the sand is to be washed after delivery without extra charge.

Fine aggregate shall be stored on the site in such a way as to avoid contamination or the risk of picking up dirt, earth, clay etc. Generally the fine aggregate is to be well graded coarse sharp sand and mainly passing B.S. 410 test sieve. Any fine aggregate which does not comply shall be removed from the site.

c. Cement

The cement is to be best quality normal setting Portland cement of local manufacture conforming to B.S. 12:1978. The cement shall be stored in sheds or under suitable covers which are water tight and damp-proof, and on wooden floor not less than 30 cm (1ft) above the ground. Bags of cement which for any reason have become partially set, or which contain lumps of caked cement, shall be rejected. The use of cement reclaimed from discarded or used bags will not be permitted.

Each grading shall be stored on site in separate areas, in such a way as to avoid contamination or the risk of picking up dirt, earth, clay etc. Generally the fine aggregate is to be well graded coarse sharp sand and mainly passing B.S, 410 test sieve. Any fine aggregate which does not comply shall be removed from the site.

d. Admixtures

Admixtures for accelerating initial setting of the cement or for increasing the permeability or workability of the concrete or for any other purpose shall be used only if approved by the Engineer. Admixtures or other materials that retard the setting of the cement shall not be used.

e. Water

All water used in concrete shall be subject to the Engineer's approval, shall be reasonably clear and free from oil, acid, alkali, sugar, and vegetable substances and, if required by the Engineer, shall be tested by comparison with distilled water.

Water shall be obtained from public supply and no water taken from a spring, well, river or similar source or from the excavations, unless approved in writing by the Engineer. If instructed, samples of water collected in an approved manner shall be submitted for the purpose of analysis and for making concrete tests.

7.3 Composition

The Contractor shall state the mix proportions and water content of his trial mixes. After approval by the Engineer these mix proportions and the water content shall not be changed. Table 7.1 provides the recommended mix proportions and water cement ratios required for various grades of concrete.

The Contractor shall take six concrete cubes from concrete poured on the site at regular intervals, from all major concrete works, and when required by the Engineer. The cubes shall be numbered and the date, particulars of mix, and position of the batch shall be recorded.

Concrete, the strength of which falls below the minimum working strengths required, shall be cut out and made good entirely at the Contractor's expense.

The Contractor shall by previous experiment and investigation determine the correct proportions necessary to produce a minimum concrete crushing strength required.

The minimum strengths required of these trial concrete cubes shall be the specified minimum strength times a factor representing the quality control on the site. In the first instance this factor shall be taken as 1.5. If the site control proves poor, the Contractor shall provide new trial mixes to strengths, determined by the Engineer.

The Contractor shall supply the Engineer with mix concrete cubes of each Concrete Quality for testing in accordance with the ASTM G172 requirements before the commencement of concrete work in order that the seven (7) days strengths may be ascertained before the pouring of concrete on the site.

Table 7.1

Nominal Proportion	Grade	Max. Aggregate Size (mm)	Min. Ultimate Compressive Strength at 28 days	Min. Cement Kg/m3	Max. W/C ratio	Workability (mm)
1:1:2	30	20	30 N/mm2	360	0.45	75
1:1.5:3	25	20	25 N/mm2	360	0.45	75
1:2:4	20	20	21 N/mm2	360	0.5	75
1:3:6	10	37.5	10 N/mm2	240	0.5	100

7.4 Mixing and Transporting of Concrete

7.4.1 Site Mixing

The mixing of concrete on site shall be allowed only with the written permission of the engineer. All the material specifications for cement aggregate and water outlined in section 7.2 of these specifications shall apply.

Mixing of concrete shall be carried out in an approved mechanical batch mixer. The water shall not be admitted to the drum of the mixer until all the cement and aggregate forming the batch are in the drum. Mixing shall continue until there is a uniform distribution of the materials and the mass is uniform in colour and consistency.

Concrete should be handled from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent the segregation or loss of the ingredients. It should be deposited as nearly as practicable in its final position to avoid rehandling and flowing.

Where hand mixing is authorized it shall be carried out on a water tight platform and in such a manner as to ensure a uniform distribution of the materials throughout the mass. Mixing shall be continued until a homogeneous mixture of the required uniform colour and consistency is obtained.

7.5 Pre mixed Concrete

Permission must be obtained and the name of the supplier submitted before the use of ready mixed concrete. Permission from the Engineer must also be obtained to change the supplier of ready mixed concrete.

The concrete must be discharged into the formwork within 45 minutes of mixing. Any ready mix concrete that has not been deposited within 45 minutes of mixing shall not be used and shall be removed from the site.

7.6 Testing

1. Slump Test

   Concrete shall have a slump such that it will be workable in the required position. It shall be of such a consistency that it will flow around reinforcing steel, but individual particles of coarse aggregate when isolated shall show a coating of mortar containing its proportionate amount of sand.

   During concreting, slump tests should be taken periodically to check for consistency, and should be in accordance with B.S. 1881: Part 2: 1970. The contractor should keep a standard slump cone on site.

   The slump of concrete shall not exceed the following:

   a. For mass and lightly reinforced concrete sections easily accessible for spading and working such as deck and invert slabs, base for drains, etc – 75 mm.

b. For heavily reinforced sections not easily accessible for spading and working 100 mm. The water cement ratio of all concrete shall be as low as practical to place the concrete, and all batches of the same section shall be of uniform consistency.

2. Cube Test

During concreting 150 mm x 150 mm x 150 mm (6" x 6" x 6") concrete cubes shall be taken from any respective mix, 3 cubes to be crushed at 7 days and 3 at 28 days. One set of cubes to be taken every main concrete pour. The cube samples are to be taken by placing the concrete in the mould in 5 cm layers, each layer being thoroughly compacted with a steel rod 37.5 mm square and weighing 1.8 kg (4 lbs.). The concrete should be subjected to at least 35 strokes per layer. All cubes must be left in the mould for 24 hours and then in damp sand until tested. The result of the tests must comply with specified strengths.

7.7 Placing Concrete

All concrete shall be placed before it has taken its initial set and, in any case within 45 minutes of mixing. Concrete shall be placed in such a manner so as to avoid segregation of coarse or fine portions of the mixture, and shall be placed in horizontal layers when practicable. The concreting shall be so arranged that complete sections of the work are carried out at one operation. Concrete is not to be used after it has developed initial set and all concrete that has commenced to set before use shall be rejected

The concrete shall be deposited in layers not exceeding 20 cm (8") thick and efficiently rammed and packed between and around the reinforcement with rammers and spatulas as well as using a heavy duty high frequency vibrator, so as to thoroughly fill the formwork and to form a dense homogenous mass with a smooth compact face and to ensure that no voids or cavities are left. The ramming is not to be confined to the upper surfaces

of the layer deposited but the whole must be well rammed and consolidated until the mass assumes a jelly-like appearance and consistency, with water just appearing on the surface.

Vibrators shall be of sturdy construction and adequately powered. The vibrator shall be sufficiently intense to cause the concrete to flow or settle readily into place and visibly affect the concrete over a radius of at least 46 cm. There shall be at least 20 seconds of vibration of all concrete where the vibrator is inserted but care must be taken to avoid over vibration.

No water shall be added to the concrete once it has been discharged from the mixer although the concrete may be mixed or agitated to help maintain workability.

7.8 Curing Concrete

The concrete should be protected from damage and contamination during the process of setting. All concrete shall be kept moist on all exposed surfaces for 7 days after

depositing by means of a layer of sand or other suitable material kept wet by watering at frequent intervals.

7.9 Faulty Construction

The Contractor shall cut out and reconstruct any portion of the work which give evidence before or after the concrete was of faulty quality at the time of depositing or was not properly deposited and sufficiently rammed and vibrated or that any reinforcing bars have been omitted, incorrectly placed or displaced, or of any fault, defect of injury, from all cases whatsoever, which may prejudicially affect the durability and strength of the construction.

7.10 Placing Formwork

All formwork must be approved by the Engineer prior to placement of concrete.

7.11 Placing Reinforcement

Reinforcing bars should be bent cold and bent and placed strictly in accordance with the drawings. Reinforcing bars must be installed free of dirt, oil or other chemicals or chemical residues. The stirrups connecting main bars should be tight around the main bars so that they are securely held and braced. All bars should be bound together at intersections with each other with 16 gauge soft iron wire, doubled and twisted tightly together with pliers. Mesh reinforcement is to be bent, placed and tied together in a similar manner.

Reinforcement in position, irrespective of whether or not it is partly embedded in hardened concrete should not be bent without permission. Bars left exposed are to be protected against exposure and corrosion.

7.12 Forming Construction Joints

Construction Joints shall be located where shown on the Drawings or permitted by the Engineer. Construction joints shall be perpendicular to the principal lines of stress and in general shall be located at points of minimum shear.

At horizontal construction joints, gauge strips 38 mm thick shall be placed inside the forms along all exposed faces to give the joints straight lines. Before placing fresh concrete, the surfaces of construction joints shall be washed and scrubbed with a wire broom, drenched with water until saturated until the new concrete is placed. Immediately prior to placing new concrete, the forms shall be drawn tight against the concrete already in place and the old surface shall be coated thoroughly with a very thin coating of neat cement mortar. Concrete in substructures shall be placed in such manner that horizontal construction joints will not be exposed to view in the finished structure. Where vertical construction joints are necessary, reinforcing bars shall extend across the joints in such a manner as to make the structure monolithic.
Necessary dowels, load-transfer devices, and bonding devices shall be placed as shown on the Drawings or directed by the Engineer.

7.13 Bonding to New Concrete

Before depositing new concrete on or against concrete which has hardened the forms shall be retightened. The surface of the hardened concrete shall be roughened by green cutting, chipping or sand blasting, as required by the Engineer so that sound concrete is exposed. It shall be thoroughly cleaned of foreign matter and laitance and saturated with water. If oil has been spilled on the surface to be bonded, this oil must be removed by chipping out the oil saturated concrete. To ensure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surfaces, including inclined surfaces, shall first be covered with a coating of mortar against which the new concrete shall be placed before the grout has attained its initial set. On horizontal construction joints, at least 50 mm of grout shall be provided. The proportions of sand and cement in the grout shall be the same as those for the sand and cement in the concrete mixture, and only sufficient water to provide a consistency similar to that of thick cream shall be used.

a. Measurement and payment

Separate payment for concrete shall be made only where it is specified in the Bills Quantities.

7.14 a Measurement

The quantities to be paid for under this Section will be the number of cubic metres (except where another basis of payment is indicated in other sections of these Specifications) of Cast-in-place Concrete, complete in place and accepted in accordance with these Specifications, within the lines, grades and dimensions shown on the Drawings or ordered by the Engineer. No deductions will be made for the volume occupied by bevels, bar reinforcing steel, weep holes, bolts, dowels, conduits or other openings less than 1000 square centimetres in area or pile heads embedded in the concrete. Reinforcing steel shall be measured and paid for as provided in Clause 504.

7.14 b Payment

Payment for items under this Section will be at the prices tendered in the bill of Quantities for the various types of concrete to be used in the structures and such prices and payments shall constitute full compensation for furnishing all labour, coarse aggregates, fine aggregates, Portland cement, water, form work, bracing, weep holes, joint filler, all other materials, tools, equipment, incidentals and all else involved in constructing the concrete work complete in place, all as shown on the Drawings, as specified in these Specifications and as directed by the Engineer.

The prices and payments shall also include for furnishing and placing construction joints, abutment joint materials, Styrofoam, dowels, sleeves, adhesive, water for curing and including the cost of preparation of all concrete surfaces etc., all as shown on the Drawings, as specified in these Specifications and as directed by the Engineer. The prices and payments shall also include for furnishing and placing the following, when they are not included in other items: bearings, sealing materials, water stops and waterproofing membranes all as shown on the Drawings as specified in these Specifications and as directed by the Engineer.

7.2 Reinforcing Steel

Separate payment for reinforcing steel shall be made only where it is specified in the Bills Quantities.

a) Description

The work to be performed under this Section consists of furnishing and placing reinforcing bars of the grade, type and size designated, in accordance with these Specifications, and in conformity with the locations shown on the Drawings.

b) Materials

Bar reinforcement in sizes up to and including 32 mm. shall conform to the requirements of ASTM 615 Grade 60 from billet steel grades.

If purchased in small lots from a warehouse, reinforcement may be accepted at the discretion of the Engineer upon certification that it meets the requirements of the Specifications listed above and subject to the applicable bending test.

Bar reinforcement for concrete structures, except that 6 mm which may be round, shall be deformed bars.

c) Construction Requirements

1. General

The Contractor shall prepare, thoroughly check, and submit to the Engineer for approval, working drawings, bar lists, and bar bending diagrams as may be required for the detailing and placement of reinforcing steel to all reinforced concrete structures. Weights of steel shall be shown for each structure.

Working drawings shall be 600 mm x 900 mm in size. Bar lists may be on smaller size sheets.

Four prints of each shall be submitted to the Engineer for his approval. Approval

of these Drawings by the Engineer shall not relieve the Contractor of any of his responsibilities under the terms of the Contract.

2. Bending and Placing

Bars shall be cold bent to the shapes shown on the Drawings and all bends shall be made accurately around pins of the following sizes:

Bars 25 mm and under: minimum pin size of 6 times the bar diameter

Bars larger than 25 mm: minimum pin size of 8 times the bar diameter

Ties: pin size over 2 times, but not greater than 4 times the bar diameter.

The extension of free ends on hooks shall be 4 times the bar diameter, but not less than 60 mm. Bends for stirrups and ties shall have radii on the inside of the bar of not less than one bar diameter.

All reinforcement shall be free from dirt, oil, paint, grease, mill scale, and loose or thick rust when placed. Reinforcement shall be placed accurately in the positions shown on the Drawings and held securely during the placing and compacting of concrete.

Main reinforcing bars carrying determinate stresses shall be spliced only where shown on the Drawings unless approval is obtained from the Engineer in writing before the reinforcing steel is ordered. Other reinforcing bars shall have a minimum length of 6 metres unless otherwise specified in the Drawings or limited by the physical dimensions of the section being reinforced. Splices shall be staggered as far as possible. Unless otherwise called for on the Drawings, a minimum lap length of 40 times the diameter of the bars shall be maintained.

Bars shall be tied at all intersections except where spacing is less than 300 mm in each direction, when alternate intersections shall be tied. Distances from the forms shall be maintained by stays, precast mortar blocks, ties, hangers or other approved supports. Welding of reinforcing steel shall not be permitted.

The placing and fastening of reinforcement in each section of the work shall be approved by the Engineer before any concrete is deposited in the section.

Chairs for supporting deck reinforcement steel shall be either of galvanized steel, approved plastic material, or precast concrete blocks acceptable to the Engineer. The maximum spacing of the chairs shall be 1.20 metres. The location of the top reinforcement steel (with respect to deck surface) shall be checked by running a

full deck width template along the longitudinal screeds.

No main steel shall touch the template nor be more than 6 mm distant from it.

d) Measurement and Payment

Measurement

The quantities of Reinforcing Steel under this Section will be measured as the number of Kilograms (except where another basis of payment is indicated in other sections of these Specifications) complete in place and accepted as shown on the approved working Drawings and bar list and not covered by other Tender items.

The unit weights for deformed bars to be used in determining payment shall be as follows unless shown otherwise on the Drawings or directed by the Engineer.

Size mm	**Weight per metre (kg)**
6	0.222
8	0.395
10	0.616
12	0.888
16	1.579
20	2.466
25	3.854
32	6.313
40	9.864

Clips, ties, separators, spacers or other materials used for positioning or fastening the reinforcement steel in place, shall not be included in the weights measured for payment under this item.

e) Payment

Payment will be made at the prices tendered for the item under this Section as it appears in the Bill of Quantities. The prices and payment shall constitute full compensation for materials, labour, tools, equipment and all else necessary to complete the work described herein in strict conformance with these Specifications and as approved by the Engineer.

There will be no payment for additional steel incurred due to the Contractors splicing at locations other than those shown on the Drawings or as ordered by the Engineer.

8. CONSTRUCTION OF NEW DITCHES

8.1 Description

Excavation of ditches on road sides and other areas by manual or mechanical means for the purpose of taking surface runoff away from the structural layers of the road. It includes removal of all dirt and ditch waste excavated.

8.2 Earthen Drain

8.2.1 Specification

1. The minimum bottom width of ditch channel shall be 0.3M.
2. The ditches shall have a maximum side slope of 1:2 to road side and 1 in 1on the other side.

3. In flat areas, the grade of the drains shall comply with:
   a. Sandy soils - minimum grade of 0.2%
   b. Clay soils - minimum grade of 0.5%

   Drains should not exceed 2% where earthen.

8.2.2 Work Methods

1. Using mechanical or manual means, cut ditches in areas identified by Engineer as per specifications below. Ditches shall be constructed to a minimum of 1m away from the road edge. Where shorter distance is required written approval from the engineer will be required.

2. Material and debris removed from the excavation shall be disposed of at a site to be approved by the Engineer. Material or debris shall not be deposited within 50 metre off any drainage channel.

3. During excavation, ensure that the bottom of the ditch is formed on compact ground, not easily susceptible to erosion.

4. Ditch sides must be sloped in accordance with **Drawing #D4 and #D5** respectfully such that they do not easily cave in.

5. Ditches should be as straight as possible with sides evenly shaped and smoothened. (Use a line or surveying equipment to obtain straight drain).

6. In steeper areas where the road has longitudinal grades of 5% and more, the grade of the ditches shall conform to that of the roads but ditch checks shall be placed as follows:-

   Road grade 5 - 9% - ditch checks every 100m.

   Road grade 10 - 15% - ditch checks every 50m.

   Road grade 15% and greater - ditch checks every 30m.

7. Ditches are to be constructed where the road shoulders end.

8. Ditches are to be a minimum of 0.45m below the road pavement layer.

9. This work shall be performed using a trapezoidal shaped ditching bucket.

8.3 Construction of Invert Drains

8.3.1 Description

The work to be performed under this section consists of supplying and installing precast concrete inverts of the classes, sizes and dimensions required, furnished and installed at such locations as are designated on the drawing or by the engineer in accordance with these specifications and in conformity with the lines and grades given.

8.3.2 Specification

The inverts to be used must be Trapezoidal cross section with the dimensions as specified in the Bills of Quantities or as specified by the engineer. The inverts shall be sourced from a reputable supplier that has been approved by the engineer. Where no dimensions are specified in the Bills of Quantities the dimension shall be as follows:

Top width- 600mm, Bottom width- 400mm, Depth -300mm, Concrete thickness- 51mm minimum. Inverts shall be appropriately grooved at the ends to ensure a snug

8.3.3 Work Method

1. During excavation, ensure that the required grade is provided.

2. If necessary, build back up to the required level using a sub grade material as authorized by the engineer and compacting in 100mm layers.

3. Compact the excavated area using mechanical or manual means before placing the inverts

4. Begin invert laying at the downstream end of the culvert with the bell or groove ends facing upstream. Ensure that each invert fits snugly into the other. Mortar joints as instructed by the Engineer.

5. The grade of the drain shall comply with that given above under earthen drain

6. Backfill behind inverts in accordance with specification #11 and restore road as necessary or instructed by the engineer .

8.4 Construction of Concrete Lined Drains

Curb and Slipper, Swale, Box drain and Cascade Drain

Description

This work shall consist of the construction of cement concrete lined curb and slipper, swale and cascade drains in accordance with these specifications and in conformity with the locations, lines, grades and dimensions shown on the plans or as ordered by the Engineer.

8.4.1 Specifications

1. Concrete used shall be of grade 20 i.e characteristic strength of 21N/mm$^{2.}$ Concrete shall be furnished, placed and compacted in accordance to specification #7.

2. BRC used shall be #65 gauge

3. Reinforcing bars shall be corrugated, high yield steel

4. Concrete blockwork shall be in accordance with specification #13

8.4.2 Work Methods

1. Excavate along lines (as mentioned above), removing all slush and soft material.

2. During excavation ensure that the required grade is provided and that the bottom of the excavation is formed on compacted ground, not easily susceptible to erosion.

3. Place and compact a 6" (150 cm)) sand blinding layer at the base.

4. In the case of swale and slipper drains, prepare formwork, place BRC and pour concrete to form the drains as shown in the drawings.

5. Curbs and slipper, swale and cascade drains should be evenly shaped and smoothened.

6. For box drains, after placing and compacting the sand blinding layer, prepare formwork, place reinforcing bars and pour concrete to form the drain base as shown in the drawings. Reinforcing steel shall be placed in the form of a continuous U shape with reinforcement extending for drain wall construction.

7. Construct drain walls for box drain in accordance with the drawings.

8. Backfill behind drain walls in accordance with specification # 11 and restore roadway as instructed by the engineer.

8.4.3 Measurement and Payment

1. The unit of measurement for payment shall be the number of metre of new concrete lined drains constructed and approved, or

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The prices and payment shall constitute full compensation for excavating, compacting, removal of waste and includes road restoration ,equipment, materials, labour, tools and all else necessary to complete the work described herein in strict conformance with these specifications, and any Special Conditions of Contract and as approved by the Engineer.

9 DITCH CLEANING

9.1 *Description*

Cleaning and shaping of roadside ditches, inclusive of concrete lined (inverts and box drains) and earthen drains to restore gradients and ensure adequate surface water run-off. Includes cleaning of all property entrance culverts etc. that lie within the roadside ditches and removal and disposal of vegetation, debris and soil material.

9.2 Work Methods

1. All rocks, logs and other obstructions and unsuitable materials should be removed well clear of the ditches where it will no longer impede any part of the drainage of the road.

2. Cut and removal of vegetation from bottom and sides of ditches.

3. Excavate silt or sand to make the bottom of the ditch flat or slightly rounded.

4. Side slopes and grades should be shaped to conform to drawing provided.

5. On hilly roads, the minimum grade should be obtained, clearing all ditch checks.

6. All property entrance crossings that lie within the roads side ditches shall be cleared of all vegetation, silt and debris to permit free flow of water from the road way and drain.

7 Dispose of excess material by spreading it out to fill low areas well clear of the ditch. Do not make a ridge of piled material along the roadway.

8. The Engineer or his representative must inspect the job and give his final approval.

9.3 Measurement and Payment

1. The unit of measurement for payment shall be the number of kilometers of ditches cleaned.

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The prices and payment shall full compensation for labor, equipment, excavation of silt and sand, cutting vegetation, and removal and disposal of all waste material and all else necessary to complete the work described herein in strict conformance with specifications, and Special Conditions of Contract and as approved by the Engineer.

10 EXCAVATION FOR STRUCTURES

10.1 Description

The work to be performed shall include all the necessary excavation for abutments, retaining walls, culverts and drains. This work shall include all the necessary bailing, pumping, draining, sheeting, bracing required.
The trenches or foundation pits for footings shall be excavated to the lines, grades and elevation shown on the drawings. They shall be of sufficient size to permit the placing of structures of the full dimensions shown in the drawing. The elevation of the bottom of the footing for the abutment and wing walls as shown in 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 for a satisfactory foundation.

Boulders, logs or other objectionable materials encountered in the excavation shall be removed. The sides of pits, trenches and other excavations shall, where necessary, be adequately supported by timber or other means, and all such excavation shall be to sizes sufficient to enable the concrete structures to be laid accurately and proper refilling and compaction to be carried out.

All excavation works for structures shall be carried out at the contractor's expense including excavation in rock, peat, muck etc.

a. Measurement and payment

Separate payment for this activity shall only be made where indicated in the Bills of Quantities. The unit of payment shall be as indicated in the Bills of quantities

11 BACKFILLING

11.1 Description

The work to be performed in this section shall consist of furnishing, placing and compacting selected granular fill material as shown in the drawings.

11.1.2 Materials

Selected granular fill material shall consist primarily of stone, sand, gravel or other acceptable material. All of the material shall pass the 50mm square sieve, not more than 40% shall pass the no.40 mesh sieve and not more 10% by a eight shall pass the n.200 mesh sieve. The soaked C.B.R. shall not be less than 25.

11.1.3 Workmanship

The material shall be placed and compacted in layers not exceeding 150mm. All material shall be bought to the required moisture content and compacted to the 95% standard proctor density.

11.2 Measurement and payment

Separate payment for this activity shall only be made where indicated in the Bills of Quantities. The unit of payment shall be as indicated in the Bills of quantities

12. STRUCTURAL STEELWORK

12.1 General

The work to be performed here consists of furnishings and placing of structural steel I-Beams and includes the supply and installation of shear connectors, bearing pads etc. as shown on the drawings.

12.2 Materials

Structural steel shall comply with the requirements of B5153 Part 1 and BS4360. Bearing plates and anchor bolts for bridge structures shall comply with ASTM specification designation A-36.

12.3 Painting

Structural beams shall be painted with two (2) coats zinc chromate primer and two (2) coats of an approved epoxy paint.

12.4 Bolts

All bolts, screws and nuts shall be greased and when erected with the correct tapered flat washers, bolts shall show two (2) clear threads beyond the nut and so threads shall bear upon the sections connected. All bolts, nuts and screws shall comply with B.S. 916 and washers with B.S 3410.

12.6 Welding

All welding shall be carried out by an electric arc process and the plant and all welding producers shall meet the approval of the engineer. Type of weld used shall be fillet weld and should meet the approval of the engineer. All welding procedures shall conform to B.S. 5135.

12.7 Erection

All structural steelwork shall be erected and bolted in accordance with the drawings. During all unloading, handling and erection operations, care must be taken to ensure that surface treatments are not damaged.

12.8 Measurement and payment

Separate payment for this activity shall only be made where indicated in the Bills of Quantities. The unit of payment shall be as indicated in the Bills of Quantities.

13 CONCRETE BLOCKWORK

13.1 MATERIALS

a) Cement and water

Cement and water shall be as described under “Concrete Work”.

b) Sand for Mortar

Sand shall be clean naturally occurring plastering sand free from salts, organic matter, clay, loam, dirt or other deleterious matter and shall conform to BS 1200. All sand shall be stored and kept free from contamination by any other material.

Measurement and payment

No separate payment shall be made for this activity

c) Mortar

Cement mortar shall consist of one part by volume of Portland cement and two parts by volume of natural sand. The components shall be thoroughly mixed in the dry state, and then water added to achieve the desired workability. Cement mortar shall be mixed in small quantities as and when required, and any mortar that has begun to set or which has been mixed for a period in excess of one hour shall be rejected. The sharp sand shall be clean; double washed fine aggregate sourced from a reputable wash plant.

d) Concrete Blocks

Concrete blocks shall conform to B.S. 6073 Part 1 of first quality good, sound, hard and well cured and true to shape and size of the types described with surfaces free from laitance and honeycombing.

Load bearing blocks shall have an average crushing strength (average of five units) of not less than 7N/mm^2 measured over the gross area. Concrete masonry units shall be tested in accordance with ASTM C-140. The Contractor shall allow for testing 5 random units, prior to commencement of the job.

The units shall be selected in the presence of the Manufacturer’s representative and the Employer’s representative.

No dimensions shall differ by more than 3 mm. from the specified standard dimension. "Standard Dimensions" refer to the manufacturer's designated dimensions and are not to be confused with "nominal dimensions" of modular size units which are equal to the standard dimensions plus 10mm. the thickness of one standard mortar joint.

Minimum face-shell thickness and web thickness shall be specified below:-

Nominal Unit Width	Minimum Face-Shell	Web Thickness
150mm	25mm	25mm
200 mm	31 mm	25 mm
250 mm	35 mm	28 mm
300 mm	38 mm	28 mm

Measurements shall be the average of 5 units taken at the thinnest point.

13.2 WORKMANSHIP

13.2.1 Laying Blocks

a) At the time of laying, all masonry units shall be free of excessive dirt and dust. Proper masonry units shall be used to provide a minimum of cutting. Where cutting is necessary, cuts shall be neat and true. Where masonry is to be bonded to a concrete beam or footing, the concrete surface shall be clean with laitance removed. Unless shown otherwise, blocks are to be laid in uniform courses with regular running bond.

b) Units shall be laid to preserve the unobstructed vertical continuity of the cells to be filled. Such cells shall be not less than 50 mm x 75 mm clear.

c) Mortar joints shall be straight, clean and uniform in thickness and shall be tooled as shown on the plans. Joints shall be tooled in a manner which compacts the mortar, pressuring the excess mortar out of the joint rather than dragging it out. The mortar shall be well bonded to the block at the edges. Tooling shall be done when the mortar is partially set but still sufficiently plastic to bond. Where walls are to receive plaster or water-proofing agent, the joints shall be struck flush. Joints which are not tight at the time of tooling shall be raked out, pointed and then tooled. If it is necessary to move a unit after it has once been set in place, the unit shall be removed from the wall, cleaned and set in fresh mortar. Joints shall be 10 mm thick unless specified otherwise and shall have full coverage of face-shells, webs and vertical ends. Where reinforcement is used in horizontal mortar joints, the thickness of the joints shall be at least twice the thickness of the diameter of the reinforcement.

d) When hot, dry weather exists, units shall be wetted with a light fog spray, but not immersed into any vessel. The work shall be carried up course by course and no one portion shall be raised more than four courses at any time. All perpends and quoins shall be kept strictly true and square and carefully leveled through every second course. Build cross walls at the same time with main walls and properly bond together.

e) Tool joints of exposed blockwork which is not plastered for a depth of 20 mm before the mortar has set to form a flush joint and leave the edges of blocks well defined.

13.2.2 Concrete filling

a) Where vertical reinforcement is specified or described, the reinforced cells are to be grouted for the full height of wall. Concrete shall consist of concrete mix 21 N/mm^2. Sufficient water shall be added to make a workable mix that will flow into all parts of the masonry cell without separation or segregation. The slump of the grout should be in the region 75 mm. - 100 mm. concrete shall be placed before any initial set occurs and in no case more than one and one half hours after water had been first added. Admixtures may be used subject to prior approval by the Employer.

b) The concrete shall develop a minimum compressive strength of 21 N/mm^2. at 28 days when tested as follows :-

1. Concrete shall be placed in a cell of a hollow concrete block of the type being grouted. The prism of grout so formed shall be separated and tested in compression in the same way as concrete test cubes except that any rough surface may require to be capped. For ease in separating the prism, the cell may be lined with porous paper. A minimum of ten preliminary tests for each day on which grouting is undertaken.

2. Concrete shall not be placed to a height of more than 1 block course at one time and there shall be a minimum interval of 60 minutes between pours. When work is stopped for one hour or longer, the horizontal construction joints shall be formed by stopping all tiers at the same elevation with the grout 38 mm below the top. Grout shall be compacted with a suitable pencil vibrator.

3. The final pour where a block wall is constructed to abut a fixed soffit shall be carried out through a chute fixed to the side of the wall so that concrete may be poured up to soffit level. The resultant surplus may be removed and cleaned off as soon as the grout has reached an initial set.

13.3 Reinforcement

a) Block walls generally shall have 'Brickforce' reinforcement laid in the joints after every third course of blockwork in addition to any rod reinforcement as shown on Employer's drawings.

b) When a foundation dowel does not line up with *a* vertical core. It shall be stopped more than one horizontal in six verticals. Vertical reinforcement shall be held in position at the top and bottom and at intervals not exceeding 192 diameters of reinforcement. Vertical reinforcing steel shall have minimum clearance of 6 mm. from masonry and not less than one bar diameter between bars.

c) Wire reinforcement shall be completely embedded in mortar. Wire reinforcement shall be lapped a minimum of 225 mm. at splices and shall contain at least one cross wire of each piece of reinforcement in the lapped distance.

13.4 Measurement and payment

No separate payment shall be made for this activity

14 <u>CONSTRUCTION OF HAND RAILS</u>

14.1 Description – See D19

The handrails shall be constructed in accordance with the drawings and specifications.

14.2.Materials and Workmanship

a) The rails shall be constructed with schedule 40 galvanized steel pipes.
b) All bolts, nuts and screws shall comply with BS 916 and washers for these BS 3415.
c) Welding shall be carried out by an electric arc process and the plant and all welding procedures shall conform to BS.5135.

d) Bridge railing shall be fabricated and erected to the lines and grades shown on the drawings and shall not reflect any unevenness in the structure. Unless otherwise specified, all railings posts shall be vertical. Panels and members shall be free from twist.

e) After erection on site, the metal railing shall receive the following coats of paint.
   i) One (1) coat of etching primer
   ii) Two (2) Top coats

14.3 Measurement and payment.

The unit of Payment shall be the Number of linear metres of railing fabricated and installed in place as shown in the drawings and in conformity with these specifications.

15 CONSTRUCTION OF CULVERTS AND FARMERS' CROSSING

15.1 Pipe Culvert

15.1.1 Description

The work to be performed under this Section consists of supplying and installing reinforced concrete pipe culverts of the classes, sizes and dimensions required, furnished and installed at such locations as are designated on the Bills of Quantities and/or by the Engineer in accordance with these Specifications and in conformity with the lines and grades given. It also involves installation of head Walls ,Wingwalls and associated structures and all necessary excavation, back filling and all else required to complete the job. (See typical drawings D6 and D7).

15.1.2 Specifications

1. Concrete pipes used shall conform to the requirements of AASHTO 170 for class IV wall C pipe.

2. Concrete used shall be of grade 20 i.e. characteristic strength of 21 N/mm² for pipe surround and grade25 for headwalls and wingwalls.

3. BRC used shall be # 65 gauges.

4. Grade for laying cylinders shall be greater than 0.5% but less than 3% to conform with existing channel slope. A minimum of 1.3m of head wall/wing wall on either of the culvert opening

15.1.3 Work Methods

1. Using backhoe or some mechanical means excavate and remove soil and existing cylinders along half of the width of road down to a hard compact layer, removing all slush and soft material.

   N.B At no time shall the entire width of road be impassable to vehicles unless approved by the Engineer.

2. During excavation, ensure that the required grade is provided.

3. If necessary, build back up to the required level using aggregate and compacting in 100mm layers.

4. Place a 6" (150cm) sand blinding layer at the base.

5. Prepare formwork, place BRC and pour concrete to form slab and aprons for placing cylinders

6. Begin pipe laying at the downstream end of the culvert with the bell or groove ends facing upstream. Ensure that each pipe fits snugly into the other.

7. Bend and tie BRC wire around the pipes. Use mild steel reinforcement as directed by Engineer.

8. Pour concrete around the pipes, ensuring that all crevices are filled and that the minimum thickness of concrete is 150mm. Place steel dowels for headwall construction.

9. Foundation for wing walls must be in accordance with drawing, and must be constructed to the Engineer's approval. Grade 20 concrete must be used.

10. Blocks placed for walls must be in accordance to lines and grades set down in the specifications and drawings.

11. Cover to steel bars 50mm minimum.

12. Holes for weepholes 50mm ø must be placed in wing wall, to allow for drainage.

13. Structure must be backfilled with suitable granular material placed and compacted in accordance with specification # 11

14. When completely dried, backfill uppermost layer with pitrun in layers of 150mm, compacting and rolling each layer, until the road base layer is reached.

15. If the road has oilsand, place a 40mm layer of oilsand, rolling and compacting smoothly to a level 10mm above that of the normal road level.

16. Construct rubble masonry or reinforce concrete headwall.

N.B. At the end of the day's work or during periods of inactivity, all excavation must be properly illuminated and warning signs placed so that motorists will be warned. Metal sheets shall be placed over the trenches to allow passage of vehicles.

15.2 Box Culvert

15.2.1 Description

The work to be performed under this section consists of the construction of the base slab or footing, sidewall and top slab. All concrete and formwork must conform to specification #7. See drawings D8 and D9

15.2.2 Specifications

1. Concrete used shall be grade25 .

2. BRC used shall be # 65 gauges.

3. Grade for the culvert base shall be greater than 0.5% but less than 3% to conform with existing channel slope. A minimum of 1.5m of head wall/wing wall on either of the culvert opening.

15.2.2 Work Method

1. Using backhoe or some mechanical means, excavate down to the required level as specified by the Engineer.

   N.B. At no time shall the entire width of the road be impossible to vehicles unless approved by the Engineer.

2. The base slab or footing shall be placed and allowed to set before the remainder of the culvert is constructed suitable provision shall be made for bending the sidewalls to the culvert base.

3. Before concrete is placed in the sidewalls, the culvert footings shall be thoroughly cleaned and the surface carefully chipped and roughened in accordance with the method of bending construction joints.

4. The concrete in the walls shall be placed and allowed to set before the top slab is placed. Appropriated keys shall be left in the sidewalls for anchoring the cover slab.

15.3 Measurement and Payment

1. The unit of measurement for payment for cylinder and box culverts shall be a lumpsum payment for the entire culvert completed as per drawings Inclusive of headwalls, wingwalls, associated structures, excavation, backfilling and road restoration works.

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The price and payment shall constitute full compensation for labour, equipment, formwork, tools and all else necessary to complete the work described herein in strict conformance with these specifications, any Special Conditions of Contract and as approved by the Engineer.

16 BRIDGE CONSTRUCTION

16.1 Description

Construction of bridges including 2 abutment walls with footings, 4 wing walls, aprons, structural steel deck beams, reinforced concrete decking and railing in accordance with the drawings. It shall also include water course clearing and shaping as instructed by the engineer. This activity shall include all the necessary excavation, backfilling and road restoration works to formation level that are required.

16.2 Specification

1. Concrete used shall be premixed, grade 30 i.e. characteristic strength on 30n/mm^2 and shall be sourced from an approved supplier.

2. Piles where necessary shall conform in all respects with AASHTO specifications for highways.

3. Reinforcing steel shall be as indicated in specification #7

4. All concrete and formwork must conform to specification #7.

5. Structural steel for steel beams shall be grade 43 mild steel or as indicated in specification #12

16.3 Work Method

1. Ensure warning signs and other appropriate safety measures are taken before construction works begin.

2. Remove existing structure and provide a temporary access crossing for vehicular and pedestrian traffic and a diversion channel if necessary. The temporary access crossing shall be able to withstand all anticipated loading during bridge construction.

3. Using mechanical means excavate area for construction of concrete base slab. Compact the area for the base slab and provide blinding layer as indicated in the drawings

4. Steel reinforcement shall be tied and placed accurately in the positions shown as per drawing or as directed by the Engineer ensuring all proper construction methods on steel handling are used.

5. Prepare formwork ensuring no seepage of aggregate and no distortion. Formwork shall be anchored in such a way that upward or lateral movement of any part of the formwork during concrete placement and consolidation is prevented. Formwork must not touch the reinforcing bars and no pouring of concrete is to start until approval is given by the Engineer or his representative upon inspection.

6. Concrete shall be placed in horizontal layers not more than 300mm thick when less than a complete layer is placed in one operation it shall be terminated at a vertical bulkhead. Each layer shall be placed and compacted before the preceding

batch has taken initial set to prevent injury to the green concrete and avoid surfaces of separation between the batches. Each layer shall be compacted so as to avoid the formation of the construction joint with a preceding layer which has not taken initial set. The base slab and concrete footings shall be cast in one pour as shown in the drawings. Only after the footings have been allowed to dry and harden for 36 hrs then casting of the abutment and wing walls can take place.

7. Erect formwork and cast abutment and wingwalls .Ensure appropriate measures are taken for the curing of concrete. As per specification # 7

8. Remove formwork ensuring precautionary measures and no damage to edges take place. The Engineer shall be informed in advance when the contractor intends to strike any forms. Remove all obstacles from the watercourse and reshape the water passage between the abutments as per drawing or as instructed by the engineer. To ensure an unobstructed flow of water the water course shall be cleared, desilted and shaped as directed by the engineer for a distance of 20m on either side of the bridge.

9. After the abutment walls have been sufficiently cured and approved by the engineer, place fabricated steel beams as per the specifications and drawings and inclusive of shear connectors, stiffners, tie beams bolts bearing pads, tie beams etc. Fabrication and installation shall be in accordance with specification # 12

10. Reinforced concrete decking shall be cast only after the engineer has approved the structural steelwork, reinforcement steelwork and formwork. Cast deck slab in accordance with specification #7.

11. Place non-woven fabric material and backfill behind the abutment and wing walls to road formation level using approved granular fill material as shown in the drawings and in accordance with specification #11.

11. Fabricate and install galvanized steel hand rails as shown in the drawings and specification #14.

16.4 Measurement and Payment

1. Separate Payments shall be made for each individual activity shown in the Bills of Quantities. bridge This includes excavation, foundation, abutments, structural steel beams, wing walls, deck slab, backfilling, temporary crossing, water course clearing, desilting, handrails, painting and coating and water course shaping etc. The units of payment shall be as indicated in the bills for quantities

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The price and payment shall constitute full compensation for labour equipment, formwork, tools and all else necessary to complete the work describe herein in strict conformance with these specifications, any Special Conditions of Contract and as approved by the Engineer.

17 REHABILITATION OF BRIDGES

A) Timber Decking
17.1 Description

The work to be performed under this Section consists of removing old wooden decks, traffic planks, handrails, damaged or rotten timber structures and the timber portions of composite structures. It also includes repair and or construction of abutment and wing walls.

The work shall include for furnishing, preparing, fabricating, erecting, treating, and painting of timber and steel. All concrete and formwork must conform to specification # 7.

17.2 Specifications

17.21 Lumber and Timber Solid Sawn

Sawn Lumber and Timber shall conform to the specifications for Hardwood under this section.

1. Hardwood shall be as follows:

a. Timber beams or runners	- 350mm x 400mm Greenheart, Balata or Guatacre
b. Traffic, deck and chair planks	- 75mm x 300mm Mora, Purple heart or Green heart
c. Timber bearings	- 150mm x 300mm Mora, Purple heart or Green heart
d. Timber rails	- 50mm x 100mm Mora, Purple heart or Green heart
e. Timber parapet/rail posts	- 100mm x 100mm Mora, Purple heart or Green heart

or equal and approved, of straight grain, consistent colour and free from soft heart, sapwood, shakes, splits, wancy edges and all evidence of insect attack or compression faults.

2. All lumber must be properly seasoned and free from seasoning defects when delivered to the works.

3. All timber to be used shall be treated with two coatings of creosote mixture of solution approved by the Engineer.

17.2.2 Steel Components

1. Rods, plates, eye bars and shapes when required shall conform to the requirements of ASTM A709 grade 36 unless otherwise specified.

2. Bolts, nuts, drift-bolts and dowels may be of mild steel. Washers may be cast iron ogee or malleable iron castings, or they may be cut from mild steel plate.
   Bolts shall comply with ASTM A307 and shall have coarse threads, class 2 tolerance conforming to ASS1 Standards Specifications.

   All fasteners, including nails, spikes, bolts, dowels, washers, and lag screws shall be galvanized, unless otherwise permitted.

3. Unless otherwise specified, all hardware for timber structures shall be galvanized in accordance with ASTM A153.

17.2.4 Work Methods

1. Workmanship shall be first class throughout, and all framing shall be true and exact. Unless otherwise specified, nails and spikes shall be driven with just a sufficient force to set the heads flush with the surface of the wood. Deep hammer marks in wood surfaces shall be considered evidence of poor workmanship and sufficient cause for rejection of the work.

2. Treated timber shall be carefully handled without sudden dropping, breaking of outer fibers, brushing, or penetrating the surface with tools.

3. All cutting, framing, and boring of treated timber shall be done before treatment insofar as is practicable. Cuts and recesses shall be covered with two applications of a mixture of 60 percent creosote oil and 40 percent roofing pitch or brush coated with at least two applications of hot creosote; creosote solutions or water-borne preservatives, all cuts, abrasions and recesses which occur after treatment shall be field treated by two liberal applications of a comparable preservative to the approval, of the Engineer.

4. Posts shall be fastened to deck planks by one of the following methods:

   a. By dowels of not less than 18mm diameter extending at least 150mm into both posts and planks.

   b. By drift-bolts of not less than 10mm diameter driven diagonally through the base of the post and extending at least 225mm into the plank.

   c. By other method of connection approved by the Engineer.

5. Unless otherwise specified, wheel guards, rails, and rail posts shall be dressed on four sides.

6. Unless otherwise specified, planks for flooring shall be dressed four sides.

   Decks shall consist of a single thickness of plank supported by runners. The planks shall be laid heart side down, with 20mm openings between them for seasoned

material and with approximately 12mm for unseasoned material. The planks shall be carefully graded as to thickness and so laid that no two adjacent planks shall vary in thickness by more than 3mm.

7. Rails and rail posts of timber and any other parts designated to be painted shall be painted with one coat of primer and at least two coats of oil paint of the colours approved by the Engineer. The Engineer may select reflectorised paint for this use.

8. All lumber removed must be transported away to an approved site.

17.2.4 Measurement and Payment

1. The quantities to be paid for shall be the number of linear meter of each species and grade of lumber and timber listed in the schedule of bid times, complete place and accepted. Measurements of lumber and timber will be computed from the nominal dimensions and actual lengths.

2. Payment for timber, lumber and deck planks, handrails, etc. and beams shall be considered to be full compensation for all costs of furnishing of materials, including hardware and timber connectors, preservative treatment, equipment, tools, and labor for the fabrication, erection, and painting necessary to complete all of the work in compliance with the Drawings and specifications and as approved by the Engineer.

Reinforced Concrete Decking

17.3 Description – See D20 B&C

The work to be performed under this Section consists of removing old wooden decks, traffic planks, handrails, damaged or rotten timber structures and the timber portions of composite structures. The work shall include for furnishing, preparing, fabricating, erecting, treating, and painting of structural steel beams and the construction of reinforced concrete decking.

17.4 *Specifications*

1. Concrete used shall be premixed, grade 25 i.e. characteristic strength of 25n/mm^2 and shall be sourced from an approved supplier.

2. Reinforcing steel shall be high yield corrugated steel of characteristic strength 460 N/sqmm

3. All concrete and formwork must conform to specification #7.

4. Structural steel for steel beams shall be grade 43 mild steel

17.4.2 Work Methods

1. Ensure warning signs and other appropriate safety measures are taken before construction works begin.

2. Remove existing timber bridge members and provide a temporary access crossing for vehicular and pedestrian traffic and a diversion channel if necessary. The temporary access crossing shall be able to withstand all anticipated loading during bridge construction.

3 After the abutment walls have been sufficiently prepared and approved by the engineer, fabricate and install steel beams as per the drawings inclusive of shear connectors, stiffeners, tie beams, bolts. bearing pads, tie beams etc. Fabrication and installation shall be in accordance with specification # 12

4. Reinforced concrete decking shall be cast only after the engineer has approved the structural steelwork, reinforcement steelwork and formwork. Cast deck slab in accordance with specification #7.

5 Fabricate and install galvanized steel hand rails as shown in the drawings and specification #14.

17.5 Measurement and Payment

1. Payment shall be based upon completion of the entire bridge deck as per drawings. This includes structural steel beams, deck slab, temporary crossing and handrails.

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The price and payment shall constitute full compensation for labour equipment, formwork, tools and all else necessary to complete the work describe herein in strict conformance with these specifications, any Special Conditions of Contract and as approved by the Engineer.

18 <u>PATCHING OILSAND ROADS</u>

18.1 Description:

Patching isolated potholes, depressions, soft spots or strips in oilsand surface with an approved roadbase material and sealing off with oilsand of 38 mm. Includes excavation and disposal of unsatisfactory material and compaction of patches with hand tamping and/or mechanical equipment.

18.2 Specifications:

1. The road base shall conform to that as stated in Specification for road base pitrun construction in specification #5

2. Bituminous binder used shall be either Colas or MCO and obtained from a recognized and approved source.

3. Oilsand shall be provided by the Contractor which shall be of the best quality available.

4. The oilsand shall be placed within twenty-four(24) hours of transportation.

5. The areas in which the oilsand is to be off-loaded shall be cleared of weeds, rubbish and all loose material. These temporary storage areas shall be chosen such that water will not collect under or near the oilsand.

18.3 *Work Methods*

18.3.1 *Isolated potholes, depressions and soft spots.*

a. Remove broken, loose and unstable material from the area.

b. Bring the hole to a regular shape and trim the sides to vertical faces. The bottom should be level or stepped.

c. Place layers of road base in hole, not exceeding 10cm thick. The material must be compacted to 95% of maximum dry density as determined by the Modified Proctor (or Vibrating Hammer) test.

d. Compact the patch with suitable mechanical equipment.

e. Sweep surface clean and prime at a rate of 1 litre/sq. meter.

f. The primer shall be allowed to cure before application of the crushed oilsand.

g. Seal off patch with oilsand layer.

h. Compact patch with hand tamps and/or roller. The compacted thickness of the oilsand shall be 38mm.

i. The Engineer or his Representatives must inspect the job and give final approval.

18.3. 2 *Strip patching*

a. Using suitable equipment scarify the area identified by the engineer for strip patching. Scarification shall proceed according to the methodology outlined in specification#1. Where instructed by the engineer the road shoulders shall also be grubbed.

b. Place and compact road base in accordance with specifications for road base construction.(Spec # 6)

c. Sweep surface clean and prime at a rate of 1 litre/sq. meter.

d. The primer shall be allowed to cure before application of the crushed oilsand.

e. Place and compact oilsand in accordance with the specification #6

g. The Engineer or his Representatives must inspect the job and give final approval.

18.4 Measurement and Payment:

The unit of measurement for payment shall be considered in 2 parts as follows:

1. The amount of square metres of road base compacted in place inclusive of all preparatory works outlined in the work methods of specification #18.3

2 The number of Square metres of oilsand compacted in place and accepted by the engineer

19 Patching Asphalt Roads

19.1 Description:

Patching isolated potholes, depressions , soft spots or strips in asphalt surface with an approved aggregate and sealing off with asphalt of 50mm. Includes excavation and disposal of unsatisfactory material and compaction of patches with hand tamping and/or mechanical equipment.

19.2 Specifications:

1. The aggregate shall be blue limestone crusher run consistent with the specifications for road base material in specification#6

2. Bituminous binder used shall be either Colas or MCO and obtained from a recognized and approved source.

3. Asphalt used shall be surface course asphalt consistent with the specifications for asphalt surfacing in specification #6

19.3 Work methods

19.3.1 Isolated potholes depressions and soft spots

a. Remove broken, loose and unstable material from the area.

b. Using an asphalt saw, bring the hole to a regular shape and trim the sides to vertical faces. The bottom should be level or stepped.

c. Apply binder to sides and bottom of hole.

d. Place layers of aggregate in hole, not exceeding 10cm thick. Hand tamp each layer to a thickness of not more than 75 mm and permeate with binder before placing the next layer. The aggregate must be compacted to 95% of maximum dry density as determined by the Modified Proctor (or Vibrating Hammer) test.

e. Seal off patch with asphalt and compact with an approved smooth wheeled roller. The compacted thickness of asphalt shall be 50mm.

f. The Engineer or his Representatives must inspect the job and give final approval.

19.3.2 Strip patching

a. Using suitable equipment scarify the area identified for patching. Scarification shall proceed according to the methodology outlined in specification#1. Where instructed by the engineer the road shoulders shall also be grubbed.

b. Place and compact crusher run in accordance with specifications for road base construction. (spec# 6). The compacted layer thickness shall be 100mm minimum.

c. Sweep surface clean and prime at a rate of 1 litre/sq. meter.

d. The primer shall be allowed to cure before application of the asphalt

e. Place and compact asphalt in accordance with the work methods for asphalt surfacing in specification #6

f. The Engineer or his Representatives must inspect the job and give final approval.

N.B: This activity is to be done in dry weather or only as instructed by Engineer otherwise.

19.3 Measurement and Payment:

The unit of measurement for payment shall be considered in 2 parts as follows:

1 The amount of square metres of crusher run compacted in place inclusive of all preparatory works outlined in sections a to d of specification # 19.3

2 The number of Square metres of asphalt compacted in place and accepted by the engineer

Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The prices and payment shall constitute full compensation for colas, hauling, handling, preparing of areas to be patched, filling of holes, compacting, trimming, protecting and correcting including labour, tools, equipment and all else necessary to complete the work described herein in strict conformance with these specifications, any special Conditions of Contract and as approved by the Engineer.

20. CLEAN CULVERTS AND BRIDGE CHANNELS

All debris entrapped in the piles or abutments shall be removed away from the normal watercourse to areas where it will not be washed back into the channel or drainage system.

Drift logs, trees and other debris scattered on the banks for 20metres upstream from the structure shall be collected and placed in areas where they will not be washed back into the channel or drainage system.

The bridge channel shall be cleared to a distance of 20 metres upstream and downstream from the bridge and all logs and debris removed to areas where they will not be washed back into the channel or drainage system.

Stockpile of debris are to be made at locations agreed by the Engineer. All debris shall be the property of the Contractor and shall be moved from site if stockpile areas acceptable to the Engineer are not locally available. No disposal of material by burning or chemical measures shall be permitted.

In the case of culverts, remove all obstruction and debris from the culvert barrel or box and inlet/outlet structures. Remove all debris from the vicinity of the culvert. Remove all obstruction and debris from a distance of 20 metres along the inlet and outlet channels. Repair minor damage to cracked or broken culverts (extent to be agreed with the Engineer).

Remove all debris from site to a place specified by the Engineer.

21.0 VEGETATION CONTROL

Cut all vegetation to maximum height of 50 mm. The work shall cover shoulders, any ditches and one metre beyond the shoulders or ditches. These distances may be wider at junctions and accesses.

Weed out all vegetation on carriageway.

Cut slots through vegetation at shoulder where this may retain water on the road surface. Slots to be 300mm wide at 5 metre centers and at low spots in the alignment.
All overhanging branches less than 3 metres high shall be trimmed and disposed off at a site designated by the Engineer.

22. EROSION CONTROL/SLIDES

22.1 *Slide Removal*

22.2 *Description*

Repair of minor erosion of shoulders, slopes and ditches and correction of conditions which cause erosion. Includes installation and repair of riprap, rock ditch lining, ditch checks, headwalls and other erosion control practices. Removal of material on roadway caused by slides.

22.3 Specification

1. This is an activity where the engineer specifies the work after site visit due to its varied nature.

2. The Engineer or his representative must inspect the job and give his final approval.

22.4 Work Methods

1. Repair eroded area by filling with gravel soil, well compacted in place.

2. Correct conditions causing erosion, with actions such as:
widening and flattening of ditches;
- providing new outlet ditches to reduce concentration of water;
- placing sod or vegetation over eroded areas;

- lining ditch channels with rock; placing riprap at end of culverts and bridges; and constructing a series of ditch checks to reduce the velocity of water on steep grades.

NB. Final conditions to be job specific as determined by Engineer.

22.5 Measurement and Payment

1. Payment for this item of work would be as follows:
Erosion Control/Slides Removal

2. Payment will be made at the prices tendered for the item under this section as it appears in the schedule. The prices and payment shall constitute full compensation for labor, equipment, removal of material from roadway and all else necessary to complete the work described herein in strict conformance with these specifications, any special Conditions of Contract and as approved by the Engineer.

22.2 Gabion Baskets

22.2.1 Description – See D2 & D14

The work under this Section covers the furnishing, assembling, filling with stones and securing zinc coated (galvanized) and/or P.V.C. coated steel wire mesh baskets of approved sizes. Sizes shall be as specified in the Bill of Quantities, on the Drawings or as instructed by the Engineer. They shall be manufactured in accordance with these Specifications and placed to the lines, grades and dimensions shown on the Drawings, or as instructed by the Engineer.

22.2.2 Materials

1. Gabion Mesh

Mesh shall be hexagonal woven mesh with uniform sized openings measuring approximately 80 mm by 105 mm. All joints shall be flexible and twisted at least three times to prevent unravelling.

2. Galvanized Wire for Gabions

All steel wire used shall be zinc coated (galvanized having a minimum amount of zinc coating of 0.25 kg/m^2 of wire, and complying with Federal

Specification (QQ-W-W-461 H, Class 3). Binding wire shall have a coating of not less than 0.21 kg/$m^{2.}$ All dimensions are subject to a tolerance limit of $\pm$5% of manufacturer's specified sizes.

3. Zinc Coated Galvanized Gabions
Mesh Wire: The nominal diameter of the steel wire mesh shall be 3 mm (U.S. Gauge No. 11) after zinc coating.

Selvedge Wire: The nominal diameter of the selvedge wire running through all the edges (perimeter wire), shall be 4 mm (U.S. Gauge No. 9) after coating.

Lacing Wire: The nominal diameter of the wire, necessary for assembling and lacing the gabion units, shall be 2.2 mm (U.S. Gauge No. 13) after coating.

4. P.V.C. Coated Gabions
P.V.C. Coating: Where stated in the Bill of Quantities or where specified by the Engineer, all zinc coated steel wire shall be additionally coated with a minimum of 0.5 mm of grey P.V.C., which shall be suitable to resist destructive effects of immersion in acidic, salt, or polluted water, exposure to ultra violet light and abrasion, and retain these characteristics under test in accordance with ASTM Specifications B117-73, D1499-64(77) and D1203-74 (ISO 176-1976).

Mesh Wire: The nominal diameter of the steel wire mesh shall be 2.7 mm(U.S. Gauge No. 12) after zinc coating and an overall nominal diameter (core wire plus P.V.C. coating of 3.7 mm).

Selvedge Wire: The nominal diameter of the selvedge wire, running through all the edges (perimeter wire), shall be 3.4 mm (U.S. Gauge No. 10) after zinc coating and an overall nominal diameter (core wire plus P.V.C. coating)of 4.4mm.

Lacing Wire: The nominal diameter of the wire, necessary for assembling and lacing the gabion units, shall be 2.2 (U.S. Gauge No. 13) after zinc coating and an overall nominal diameter (core wire plus P.V.C. coating) of 3.1. All wire gauges are subject to tolerances in accordance with ASTM 641A-71A Table 3. Tensile Strength of all wire used for manufacturing the gabions and lacing wire shall be in accordance with ASTM A641, measured before fabrication of netting. Load Test shall be conducted in accordance with Federal Specifications (QQ-W-461 H Class 3). Elongation Test shall be conducted in accordance with Federal Specifications (QQ-W-461 H Class 3). The steel wire diameters are based on the French wire gauges and are approximately the U.S. gauge numbers stated.

22.2.3 Execution

1. Gabion Fabrication/Assembly Gabions shall be manufactured in such a manner that their sides, ends, lid and diaphragm(s) can be assembled to form rectangular units of the specified dimensions. Gabions shall be of a single unit construction. The front, base, back and lid shall be woven into a single unit. All perimeter edges of the mesh forming the gabion shall be securely selvedged so that the joints obtained have at least the same strength as the wire mesh itself.

   All kinks and bends shall be flattened from the gabion materials. The gabions unit shall be assembled individually, by erecting the sides (front and back), ends and diaphragm(s), ensuring that all creases are in the correct position and the tops of all sides level. The four corners of the gabion unit shall be laced first, followed by the edges of internal diaphragm(s) to the sides. The recommended lacing procedure consists of cutting a length of lacing wire (approximately 1.5 times the distance to be

laced – not to exceed 1.5 metres). The wire terminal shall be secured at the corner by looping and twisting, then lacing shall proceed with alternating single and double loops at approximately 100 mm intervals. The finishing end of the lacing wire shall be securely fastened. Alternative methods of assembly using rings or wire ties may be used in lieu of lacing wire if approved by the Engineer.

2. Nominal Dimensions of Gabions

Gabion length shall be 2,3 or 4 times its horizontal width or as specified in the Bill of Quantities. The horizontal width shall not be less than 1 meter. Where the gabion length exceeds 1.5 times its horizontal width, the gabion shall be divided into cells by diaphragm(s) of the same mesh and
gauge as the gabion body.

3. Gabion Installation

The assembled gabion units shall be carried to the work site and placed in their proper location. For structural integrity, all adjoining empty gabions must be laced along the perimeter of their contact surfaces in order to obtain a monolithic structure. After the gabion units have been laced together, they shall be stretched to effective alignment. This operation shall be carried out after several empty gabion units have been positioned. The first gabion in the line shall be partially filled to provide the necessary anchorage. Any stretching shall be carried out using a come-along or other means of at least one ton capacity. While under tension, the gabion joints shall be carefully controlled against any possible unravelling. Whenever gabion structures require more than one tier, the upper empty gabion tier (under tension) shall also be laced to the top of the lower one.

These requirements cover both zinc coated (galvanized) and P.V.C. Coated gabions. Requirement E shall only apply when the gabion mesh must be cut and folded to suit existing site conditions or when special Structures are required. See also Bill of Quantities.

Gabion units shall be neatly packed with hard, durable, blue limestone boulders from100mm to 200 mm in size, or as approved by the Engineer. For units 300mm deep the stone size shall not exceed 150 mm unless direct the Engineer.
Boulders shall be tightly hand packed in the gabions in a manner that maximizes the overall packing factor of the unit. Care shall be taken when placing fill material to assure that the sheathing on P.V.C. coated gabions is not broken or damaged. Gabions shall be filled in 200 mm thick layers. Two connecting wires shall be placed between each layer in all cells along all exposed faces of the gabion structure. All connecting wires shall be looped around two mesh openings and the wire terminals shall be securely twisted to prevent their loosening. The cells in any row shall be filled in stages so that local deformation may be avoided. At no time shall any cell be filled to a depth exceeding 300 mm higher that the adjoining cell. The outer layer of stone shall be carefully placed and packed by hand along all exposed gabion faces, in order to ensure proper alignment and a neat, compact, square appearance. The last layer of stone shall be leveled with the top of the gabion to allow proper closing of the lid and provide an even surface for the next course. It is good practice to place backfill to gabion walls simultaneously with the gabion filling operation.

5. Lid Closing

Lids shall be stretched tight over the filling, using crow bars or lid closing tools, until the lid meets the perimeter edges of the front and end panels. They shall then be tightly laced along all edges, ends and diaphragm(s) in the same manner as described above for assembling. On completion the structure shall be checked and all ends of wire shall be folded into the structure. It is essential that all structures have well packed fillings without undue bulging, and are securely laced.

6. Cutting and Folding Mesh

Where shown on the Drawings or as directed by the Engineer, the gabion mesh shall be cut, folded and wired together to suit existing site conditions. The mesh must be cleanly cut and the surplus mesh cut out completely, or folded back and neatly wired to an adjacent gabion face. The cut edges of the mesh shall be securely laced together in the manner described above for assembling. The assembling, installation, filling and lid closing of the re-shaped gabions shall be carried out as specified above.

22.5 Measurement and Payment

Measurement

No separate payment will be made for this activity

22.6 Payment

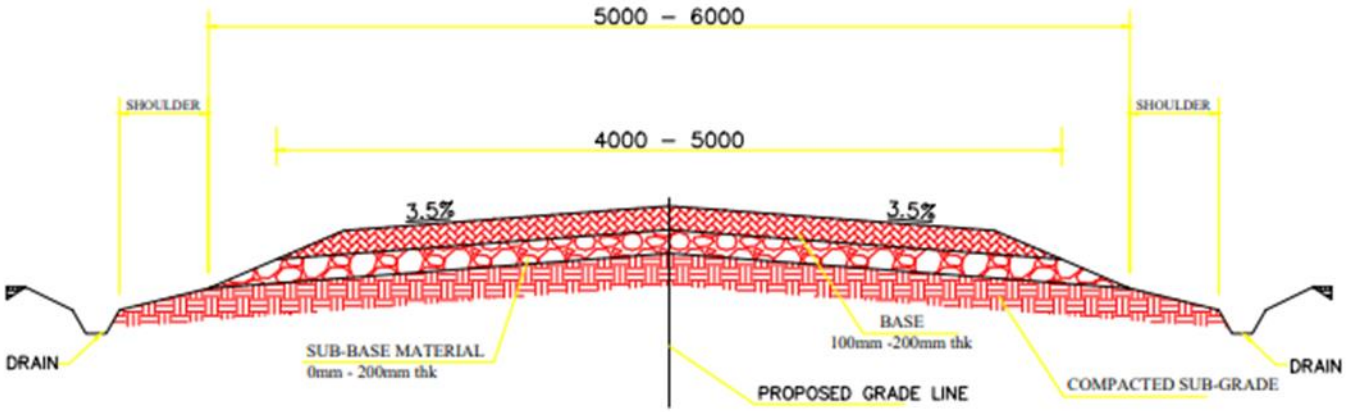
Payment will be made at the prices tendered for the items under this Section as they appear in the Bill of Quantities. The prices and payments shall constitute full compensation for furnishing all labour, materials, stone filling, plant, equipment and all else necessary to satisfactorily secure and complete the work described herein in strict conformance with these Specifications and as approved by the Engineer.

DRAWINGS

LIST OF SPECIFIED DRAWINGS

Typical Road Section	**D1 (a)**
Typical Road Section	**D1 (b) (c)**
Typical Road Pavement Section	**D2**
Typical End Elevation Cylinder Crossing	**D6**
Typical Plan View Cylinder Crossing	**D7**
Typical End Elevation of Box Culvert	**D5A**
Typical Plan View Box Culvert	**D5B**
Typical Box Drain Section	**D12**
Drain Types - Earth	**D3 (a) (b)**
Site Location Maps	**S.L. 1-10**

TYPICAL ROAD SECTION TYPE D1(a)



NOTES

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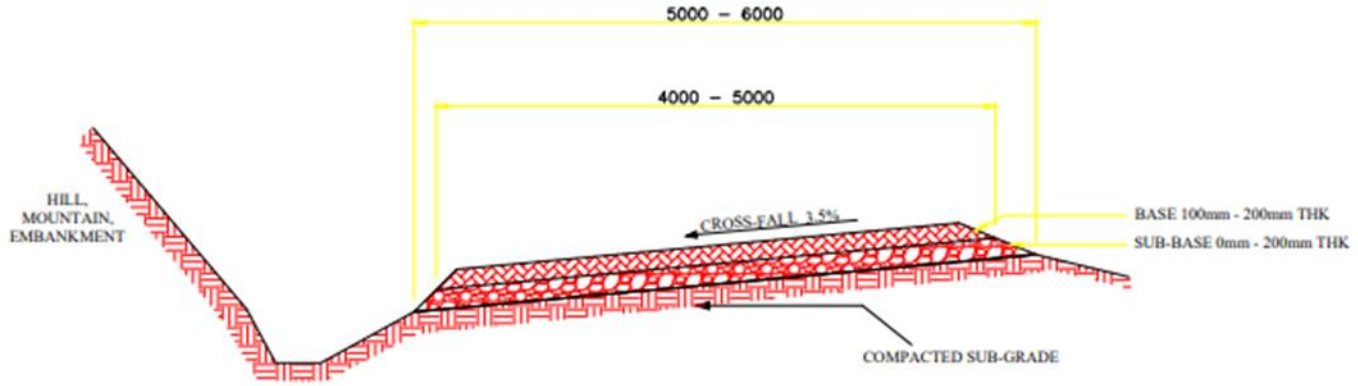
LAND AND WATER DIVISION
MAUSICA ROAD, CENTENO.

TYPICAL ROAD SECTION

PROJECT: R.A.R.R.M.P.
DRAWING: D1(a)
DATE: 15th Nov 2010
SCALE: N.T.S.

TYPICAL ROAD SECTION
D1(b)

TYPICAL ROAD SECTION
D1(c)



NOTES

1. All dimensions are in millimeters.

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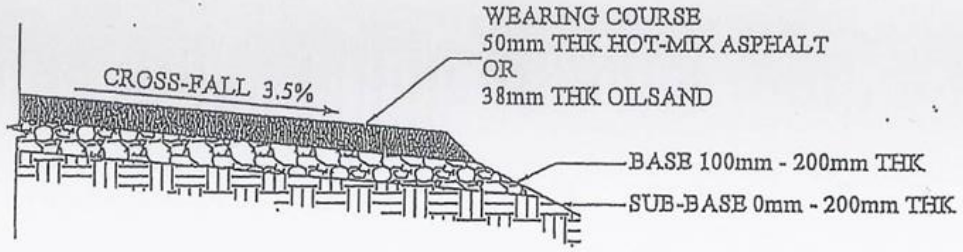
TYPICAL ROAD SECTIONS

PROJECT:	DRAWING:
R.A.R.R.M.P.	D1(b)
DATE: 15th Nov 2010	D1(c)
SCALE: N.T.S.	



TYPICAL ROAD PAVEMENT SECTION

NOTES

1. All dimensions are in millimeters.

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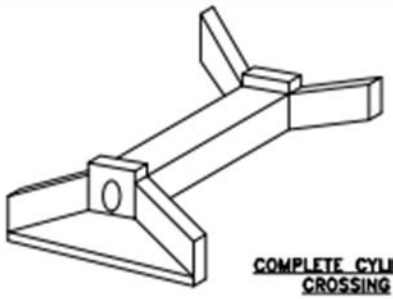
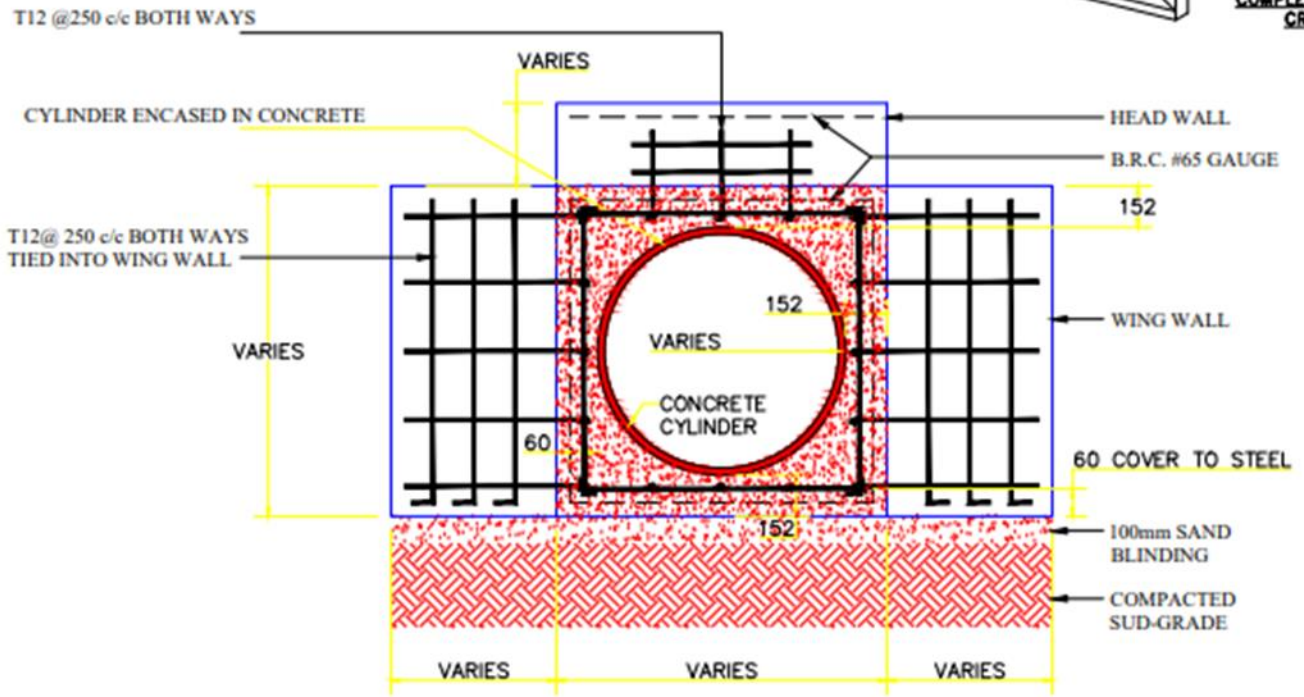
TYPICAL ROAD PAVEMENT SECTIONS

PROJECT: R.A.R.R.M.P.
DRAWING: D2.
DATE: 18th Nov 2011
SCALE: N.T.S.



COMPLETE CYLINDER CROSSING



TYPICAL END ELEVATION OF CYLINDER CROSSING

NOTES

1. All dimensions are in millimeters.
2. All steel are high tensile.
3. All concrete 4000psi.

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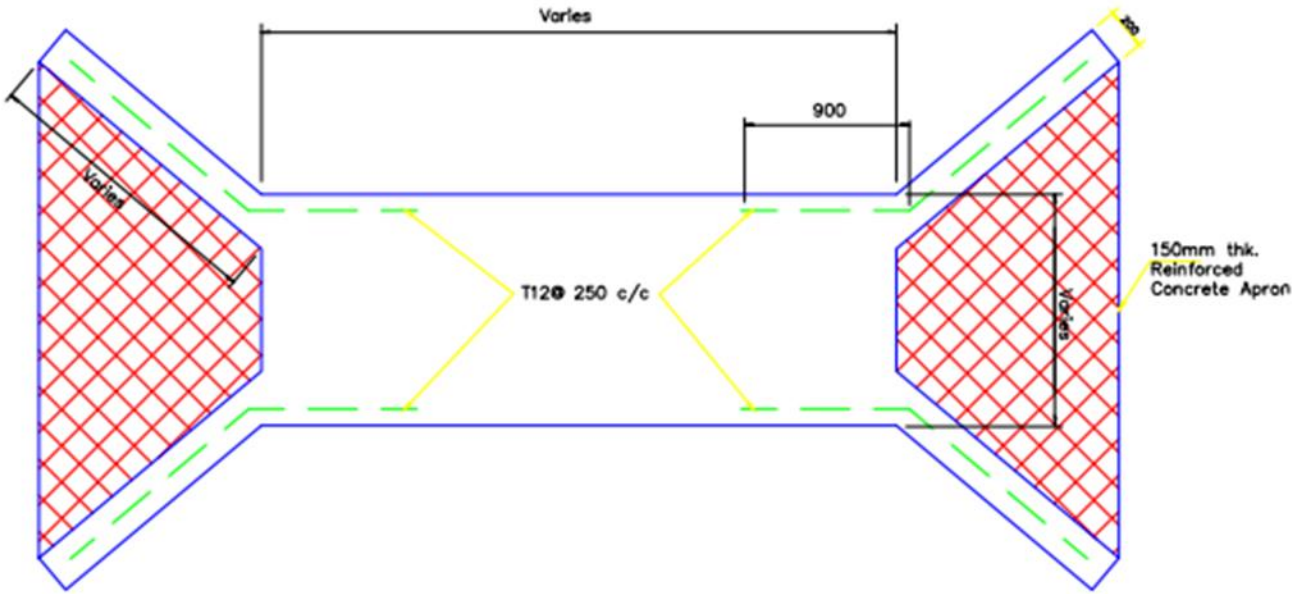
TYPICAL CYLINDER CROSSING CROSS SECTION

PROJECT: R.A.R.R.M.P.	DRAWING: D6
DATE: 15th Nov 2010	
SCALE: N.T.S.	



TYPICAL PLAN CYLINDER CROSSING

NOTES

1. All dimensions are in millimeters.
2. All steel are high tensile.
3. All concrete 4000psi.

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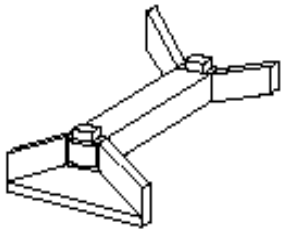
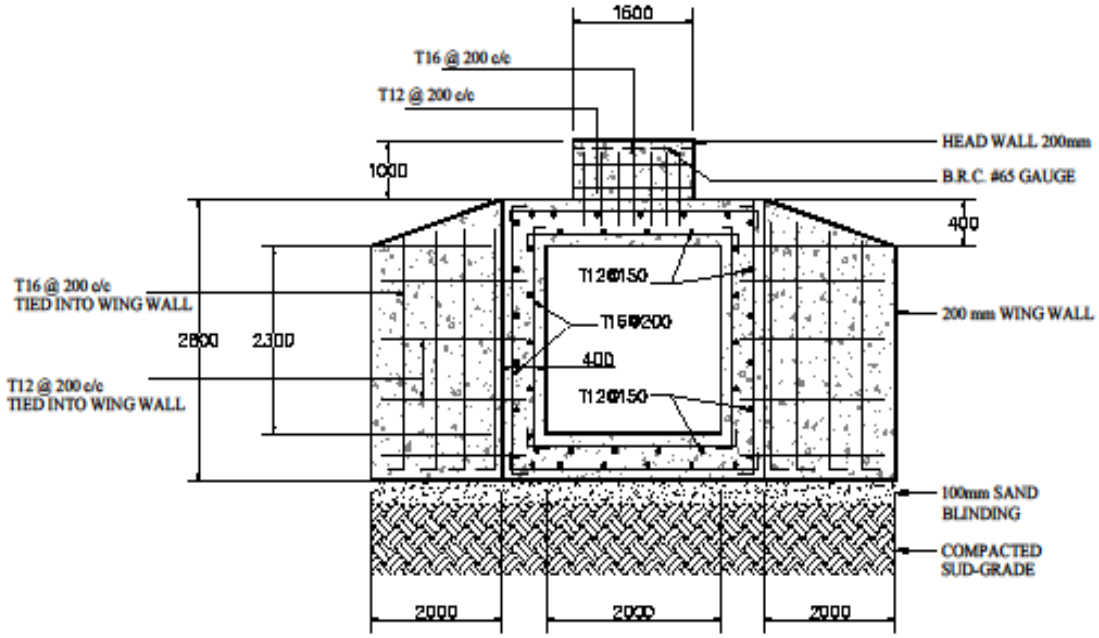
TYPICAL CYLINDER CROSSING PLAN

PROJECT: R.A.R.R.M.P.	DRAWING: D7
DATE: 15th Nov 2010	
SCALE: N.T.S.	



COMPLETE BOX CULVERT



END ELEVATION OF BOX CULVERT

NOTES

1. DO NOT SCALE DRAWINGS USE FIGURED DIMENSIONS ONLY
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
3. FOR SPECIFICATION OF MATERIALS REFER TO SPECIFICATION SHEET
4. THE CONTRACTOR SHALL THOROUGHLY VERIFY ALL DIMENSIONS ON SITE AND DISCREPANCIES FOUND SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER
5. CONCRETE TO BE 400 mm

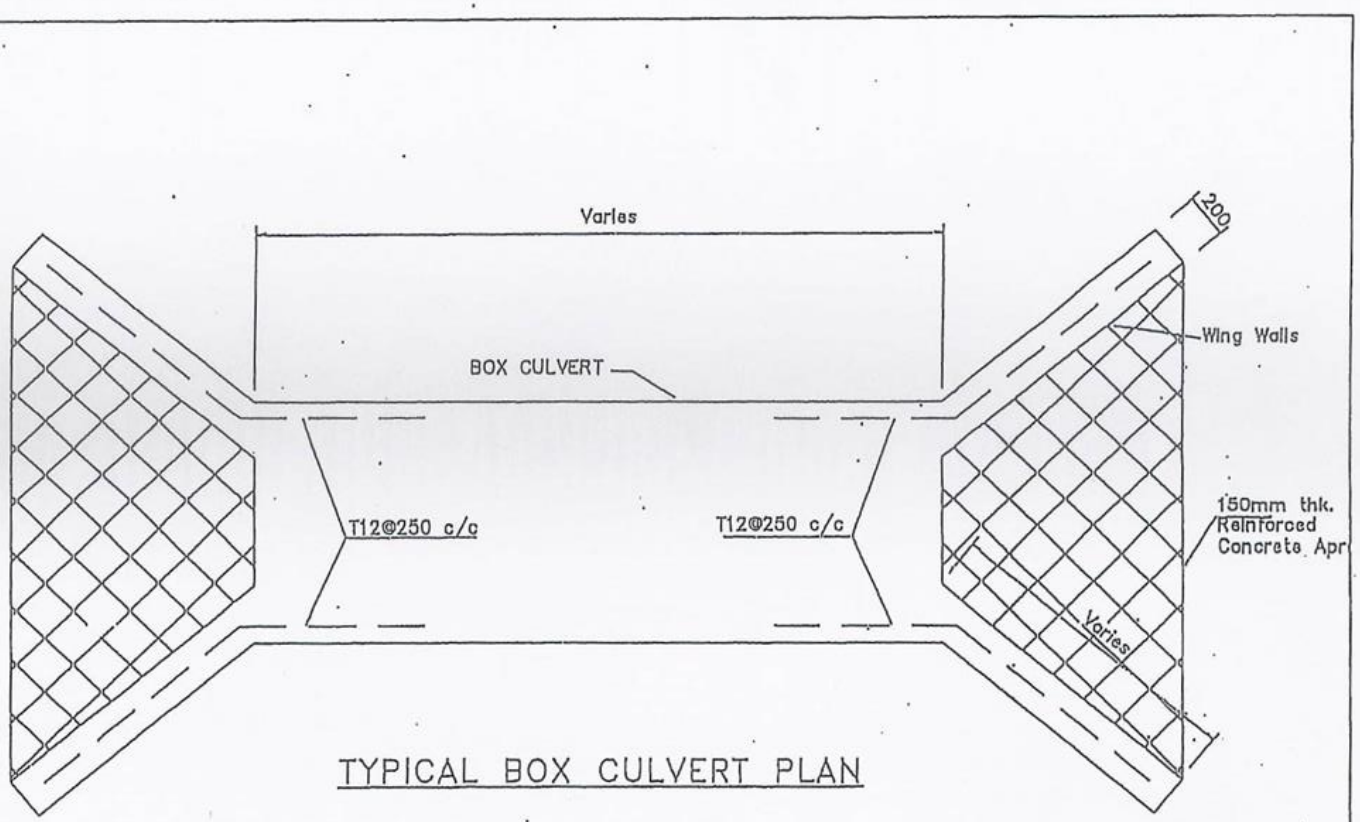
NO.	REVISIONS	DATE	BY

MINISTRY OF AGRICULTURE,
LAND AND FISHERIES
ENGINEERING DIVISION
MAUSICA ROAD, CENTENO
TEL: [illegible] FAX: [illegible]

PROJECT NAME
ORANGE GROVE BOX CULVERT

DRAWING TITLE
SECTION

DRAWN BY: E.D.	DATE: APRIL, [illegible]	DRG NO: C - 01
PROJECT ENGINEER: E.B.	CHECKED BY: E.L.	SCALE: AS SHOWN
APPROVED BY:	APPROVED DATE:	



TYPICAL BOX CULVERT PLAN

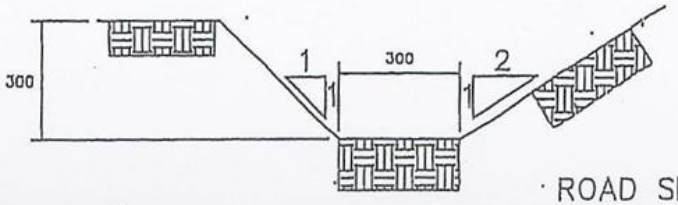
NOTES

1. All dimensions are in millimeters.
2. All steel are high tensile.
3. All concrete 25 N/mm^1.
4. Cover to all reinforcement is 60mm.

MINISTRY OF FOOD PRODUCTION,
LAND AND WATER DIVISION
MAUSICA ROAD, CENTENO.

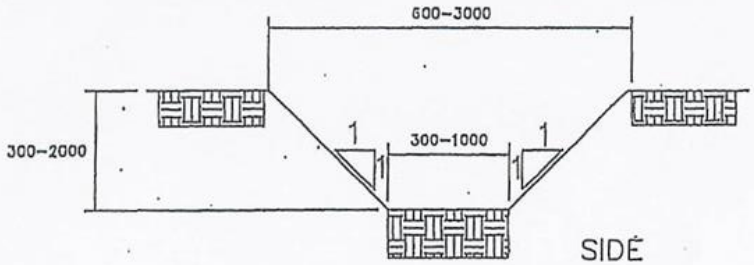
TYPICAL BOX CULVERT PLAN

PROJECT: R.A.R.R.M.P.	DRAWING: D5B
DATE: 18th Nov 2011	
SCALE: N.T.S.	



DRAIN TYPE – EARTH

D 3A



DRAIN TYPE – EARTH

D 3B

NOTES

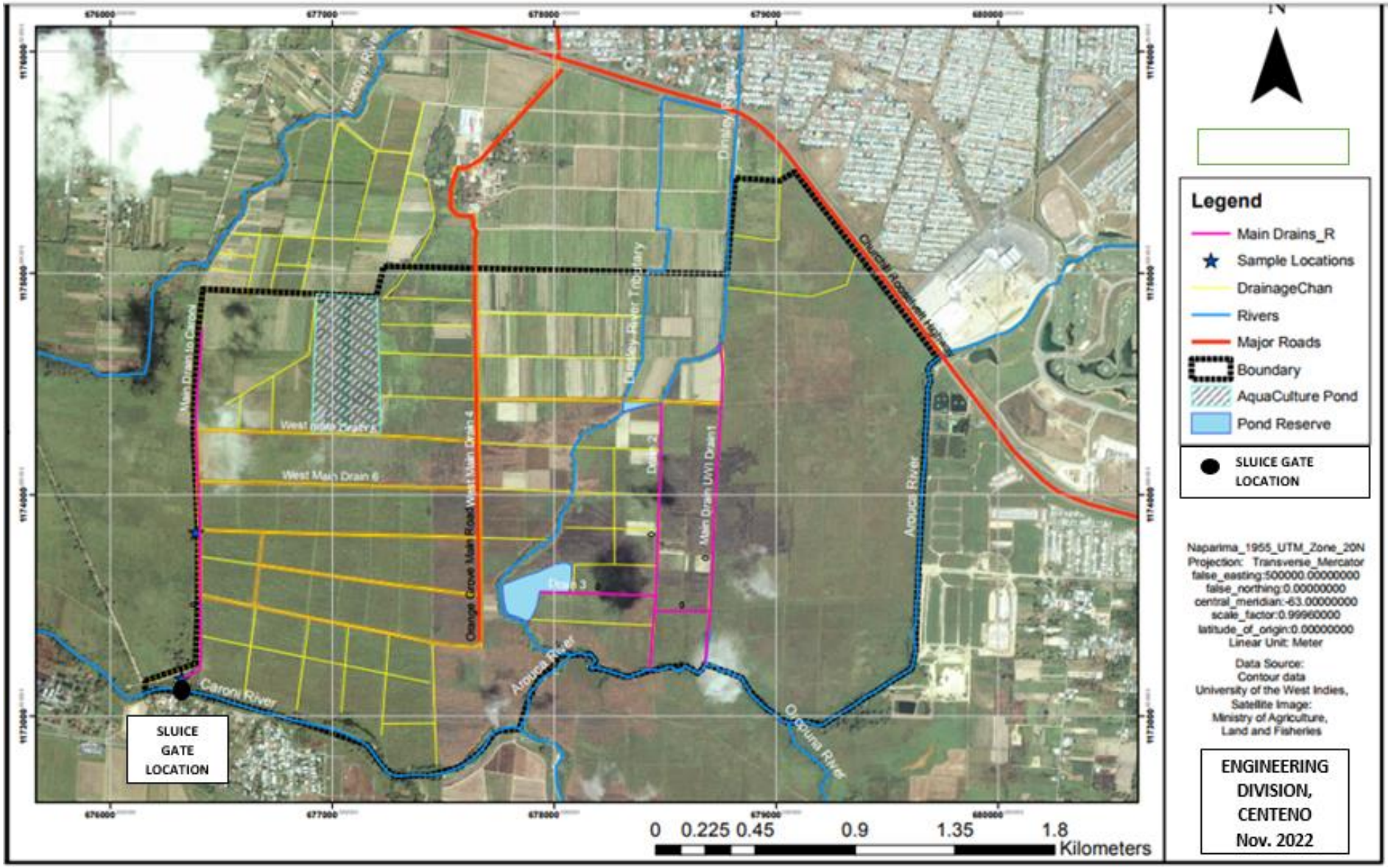
All dimensions are in millimeters.

MINISTRY OF FOOD PRODUCTION,
LAND AND WATER DIVISION
MAUSICA ROAD, CENTENO.

DRAIN TYPES

PROJECT: R.A.R.R.M.P.	DRAWING: D 3A & B
DATE: 18th Nov 2011	
SCALE: N.T.S.	

SITE LOCATION MAP


N
Legend
Main Drains_R
Sample Locations
DrainageChan
Rivers
Major Roads
Boundary
AquaCulture Pond
Pond Reserve
SLUICE GATE LOCATION
SLUICE GATE LOCATION
Naparima_1955_UTM_Zone_20N
Projection: Transverse_Mercator
false_easting:500000.00000000
false_northing:0.00000000
central_meridian:-63.00000000
scale_factor:0.99960000
latitude_of_origin:0.00000000
Linear Unit: Meter
Data Source:
Contour data
University of the West Indies,
Satellite Image:
Ministry of Agriculture,
Land and Fisheries
ENGINEERING DIVISION, CENTENO
Nov. 2022
0 0.225 0.45 0.9 1.35 1.8
Kilometers
Caroni River
Arouca River
Oropuna River
Orange Grove Main Road
West Main Drain 6
West Main Drain 4
Main Drain UWI Drain1
Drain 3
Drain 2
Drain 1
Main Drain to Caroni
Lisette River
Lisette River Tributary
Churchill Roosevelt Highway