

THE DISTRICT COUNCIL OF BLACK RIVER

BID DOCUMENT

for

CONSTRUCTION AND RESURFACING OF ROADS/LANES AND ASSOCIATED WORKS FOR A PERIOD OF 13 MONTHS AS FROM JUNE 2019

**Procurement Reference No:
ONB/DCBR/W07/2018-2019**

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Standard Bidding Document

Table of Contents

PART 1 – Bidding Procedures	1
Section 1 - Instructions to Bidders.....	2
Section II- Bidding Data Sheet	19
Section III - Bidding Forms.....	23
Section IV - Evaluation Criteria	62
PART 2 – Employer’s Requirements.....	70
Section V - Employer’s Requirements.....	94
PART 3 – Conditions of Contract and Contract Forms.....	65
Section VI. General Conditions of Contract.....	66
Section VII. Particular Conditions of Contract.....	66
Section VIII - Contract Forms.....	72

PART 1 – Bidding Procedures

Section 1 - Instructions to Bidders

Table of Clauses

A.	General.....	4
1.	Scope of Bid	4
2.	Source of Fund	4
3.	Challenge and Appeal	4
4.	Fraud and Corruption.....	4
5.	Eligible Bidders	6
6.	Qualifications of Bidders.....	8
B.	Contents of Bidding Document.....	9
7.	Sections of Bidding Document.....	9
8.	Clarification of Bidding Document	10
9.	Site visit/Pre-bid meeting	10
10.	Amendment of Bidding Document.....	10
C.	Preparation of Bids	Error! Bookmark not defined....11
11.	Cost of Bidding	11
12.	Language of Bid	11
13.	Documents Comprising the Bid	11
14.	Bid Submission Form and Schedules	11
15.	Alternative Proposal.....	11
16.	Bid Prices and Discounts.....	11
17.	Currencies of Bid and Payment.....	12
18.	Documents Comprising the Technical Proposal	12
19.	Period of Validity of Bids	12
20.	Bid Security/Bid Securing Declaration	12
21.	Format and Signing of Bid.....	13
D.	Submission and Opening of Bids	13
22.	Sealing and Marking of Bids.....	13
23.	Deadline for Submission of Bids	13
24.	Late Bids.....	14
25.	Withdrawal, Substitution, and Modification of Bids.....	14
26.	Bid Opening	14
E.	Evaluation and Comparison of Bids	14
27.	Confidentiality.....	14
28.	Clarification of Bids	14
29.	Determination of Responsiveness	14
30.	Nonconformities, Errors, and Omissions	15

31.	Correction of Arithmetical Errors	15
32.	Margin of Preference.....	15
33.	Evaluation of Bids	15
34.	Comparison of Bids.....	16
35.	Qualification of the Bidder	16
36.	Employer’s Right to Accept Any Bid, and to Reject Any or All Bids.....	16
F.	Award of Contract	16
37.	Award Criteria	16
38.	Notification of Award.....	16
39.	Signing of Contract.....	17
40.	Performance Security.....	17
	Preference Security	17
41.	Advance Payment and Security.....	18
42.	Plant and Materials on site	18
43.	Debriefing.....	18

Section I - Instructions to Bidders

A. General

1. **Scope of Bid**
 - 1.1 The Public Body as defined¹ in Section II “Bidding Data Sheet” (**BDS**) also referred to herein as Employer invites bids for the construction of Works, as **described in the BDS**, Section V - Employer’s Requirements and Section VII, “Particular Conditions of Contract” (PCC).

The name and identification number of the Contract are **provided in the BDS and the PCC**.
 - 1.2 The successful Bidder shall be expected to complete the Works by the Intended Completion Period **specified in the BDS**.
 - 1.3 Throughout these bidding documents, the terms:
 - (a) the term “in writing” means communicated in written form (e.g. by mail, e-mail, fax, online) with proof of receipt.
 - (b) if the context so requires, “singular” means “plural” and vice versa;
 - (c) “day” means calendar day; and
 - (d) “online refers to the e-Procurement System
2. **Source of Fund**
 - 2.1 The Works shall be financed by the Public Body’s own budgetary allocation, **unless otherwise stated in the BDS**.
3. **Public Entities related to Bidding Documents and to Challenge & Review**
 - 3.1 The public entities related to these bidding documents are the Public Body, acting as procurement entity, the Procurement Policy Office, in charge of issuing standard bidding documents and responsible for any amendment these may require, the Central Procurement Board for vetting bidding documents and for receiving and evaluating bids for major contracts, and the Independent Review Panel, set up under the Public Procurement Act 2006 (hereinafter referred to as the Act.).
 - 3.2 Unsatisfied bidders shall follow procedures prescribed in Regulations 48, 49 and 50 of the Public Procurement Regulations 2008 to challenge procurement proceedings and award of procurement contracts or to file application for review at the Independent Review Panel.

¹ See Section IV, “General Conditions of Contract,” Clause 1. Definitions.

3.3 Addresses to forward Challenges or Application for Review are **specified in the BDS**.

4. Fraud and Corruption

4.1 The Government of the Republic of Mauritius requires that bidders/suppliers/contractors, participating in procurement in Mauritius, observe the highest standard of ethics during the procurement process and execution of contracts.

4.2 Bidders, suppliers and public officials shall be aware of the provisions stated in sections 51 and 52 of the Public Procurement Act which can be consulted on the website of the Procurement Policy Office (PPO): ppo.govmu.org

4.3 The Employer will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

For the purposes of this Sub-Clause:

- (i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
- (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- (v) “obstructive practice” is deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede an investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation

4.4 The Employer commits itself to take all measures necessary to prevent fraud and corruption to ensure that none of its staff, personally or through his/her close relatives or

through a third party, will in connection with the bid for, or the execution of a contract, demand, take a promise for or accept, for him/herself or third person, any material or immaterial benefit which he/she is not legally entitled to. If the Employer obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of Mauritius or if there be a substantive suspicion in this regard, he will inform the relevant authority (ies) and in addition can initiate disciplinary actions. Furthermore, such bid shall be rejected.

5. Eligible Bidders

5.1 (a) In accordance with CIDB (Registration of Consultant and Contractors) Regulation 2014, Contractors currently operating in the construction industry have the statutory obligation to be registered with the Construction Industry Development Board (CIDB) accordingly.

(b) Subject to paragraph (e), Foreign contractors as defined in the CIDB Act will have to apply for and obtain a Provisional Registration prior to bidding for this project. If the contract is awarded to the foreign contractor the latter shall have to apply for and obtain a Temporary Registration before starting the project.

(c) Contractors whether local or foreign under an existing or intended joint venture will be eligible as a joint venture if, in addition to their respective individual registration, they obtain a Provisional Registration for the joint venture prior to bidding for this project. If an existing or intended joint venture is awarded the contract it shall have to apply for a Temporary Registration prior to starting the project.

(d) Sub-contractors undertaking works for value Rs 500 000 or above are subject to registration as applicable to Contractors.

(e) Paragraph (b) shall not apply to Foreign contractors who have been carrying construction works in the construction industry during the 20 years preceding 01 March 2017; and where at least two-thirds, or such other percentage as may be prescribed, of the total number of its or his employees are as citizens of Mauritius.

(f) A Foreign contractor referred to in paragraph (e) shall, for the purpose of registration, make an application with the CIDB and obtain a valid registration certificate prior to bidding for this project.

(g) Bidders are strongly advised to consult the website of the CIDB cidb.govmu.org for further details concerning

registration of contractors.

- 5.2 (a) Subject to ITB 5.6, a Bidder, and all parties constituting the Bidder, may have the nationality of any country except in the case of open national bidding where the bidding documents may limit participation to citizens of Mauritius or entities incorporated in Mauritius, if so qualified in the BDS.
- (b) Bidder may be natural person, private entity, or government-owned entity or any combination of them in the form of a joint venture.
- (c) Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated in the **BDS**:
- (i) the Bid shall include all the information listed in ITB Sub-Clause 6.2 below for each joint venture partner;
 - (ii) the Bid shall be digitally signed so as to be legally binding on all partners;
 - (iii) the Bid shall include an uploaded copy of the agreement entered into by the joint venture partners defining the division of assignments to each partner and establishing that all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms; alternatively, a Letter of Intent to execute a joint venture agreement in the event of a successful bid shall be signed by all partners and submitted with the bid, together with a copy of the proposed agreement;
 - (iv) one of the partners shall be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and
 - (v) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.
- 5.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if :
- (a) they have a controlling partner in common; or
 - (b) they receive or have received any direct or indirect

- subsidy from any of them; or
- (c) they have the same legal representative for purposes of this bid; or
 - (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
 - (e) a Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which the party is involved. However, this does not limit the inclusion of the same subcontractor in more than one bid; or
 - (f) a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid; or
 - (g) a Bidder, or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Engineer for the contract.
- 5.4 (a) A bidder that is under a declaration of ineligibility by the Government of Mauritius in accordance with applicable laws at the date of the deadline for bid submission and thereafter shall be disqualified
- (b) Bids from contractors appearing on the ineligibility lists of African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank Group and World Bank Group shall be rejected.
- Links for checking the ineligibility lists are available on the PPO's website: ppo.govmu.org
- 5.5 Government-owned enterprises in the Republic of Mauritius shall be eligible only if they can establish that they are legally and financially autonomous and operate under commercial law, and that they are not a dependent agency of the Government.
- 5.6 A firm shall be excluded if by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Mauritius prohibits any import of goods or contracting of Works or services from a country where it is based or any payment to persons or entities in that country.

6. Qualifications of Bidders

- 6.1 All bidders shall upload on template “Qualification Information 10 – Program of works” along with their bid a soft copy of preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.
- 6.2 Bidders shall include the information and documents listed hereunder with their bids, unless otherwise **stated in the BDS**. If, after opening of bids, it is found that any document is missing, the Employer may request the submission of that document subject to clause 30. The non-submission of the documents by the Bidder within the prescribed period may lead to the rejection of its bid.
- (a) Scanned Copy of valid registration certificate with the CIDB, including field of specialisation;
 - (b) scanned copies of original documents defining the constitution or legal status, place of registration, and principal place of business of the Bidder;
 - (c) scanned copies of original documentary evidence of list of major items of construction equipment proposed to carry out the Contract;
 - (d) scanned copies of original documentary evidence of qualifications and experience of key site personnel and technical personnel proposed for the contract;
 - (e) scanned copies of original report on the financial standing of the Bidder for the last three years, such as certified copies of Financial Statements/Audited Accounts as filed at the Registrar of Companies before the deadline set for submission of bids;
 - (f) scanned copies of original documentary evidence of adequacy of cash-flow capital for this Contract (access to line(s) of credit and availability of other financial resources);
 - (g) scanned copy of original authority to seek references from the Bidder’s bankers;
 - (h) scanned copies of original documentary evidence information regarding any litigation, current or during the last five years, in which the Bidder was/is involved, the parties concerned, the issues involved, the disputed amounts, and awards;
 - (i) scanned copies of original documents of proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price; and
 - (j) online response to mandatory criteria in respect of Eligibility and Conflict of Interest, Qualifications and Experience and Technical conformity **as specified in the**

BDS

- 6.3 To qualify for award of the Contract, bidders shall meet the following minimum qualifying criteria:
- (a) duly registered with the CIDB under the grade that would allow him to perform the value of works for which he is submitting his bid.
 - (b) registered with the CIDB under the class(es) and field of specialisation **specified in the BDS**.
 - (c) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment **listed in the BDS**;
 - (d) a Contract Manager/Supervisor with five years' experience in works of an equivalent nature and volume, including no less than three years as Manager or as otherwise **specified in the BDS**; and
 - (e) liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than the amount **specified in the BDS**.²

Pending litigations against the Applicant or any partner of a Joint Venture may result in Disqualification.

B. Contents of Bidding Document

7. Sections of Bidding Document

- 7.1 The Bidding Document consists of all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 10.

Section I - Instructions to Bidders (ITB)

Section II- Bidding Data Sheet

Section III – Bidding Forms

Section IV - Evaluation Criteria

Section V - Employer's Requirements

Section VI – General Conditions of Contract

Section VII- Particular Conditions of Contract

Section VIII - Contract Forms

- 7.2 The Invitation for Bids issued by the Employer are not part of the Bidding Document.

- 7.3 The Bidder is expected to examine all instructions, forms,

² Usually the equivalent of the estimated payments flow over 4-6 months at the average (straight line distribution) construction rate. The actual period of reference shall depend on the speed with which the Government shall pay the Contractor's monthly certificates.

terms, guidelines and specifications in the Bidding Documents. Failure to furnish all information or documentation required by the Bidding Documents may result in the rejection of the bid.

8. Clarification of Bidding Document

- 8.1 A prospective bidder requiring any on the bidding document shall request such clarification online.

The Employer will endeavor to respond online to any request for clarification no later than 7 days prior to the deadline for submission of proposals (bid preparation and hash submission), provided that such request is received no later than fourteen (14) days prior to the deadline. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 10.

9. Site visit/Pre-bid meeting

- 9.1 Bidders, at the Bidders' own responsibility and risk, are encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing their Bids and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.

- 9.2 The Bidder or its designated representative is invited to attend a pre-bid meeting, as **provided for in the BDS**. The purpose of the pre-bid meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

10. Amendment of Bidding Document

- 10.1 At any time prior to the deadline for submission of bids (bid preparation and hash submission), the Employer may amend the Bidding Document by issuing addenda.

- 10.2 Any addendum issued shall be part of the Bidding Documents.

- 10.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids (bid preparation and hash submission), pursuant to ITB Sub-Clause 23.2

C. Preparation of Bids

11. Cost of Bidding

- 11.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs irrespective of the outcome of the bidding process.

- 12. Language of Bid** 12.1 The Bid, supporting documents as well as all correspondence relating to the bid exchanged by the Bidder and the Employer shall be in English Language.
- 13. Documents Comprising the Bid** 13.1 The Bid shall comprise the following:
- (a) Bid submission Form (in the format indicated in Section III);
 - (b) Qualification information and documentary evidence establishing the Bidder's qualifications to perform the contract;
 - (c) Technical Proposal as per ITB 18.1;
 - (d) completed Bill of Quantities / Activity Schedule;
 - (e) Bid Security as per the format provided in section III or as a subscription to a Bid Securing Declaration in the Bid Submission Form; and
 - (f) any other material required to be completed and submitted by bidders, as specified in ITB **and the BDS**.
- 14. Bid Submission Form and Schedules** 14.1 The Bid Submission Form, Schedules, and all documents listed under ITB 13.1 shall be prepared using the relevant forms, if so provided.
- 15. Alternative Proposal** 15.1 Alternative Technical Proposals and completion dates if allowed shall be indicated in Section V- Specifications. The evaluation methodologies for their consideration shall be given in Section IV.
- 16. Bid Prices and Discounts** 16.1 The Contract shall be for the whole Works, as described in ITB Sub-Clause 1.1, based on the priced Activity Schedule/Bill of Quantities³ submitted by the Bidder.
- 16.2 Bidders shall fill in rates and prices for all items of the Works described in the Bill of Quantities.⁴ Items for which no rate or price is entered by Bidders, shall not be paid for by the Public Body when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.
- 16.3 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 14 days prior to the deadline for submission of bids (bid preparation and hash submission), shall be included in the rates, prices, and total Bid price submitted by Bidders.⁵
- 16.4 The price to be quoted in the Bid Submission Form shall be

³ In lump sum contracts, delete "priced Bill of Quantities" and replace with "priced Activity Schedule."

⁴ In lump sum contracts, delete "described in the Bill of Quantities" and replace with "described in the drawings and specifications and listed in the Activity Schedule."

⁵ In lump sum contracts, delete "rates, prices, and."

the total price of bid excluding VAT and any discount offered.

The discount if any and the conditions of its application shall be indicated separately.

- 17. Currencies of Bid and Payment**
- 17.1 The bid price and rates shall be in Mauritian Rupees and fixed for the duration of the contract unless otherwise **specified in the BDS**.
- 17.2 Unless otherwise **specified in BDS**, interim payment for Plant and Material on site is applicable as per GCC 39.7.
- 18. Documents Comprising the Technical Proposal**
- 18.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in the Bidder Qualification response template in the system, in sufficient details to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.
- 19. Period of Validity of Bids**
- 19.1 Bids shall remain valid for a period of 90 days after the bid submission (bid preparation and hash submission) deadline prescribed by the Employer unless otherwise **specified in the BDS**.
- 19.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the responses thereto shall be made online through the e-Procurement System.
- 20. Bid Security/Bid Securing Declaration**
- 20.1 The Bidder shall furnish either a subscription to a Bid Securing Declaration or a scanned copy of the Bid Security in its original form with its bid as part of its bid, if so **required in the BDS**. The Bid Security in its original form shall be submitted to the Office of the Public Body by the deadline for submission of bids (Bid preparation and Hash submission)
- 20.2 Bid Security shall be in the form of a Bank Guarantee from a local commercial bank as per the format contained in section III and shall be valid for a period of 30 days beyond the validity period of the bid or beyond any period of extension.
- 20.3 Any bid not accompanied by an enforceable and substantially compliant Bid Security or a subscription to a Bid Securing Declaration in the Bid Submission Template, if required in accordance with ITB 20.1, shall be rejected by the Employer as non-responsive.
- 20.4 Bid Security shall be forfeited or the Bid Securing declaration exercised for non-compliance on the part of the Bidder for reasons mentioned in the Bid Security format contained in Section III or the Bid Suring Declaration contained as

Appendix to the Bid Submission Form.

- 21. Format and Signing of Bid**
- 21.1 The Bidder shall prepare the bid online in the templates provided for, comprising of the bid as described in ITB 13.1
- 21.2 The online bid shall be digitally signed by a person duly authorized to sign on behalf of the Bidder.

D. Submission and Opening of Bids

- 22. Sealing and Marking of Bids**
- 22.1 Bidders may always submit their bids by mail or by hand. Procedures for submission, sealing and marking are as follows:
- (a) Bidders submitting bids by mail or by hand shall enclose the original and each copy of the Bid, including alternative bids, if permitted in accordance with ITB 15, in separate sealed envelopes, duly marking the envelopes as “ORIGINAL”, “ALTERNATIVE” and “COPY.” These envelopes containing the original and the copies shall then be enclosed in one single envelope. The rest of the procedure shall be in accordance with ITB sub-Clauses 22.2.
- 22.2 The inner and outer envelopes shall:
- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer as indicated in ITB 22.1;
- (c) bear the specific identification of this bidding process indicated in accordance with ITB 1.1; and
- (d) bear a warning not to open before the time and date for bid opening.
- 23. Deadline for Submission of Bids**
- 23.1 Bids shall be delivered to the Employer at the address and no later than the time and date **specified in the BDS**.
- The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 10.
- 24. Late Bids**
- 24.1 Late bids shall not be considered. They will be returned unopened
- 25. Withdrawal, Substitution, and Modification of Bids**
- 25.1 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid submission Form or any extension thereof.
- 26. Bid Opening**
- 26.1 The Employer shall open the bids at the time place and address **specified in the BDS** in the presence of Bidders`

designated representatives who choose to attend.

- 26.2 The bidders' names, the Bid Prices, the total amount of each bid, any discounts, any alternative bid, bid modifications and withdrawals, the presence or absence of bid security, and such other details as the Employer may consider appropriate, will be announced and recorded by the Employer at the opening.

E. Evaluation and Comparison of Bids

- 27. Confidentiality**
- 27.1 Information relating to the examination, evaluation, comparison of bids and recommendation of contract award, shall not be disclosed to Bidders or any other person not officially concerned with such process.
- 27.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
- 28. Clarification of Bids**
- 28.1 To assist in the examination, evaluation, and comparison of the bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its bid. No change in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetical errors discovered by the Employer in the evaluation of the bids, in accordance with ITB 31.
- 29. Determination of Responsiveness**
- 29.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB13 including.
- 29.2 A substantially responsive bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission.
- 29.3 The Employer shall examine the technical aspects of the bid submitted in accordance with ITB 18, Technical Proposal, in particular, to confirm that all requirements of Section IV (Employer's Requirements) have been met without any material deviation, reservation or omission.
- 29.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
- 30. Nonconformities, Errors, and Omissions**
- 30.1 Provided that a bid is substantially responsive, the Employer may waive any non-material non-conformity in the bid, request that the Bidder submit the necessary information or documentation, to rectify nonmaterial nonconformities in the bid related to documentation requirements but not related to

any aspect of the price of the bid; and shall rectify quantifiable nonmaterial nonconformities related to the Bid Price.

31. Correction of Arithmetical Errors

31.1 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors on the following basis:

- (a) only for unit price contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
- (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

32. Margin of Preference

32.1 **Unless otherwise specified in the BDS**, Margin of preference shall not apply.

33. Evaluation of Bids

33.1 The Employer shall use the criteria and methodology defined in this clause and no other evaluation criteria or methodologies shall be permitted.

33.2 To evaluate a bid, the Employer shall consider the following:

- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies for admeasurement contracts or Schedule of Prices for lump sum contracts, but including Daywork items, where priced competitively; and
- (b) price adjustment for correction of arithmetic errors, discounts, non-conformities, due to the supplementary criteria as defined in Section IV, and Margin of Preference, if applicable.

33.3 If this Bidding Document allows Bidders to quote separate prices for different contracts, and to award multiple contracts to a single Bidder, the methodology to determine the lowest evaluated price of the contract combinations, including any discount offered in the Bid Submission Form, is specified in

Section IV (Evaluation and Qualification Criteria).

- 33.4 If the bid for an admeasurement contract, which results in the lowest Evaluated Bid Price, is seriously unbalanced, front loaded or substantially below updated estimates or if any item in the Priced Activity Schedule is front loaded or contains an erroneous amount in the opinion of the Employer, the Employer may after clarification require the Bidder to produce detailed price analysis for any or all items that the amount of the performance security be increased at the expense of the Bidder.
- 34. Comparison of Bids** 34.1 The Employer shall compare all substantially responsive bids in accordance with ITB 33 to determine the lowest evaluated bid.
- 35. Qualification of the Bidder** 35.1 The Employer shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated substantially responsive bid meets the qualifying criteria.
- 36. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 36.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders.

F. Award of Contract

- 37. Award Criteria** 37.1 Subject to ITB 36.1, the Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
- 38. Notification of Award** 38.1 Prior to the expiration of the period of bid validity, the Employer shall, for contract amount above the prescribed threshold, notify the selected bidder of the proposed award and accordingly notify unsuccessful bidders online. Subject to Challenge and Appeal the Employer shall notify the selected Bidder, in writing, by a Letter of Acceptance for award of contract. The Letter of Acceptance shall specify the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price") and the requirement for the Contractor to remedy any defects therein as prescribed by the Contract. Within seven days from the issue of Letter of Acceptance, the Employer shall publish on the Public Procurement Portal (publicprocurement.govmu.org) and the Employer's website, the results of the Bidding Process identifying the bid and lot numbers and the following

information:

(i) name of the successful Bidder, and the Price it offered, as well as the duration and summary scope of the contract awarded; and

(ii) an executive summary of the Bid Evaluation Report.

38.2 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

39. Signing of Contract

39.1 Promptly upon issue of Letter of Acceptance, the Employer shall send to the successful Bidder the Contract Agreement.

39.2 Within twenty-one (21) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.

40. Performance Security

40.1 Within twenty-one (21) days of the receipt of the Letter of Acceptance from the Employer, the successful Bidder shall furnish the Performance Security in accordance with the conditions of contract, using for that purpose the Performance Security Form included in Section VIII (Contract Forms).

40.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement within the prescribed delay shall constitute sufficient grounds for the annulment of the award and Forfeiture of the bid security.

Preference Security

40.3 The successful bidder having benefitted from a Margin of Preference shall provide a Preference Security, **as specified in the BDS**. The amount for the Preference Security shall be the difference between the price quoted by the selected bidder and that of the lowest evaluated bid which would have been selected for award of contract, if the said Margin of Preference was not applicable

41. Advance Payment and Security

41.1 The Public Body shall provide an Advance Payment on the Contract Price as stipulated in the GCC, subject to a maximum amount, as stated in the BDS. The Advance Payment shall be guaranteed by a security as per the format contained in Section VIII.

42. Plant and Materials on site

42.1 Unless otherwise **specified in BDS** interim payment for Plant and Material on site is applicable as per GCC 39.7.

43. Debriefing

43.1 The Employer shall promptly attend to all requests for debriefing for the contract, made in writing, and within 30 days from the date of the publication of the award or date the unsuccessful bidders are informed about the award, whichever is the case, by following regulation 9 of the Public Procurement Regulations 2008 as amended.

Section II- Bidding Data Sheet

A. General	
ITB 1.1	<p>The Public Body is: THE DISTRICT COUNCIL OF BLACK RIVER</p> <p>The Works are Resurfacing of roads/Lanes, Construction of New Roads & Related works within The Black River District on an “as and when required basis” following signature of contract</p> <p>The name and identification of the Contract are <i>The Construction and Resurfacing of Roads/Lanes and associated works for a period of 13 months as from June 2019 on an “as and when required basis”– ONB/DBCR/W07/2018-2019</i></p>
ITB 1.2	<p>The Intended Completion period of the works would be specified in works orders which would be issued as and when required within Thirteen (13) months after signature of contract. The value of works which would be allocated to the contractor would be any amount up to a maximum of Rs 15m Excluding VAT</p>
ITB 2.1	<p>The Funding Agency is: The Government of Mauritius</p>
ITB 3.2	<p>The address to file Challenges in respect of this procurement is:</p> <p style="text-align: center;">The Chief Executive, District Council of Black River Geoffroy Road, Bambous</p> <p>(a) The address to file Application for Review is:</p> <p style="text-align: center;">The Chairman Independent Review Panel, 9th Floor, Wing B Emmanuel Anquetil Building Pope Hennessy Street Port Louis Tel : 2013921</p>
ITB 5.4	<p>The list of debarred firms according to the Debarment process may be obtained from the web site of the Procurement Policy Office: ppo.govmu.org</p>
ITB 6.2	<p>The information required from bidders in ITB Sub-Clause 6.2 is modified as follows: none</p>
ITB 6.2 ©	<p>Contractors should have at least 5 years of experience in Civil Engineering.</p>
ITB 6.2 (g)	<p>The assessment of the financial soundness of the company shall be on a pass/fail basis on its overall performance including its profitability.</p>

<p>ITB 6.3 (b)</p>	<p>(A1) The Contractor shall demonstrate that it is registered with the CIDB under the following class(es): Civil Engineering Construction works with a valid registration not below grade F and specialization in the following area(s) Resurfacing works with Hot premixed Asphalt Concrete and Construction of New Roads</p> <p>In case the areas of specialization defined by CIDB do not cover the particular work, the criteria (A2) below shall also apply.</p> <p>(A2) The Contractor shall also demonstrate that it meets experience as prime contractor in the Resurfacing works with Hot mixed Asphalt Concrete and Construction of New Roads of a minimum of 2 works of a nature and complexity equivalent to the Works over a period of 3 years</p>
<p>ITB 6.3 (c)</p>	<p>The essential equipment to be made available for the Contract by the successful Bidder shall be: PAVER, VIBRATING ROLLER 8-10T, VIBRATING ROLLER 1.5-2T, MILLING MACHINE, DUMPERS, LORRIES/TIPPER LORRIES, EXCAVATOR LOADER, WATER PUMP, BITUMEN SPRAYER, ASPHALT CUTTER ,TRANSPORTATION VEHICLES AND ANY OTHER EQUIPMENT REQUIRED FOR THE PROPER EXECUTION OF THE CONTRACT.</p> <p>Particulars as to whether the equipment is owned or on hire have to be specified.</p>
<p>ITB 6.3 (d)</p>	<p>QUALIFICATIONS OF KEY PERSONEL</p> <p>Project Manager: A Civil Engineer registered with the Council of Registered Professional Engineers’ of Mauritius having at least 5years post registration experience.</p> <p>Technical Officer: A Diploma in Building & Civil Engineering having at least 5 years experience in Asphalt works/Civil works</p> <p>Foreman:10 years experience dealing with Asphalt / civil or related works</p>
<p>ITB 6.3 (e)</p>	<p>The minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the successful Bidder shall be Rs 3 million.</p> <p>The Bidder should submit documentary evidence mentioning the name of this project and its Procurement Reference. Non-submission of the supporting document may lead to rejection of the bids.</p> <p>Documentary evidence may comprise but not limited to:-</p> <ol style="list-style-type: none"> (1) Bank Certificate (2) Certificate from Auditors (3) Certificate from a Professional Registered Accountant

ITB 8.1	The Public Body's address for clarification is: The Chief Executive Officer, District Council of Black River, Geoffroy Road, Bambous
B. Bidding Documents	
ITB 9.2	A pre-bid meeting has been scheduled for <i>Not Applicable</i>
C. Preparation of Bids	
ITB 13.1 (f)	Any additional materials required to be completed and submitted by the Bidders are <i>NONE</i>
ITB 15.1	(a) Alternative bids " <i>shall not be</i> " permitted. (b) Alternative times for completion " <i>shall not be</i> " permitted. (c) Alternative Technical Proposal " <i>shall not be</i> " permitted.
ITB 17.1	The Contract is not subject to price adjustment in accordance with GCC Clause 44.
ITB 17.2	Interim Payment for Plant and Material on site " is not " applicable.
ITB 19.1	The Bid shall be valid for 90 DAYS after the deadline set for the submission of bid, the deadline being counted as day one of the validity period.
ITB 20.1	<ul style="list-style-type: none"> • No Bid Security is required. • Bid shall include a subscription to a Bid Securing Declaration
D. Submission of Bids	
ITB 23.1	The deadline for submission of bids shall be <u>Thursday 06 JUNE 2019 up to 12.00 hours (Local Time) at latest.</u>
	The Employer's address for the purpose of Bid submission is Attention: The Chief Executive Officer, District Council of Black River, Geoffroy Road, Bambous

E. Evaluation and Comparison of Bids	
ITB 26.1	<p>The bid opening shall take place at:</p> <p><u>Council Room 1st Floor, the District Council of Black River, Geoffroy Road, Bambous on Thursday 06 June 2019 at 12h30</u></p> <p>The bidders' representatives who are present shall sign a register evidencing their attendance.</p>
ITB 32	<p>32.1 A Margin of Preference shall apply as defined hereunder and in Section IV-Evaluation Criteria.</p> <p>The following procedure shall be used to apply the Margin of Preference:</p> <p>(a) responsive bids shall be classified into the following groups:</p> <ul style="list-style-type: none"> • Group A: bids offered by bidders meeting the conditions satisfying eligibility for a Margin of Preference, and • Group B: all other bids; <p>(b) for the purpose of further evaluation and comparison of bids only, all bids classified in Group B shall be increased by the percentage(s) of preference allocated to those in group A.</p> <p>32.2 Bidders applying for the Margin of Preference shall submit, as part of their bidding documents evidence of:</p> <p>(a) their incorporation in the Republic of Mauritius;</p> <p>(b) their Joint Venture Agreement or intention to legally enter into a Joint Venture Agreement to be incorporated in the Republic of Mauritius, where applicable;</p> <p>(c) the percentage of the total man-days to be deployed by local manpower with break-down indicating type of works to be entrusted to the local manpower.</p> <p>(d) A financial statement signed by a Professional Accountant duly registered with the Mauritius Institute of Professional Accountant (MIPA) vouching that the annual turn-over of the local Small and Medium enterprise (where applicable) does not exceed Rs 50M.</p> <p>(e) their deployment of manpower to demonstrate how they will undertake to employ the local manpower for the project. The evidence may include the number of existing employees that will be involved in the project and the number of workers that may be hired temporarily. <i>Non-submission of the evidence may entail non-eligibility of the bidder for margin of preference.</i></p>

F. Award of Contract	
ITB 40.1	The Standard Form of Performance Security acceptable to the Public Body shall be “a Bank Guarantee”. The Bank guarantee shall be for an amount of Rs 1.5m.
ITB 41	The Advance Payment shall be limited to <i>[insert percentage]</i> percent of the Contract Price less the provisional and contingencies sums. <i>[Usually 10 to 20 percent of the Contract Price. The amount shall be adequate to minimize the needs of the Contractor to borrow money for the Contract.]</i>
ITB 42.1	Interim Payment for Plant and Material on site [“is” or “is not “] applicable Not Applicable <i>[If payment for plant and material on site is applicable the Public Body may insert the list of items for which payment is applicable, as appropriate.]</i>

Section III - Bidding Forms

Table of Forms

Bid Submission Form	284
Qualification Information	328
Bill of Quantities	60
Form of Bid Security (Bank Guarantee)	61

Bid Submission Form

The Bidder must prepare the Bid Submission Form on stationery with its letterhead clearly showing the Bidder's complete name and address.

Note: All italicized text is for use in preparing these form and shall be deleted from the final document.

Date: _____
 Bidder's Reference No.: _____
 Procurement Reference No.:

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 10;
- (b) We offer to execute in conformity with the Bidding Documents the following Works:
 _____;
- (c) The rates are as given in **Bill of Quantities - Price Activity Schedule -Schedule of Rates**;
- (d) The discounts offered and the methodology for their application are:

 _____;
- (e) Our bid shall be valid for a period of **90 days** from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) We hereby confirm that we have read and understood the content of the Bid Securing Declaration attached hereto and subscribe fully to the terms and conditions contained therein, if required. We understand that non-compliance to the conditions mentioned may lead to disqualification.
- (g) If our bid is accepted, we commit to obtain a Performance Security and a Preference Security (if applicable) in accordance with the Bidding Document;
- (h) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 5.4;

- (i) We are not participating, as a Bidder in more than one bid in this bidding process other than alternative offers submitted in accordance with ITB 15;
- (j) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible under the laws of Mauritius;
- (k) We are not a government owned entity / We are a government owned entity but meet the requirements of ITB 5.4;⁶
- (l) We have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption as per the principles described hereunder, during the bidding process and contract execution:
 - i. We shall not, directly or through any other person or firm, offer, promise or give to any of the Public Body's employees involved in the bidding process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
 - ii. We shall not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelisation in the bidding process.
 - iii. We shall not use falsified documents, erroneous data or deliberately not disclose requested facts to obtain a benefit in a procurement proceeding.

We understand that transgression of the above is a serious offence and appropriate actions will be taken against such bidders.

- (m) We understand that this bid, together with your written acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive; and
- (o) If awarded the contract, the person named below shall act as Contractor's Representative:

⁶ Use one of the two options as appropriate.

Name:

In the capacity of:

Signed:

Duly authorized to
sign the Bid for and
on behalf of:

Date:

Seal of Company

Appendix to Bid Submission Form

Bid Securing Declaration

By subscribing to the undertaking in respect of paragraph (f) of the Bid Submission form:

I/We* accept that I/we* may be disqualified from bidding for any contract with any Public Body for the period of time that may be determined by the Procurement Policy Office under section 35 of the Public Procurement Act, if I am/we are* in breach of any obligation under the bid conditions, because I/we*:

- (a) have modified or withdrawn my/our* Bid after the deadline for submission of bids during the period of bid validity specified by the Bidder in the Letter of Bid; or
- (b) have refused to accept a correction of an error appearing on the face of the Bid; or
- (c) having been notified of the acceptance of our Bid by the (*insert name of public body*) during the period of bid validity, (i) have failed or refused to execute the Contract, if required, or (ii) have failed or refused to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We* understand this Bid Securing Declaration shall cease to be valid (a) in case I/we am/are the successful bidder, upon our receipt of copies of the contract signed by you and the Performance Security issued to you by me/us ; or (b) if I am/we are* not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our* Bid.

In case of a Joint Venture, all the partners of the Joint Venture shall be jointly and severally liable.

Qualification Information

*[The information to be filled in by **bidders** in the following pages shall be used for purposes of post-qualification or for verification of prequalification as provided for in ITB Clause 6. This information shall not be incorporated in the Contract. Attach additional pages as necessary. Pertinent sections of attached documents should be translated into English. If used for prequalification verification, the Bidder should fill in updated information only.]*

1. Individual Bidders or Individual Members of Joint Ventures

- 1.1 Constitution or legal status of Bidder: *[attach copy]*
- Place of registration: *[insert]*
- Principal place of business: *[insert]*
- Valid Registration certificate from the CIDB: *[attach copy]*
- Evidence of signatory authorized to sign the bid (if applicable): *[attach]*

1.2 Where the specialization category for which the Bidder is required to be registered does not cover adequately the specialization required for the works Bidder shall provide *[insert number]* of works of a nature and amount similar to the Works performed as prime Contractor over the last *[insert number]* years. *[Also list details of work under way or committed, including expected completion date(s).]*

Project/Contract name and country	Name of client and contact person	Type of work performed and year of completion	Value of contract (national currency)
(a)			
(b)			

- 1.3 Major items of Contractor's Equipment proposed for carrying out the Works. *[List all information requested below. Refer also to ITB Sub-Clause 6.3 (c).]*

Item of equipment	Description, make, and age (years)	Condition (new, good, poor) and number available	Owned, leased (from whom?), or to be purchased (from whom?)
(a)			
(b)			

- 1.4 Qualifications and experience of key personnel proposed for administration and execution of the Contract. *[Attach biographical data. Refer also to ITB Sub-Clause 6.3 (d).]*

Position	Name	Years of experience (general)	Years of experience in proposed position
(a)			
(b)			

1.5 Proposed subcontracts and firms involved. Refer to General Conditions of Contract Clause 7.

Sections of the Works	Value of subcontract	Subcontractor (name and address)	Experience in similar work
(a)			
(b)			

[Bidders have to ascertain that sub-contractors executing works of amount Rs 500 000 are duly registered with the CIDB in accordance with CIDB Act 2016.]

1.6 Financial reports for the last *[insert number; usually 3]* years: Financial Statements, Audited Accounts, etc. *[List below and attach copies.]*⁷

1.7 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of support documents.

1.8 Name, address, and telephone, telex, and facsimile numbers of banks that may provide references if contacted by the Public Body.

1.9 Information on current litigation(s) in which the Bidder is involved.

Other party(ies)	Cause of dispute	Amount involved
(a)		
(b)		

1.10 Statement of compliance with the requirements of ITB Sub-Clause 5.3.

1.11 Proposed program (service work and schedule). Description, drawings and charts, as necessary, to comply with the requirement of the bidding documents.

⁸*In lump sum contracts, the "Bill of Quantities" is prepared for information; it is not contractual. The contractual document prepared by the Bidder shall be a "Schedule of Activities."*

- 2. Joint Ventures**
- 2.1 The information listed in 1.1 - 1.9 above shall be provided for each partner of the joint venture.
 - 2.2 The information in 1.11 above shall be provided for the joint venture.
 - 2.3 Attach the power of attorney or other acceptable document of the signatory (ies) of the Bid authorizing signature of the Bid on behalf of the joint venture.
 - 2.4 Attach the Agreement among all partners of the joint venture (and which is legally binding on all partners), which shows that
 - (a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
 - (b) one of the partners will be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and
 - (c) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.
- 3. Additional Requirements**
- 3.1 Bidders should provide any additional information requested in the Bidding Document.

Bill of Quantities⁸

Objectives

The objectives of the Bill of Quantities are:

1. (a) to provide sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately; and
2. (b) When a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and contents of the Bill of Quantities should be as simple and brief as possible.

Dayworks Schedule

A Dayworks Schedule should be included only if the probability of unforeseen work, outside the items included in the Bill of Quantities, is high. To facilitate checking by the Public Body of the realism of rates quoted by the bidders, the Dayworks Schedule should normally comprise the following:

1. (a) A list of the various classes of labor, materials, and Constructional Plant for which basic day work rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor shall be paid for work executed on a day work basis.
2. (b) Nominal quantities for each item of day work, to be priced by each Bidder at day work rates as Bid. The rate to be entered by the Bidder against each basic day work item should include the Contractor's profit, overheads, supervision, and other charges.

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary priced Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the Particular Conditions of Contract should state the manner in which they shall be used, and under whose authority (usually the Employer's Representative).

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors (refer to GCC Clause 8) should be indicated in the relevant

⁸*In lump sum contracts, the "Bill of Quantities" is prepared for information; it is not contractual. The contractual document prepared by the Bidder shall be a "Schedule of Activities."*

part of the Bill of Quantities as a particular provisional sum with an appropriate brief

⁹In lump sum contracts, the “Bill of Quantities” is prepared for information; it is not contractual. The contractual document prepared by the Bidder shall be a “Schedule of Activities.”

Section III- Bidding Forms 31

PRICED ACTIVITY SCHEDULE

Complete the unit prices (rate) for each item listed below. Authorise the prices quoted in the signature block below.

Schedule of Rates

Item No	Description	Unit of Measure	Rate Incl of VAT (Rs)
1	EXCAVATION FOR TRIAL PITS (ON ROADS)	m ³	
2	EXCAVATION IN ANY MATERIAL	m ³	
3	<p>SCARIFICATION AND COMPACTION</p> <p>The price quoted for this item shall include:- Scarifying (to a depth of 200mm), loosening and digging of any material from carriageway, shoulder, verge including topsoil; Clearance and demolition of existing concrete kerbs, dry stone kerbs or walls bordering the carriageway; Loading and carting away of excess materials to any distance or as directed by the Engineer; Shaping and compaction of the bottom of the excavation to 90% B.S. Heavy Compaction or as directed by the Engineer and any miscellaneous costs arising.</p>	m ³	
4	<p>MILLING OF ASPHALTIC CONCRETE SURFACE DEPTH NOT EXCEEDING 70MM</p> <p>Milling of road pavement on a thickness of 70mm and carting away of any excess material.</p>	m ²	
5	CUT TO FILL	m ³	
6	SPALLS 200-300MM	m ³	
7	GRADED HARDCORE FILLING 0-100MM	m ³	
8	ROAD BASE/ CRUSHER RUN	m ³	
9	ROAD BASE/ CRUSHER RUN WITH PRIME COAT	m ³	

Item No	Description	Unit of Measure	Rate Incl of VAT (Rs)
10	ASPHALTIC CONCRETE BASE COURSE FOR RESHAPING EXCEEDING 25MM THICK	TON	
11	<p>BITUMINOUS CONCRETE WEARING COURSE (0/10) WITH BINDER CONTENT 6% (40 mm thick)</p> <p>The price quoted for this item shall include:- Preparatory works on the road being constructed which shall include sweeping and carting away to any distance of all materials to be disposed of; Supply, transport and spraying primer/tack coat at the rate of 0.6 kg/m² of cut-back bitumen as per specification; The supply and transport of bitumen, washed aggregates and filler to the Asphalt Plant; Making the asphalt concrete as per specification; Transporting the asphalt concrete to the site; Spraying, compacting and smoothing the asphalt concrete as per specification, including on narrow surfaces and other areas where this has to be done by hand; Trimming of the edges and any miscellaneous cost, which may arise.</p> <p><i>Rate to include for cores to be taken and tested as directed by the Engineer along each constructed roads).</i></p>	m2	
12	<p>PRECAST (OR CAST IN-SITU) CONCRETE KERBS</p> <p>The price quoted for this item shall include: - Excavation in any material, including rock; Carting away of excess excavated materials; Supplying, fixing/placing of formwork, reinforcement and concrete including for blinding concrete; Curing of concrete; Striking of formwork; Back-filing and smoothing as required.</p>		
12(A)	Kerb K1	M	
12(B)	Kerb K2	M	
12(C)	Kerb K3	M	
12(D)	Kerb K4	M	
13	SUPPLY AND PLACE GEOTEXTILE	m2	

Item No	Description	Unit of Measure	Rate Incl of VAT (Rs)
14	<p>FELL TREES AND REMOVE STUMPS</p> <p>The price quoted for this item shall include:-</p> <p>Liaison with Forestry Department for clearance for felling of trees (List of trees to be approved by the Engineer).</p> <p>Felling of trees and grubbing up roots;</p> <p>Clearing away felled trees and roots to stock pile or spoil tips as directed by the Engineer or disposed of by burning in areas approved by the Engineer.</p> <p>Back-filling of holes left by the roots with compacted materials approved by the Engineer to existing ground level or subgrade level and</p> <p>Any miscellaneous cost which may arise.</p>		
14(A)	Diameter 100-150mm	No.	
14(B)	Diameter 151-200mm	No.	
14(C)	Diameter above 200mm	No.	
15	<p>DEMOLITION OF MASONRY STRUCTURES, CONCRETE STRUCTURES, STONES KERBS AND WALLS</p> <p>The price quoted for this item shall include:</p> <p>Demolition of reinforced or unreinforced concrete or masonry structures including blockwall, masonry walls, concrete drains, hydraulic structures;</p> <p>Removal and transport of material to any distance to spoil tips as located by Contractor and approved by Engineer;</p> <p>Possible recuperation and reuse of demolished materials according to Engineer's instructions and;</p> <p>Any miscellaneous cost which may arise.</p>	M ³	
16	<p>REINFORCED CONCRETE STRUCTURES</p> <p>The prices quoted for this item shall include:-</p> <p>Preparatory works including any demolition or hacking of existing structure;</p> <p>Excavation in any material including rock and removal of water for dry work;</p> <p>Supply of all necessary plants and materials as per requirements and specification;</p> <p>Erection of necessary form-work,</p> <p>Supply, cutting, bending and placing into position of reinforcement as per specification;</p> <p>Mixing, placing and curing of concrete as per specification;</p> <p>Striking of formwork and</p> <p>Any miscellaneous costs arising.</p>		
16(A)	BLINDING CONCRETE (CLASS 15)	M ³	

Item No	Description	Unit of Measure	Rate Incl of VAT (Rs)
16(B)	CLASS 25 STRUCTURAL CONCRETE	M ³	
16(C)	FORMWORK	M ²	
16(D)	HIGH TENSILE REINFORCEMENT	KG	
17	<p>BLOCK WALLS</p> <p>The price quoted for this item shall include:-</p> <p>Excavation in any material including rock and removal of water for dry work; Supply of material and plant; Mixing and placing of mortar and concrete; Supply and placing of 150 mm concrete blocks; Placing blinding concrete, strip footing, R.C. column at 3 mm spacing, concrete coping; Rendering of all surfaces surface and Any miscellaneous cost which may arise.</p>	M ²	
18	<p>MASONRY STRUCTURE</p> <p>The price quoted for this item shall include:-</p> <p>Excavation in any material, including rock; Supply of necessary materials and plant on site; Mixing, of cement mortar and concrete as per specification; Mixing and placing of concrete strip footing and coping; Supply, cutting and placing of sound stones for masonry works to lines and levels and Any miscellaneous cost arising.</p>	M ³	
19	<p>CONCRETE FOOTPATHS</p> <p>The price quoted for this item shall include:-</p> <p>Supply, spread, level and compact 150mm thick crusher run 0/20 including application of binder. Supply and Placing of 150mm thick Class 20 concrete including fixing of A252 mesh. Provide joints as directed by the Engineer and Any miscellaneous cost arising.</p>	M ²	

Item No	Description	Unit of Measure	Rate Incl of VAT (Rs)
20	<p>MANHOLE RAISING</p> <p>The price quoted for this item shall include:-</p> <p>Excavation in any type of material; Demolition of the any headwork or supporting slab or re-working the outer edge of the existing man-hole Supply on site of all the necessary plant and materials, erecting the formwork, fixing the reinforcement and placing the concrete as per specification; Curing of the concrete; Striking the formwork; Placing and adjusting the covers; Clearing the site and Trimming of the edges and Any miscellaneous cost which may arise.</p>		
20(A)	manholes where the internal size of the chamber is less than or equal to 800 mm	NOS	
20(B)	manholes where the internal size of the chamber is greater than 800 mm	NOS	
21	<p>DRAIN RAISING</p> <p>The prices quoted for this item shall include:-</p> <p>Excavation in any type of material; Demolition of the any headwork or supporting slab or re-working the outer edge of the existing; Supply on site of all the necessary plant and materials, erecting the formwork, fixing the reinforcement and placing the concrete as per specification; Curing of the concrete; Striking the formwork; Placing and adjusting the covers; Clearing the site and; Trimming of the edges and Any miscellaneous cost which may arise</p>	m	
22	<p>ROAD MARKING</p> <p>The price quoted for this item shall include:-</p> <p>Preliminary cleaning and marking out the pavement; Supply of road marking material and plant as per specification; Supply of traffic cones, temporary traffic signs for the proper regulation of traffic as directed by the Engineer; Painting the road surface as directed by the Engineer and Any miscellaneous cost, which may arise.</p>		
(A)	White hot melt thermoplastic 1.5 mm thick.	m	
(B)	Yellow hot melt thermoplastic 1.5 mm thick.	m	

Item No	Description	Unit of Measure	Rate Incl of VAT (Rs)
(C)	White chlorinated rubber paint road marking	m	
(D)	Yellow chlorinated rubber paint road marking	m	

THE QUANTITIES MENTIONED IN THE BILL OF QUANTITIES ARE INDICATIVE AND MAY INCREASE OR DECREASE. HOWEVER, THE CONTRACT AMOUNT SHALL NOT EXCEED RS 15,000,000.00

Rates shall include all labour, materials, VAT, taxes, charges, watchmanship, scaffolding, security measures, constructional plant, temporary access, temporary works, liaising with relevant authorities such as NTA, CWA, CEB, Wastewater Authority, Mauritius Telecom, Fire services, Police Force etc for placing of lanterns at night and all other requirements to carry out the works in accordance with the specifications and drawings including excavation, transport, carting away of debris, etc.

Note: In case roads are not accessible by paver, the works are to be carried out manually that is asphalt concrete to be spread manually and properly rolled

Note: (1) Rates quoted to include preliminary & General costs.

- (2) The Priced Activity Schedule is not and does not purport to be either exhaustive or explanatory of all the obligations and duties of the contractor who shall be deemed to have satisfied himself as to the correctness and sufficiency of the rates and prices stated in the Priced Activity Schedule, all of which shall cover all his obligations under the contract and all matters and things necessary for the proper execution and completion of the works.
- (3) The contractor shall be deemed to have inserted against each item in the Priced Activity schedule such rates and prices as he may deem necessary to cover the requirements of the contract.
- (4) Where the Priced Activity schedule does not include separate items for the Contractor's equipment and temporary works, the contractor shall be deemed to have covered his obligations in these respects in the rates and prices for permanent works.

THE BID SHALL BE CONSIDERED NON-RESPONSIVE FOR:

1. Non-Submission of rates, or
2. Incomplete Submission of rates; or
3. Any modification/tampering of the quantities unless instructed so through an Addendum

Bill of Quantities – Priced Activity Schedule – Schedule of Rates
Authorised by:

Name:		Signature:	
Position:		Date:	
Authorised for and on behalf of:	Company		
Tel No.:			
Fax No.:			

***SCHEDULE OF
DAYWORK***

DAYWORK SCHEDULES

PLANT

The rates to be inserted herein are to include all operational maintenance costs including fuel, oil, grease, spare parts, repairs, any extra costs of overtime and all superintendence, overheads and profit. The rates shall also include for all travelling time and costs for the plant operators, etc, to, from and about the site. Idle time where due solely to the nature of the dayworks or the authorised method of procedure will be paid for at ½ (one half) of the rates entered herein. Idle time due to breakdowns, inefficiency or unsuitability or incompleteness of the plant will not be paid.

ITEM	DESCRIPTION	UNIT	RATE (Rs)
1.	ASPHALT PAVER	Hour	
2.	TRAILER & TRACTOR	Hour	
3.	PICK-UP TRUCK – 1 T	Hour	
4.	TIPPER TRUCK – 7 T	Hour	
5.	WATER BAUSER	Hour	
6.	COMPRESSOR	Hour	
7.	TOOLS FOR COMPRESSOR	Hour	
8.	TANDEM ROLLER 6 –8 T	Hour	
9.	-DO – 10 – 12 T	Hour	
10.	PNEUNATIC ROLLER 10 – 15 T	Hour	
11.	VIBRATING ROLLER 3.5 T	Hour	
12.	-DO - HAND PROPELLED	Hour	
13.	CONCRETE MIXER WITH WGT BATCHER	Hour	
14.	DUMPER - 1 T	Hour	
15.	POKER VIBRATOR	Hour	
16.	POWER FLOAT	Hour	
17.	TAR SPRAYER 4500 LITRES	Hour	
18.	PUMP & MOTOR 50 mm	Hour	
19.	-DO – 75 mm	Hour	
20.	BACKACTOR WITH GRAB	Hour	
21.	CUTTING EQUIPMENT	Hour	
22.	MOBILE CRANE	Hour	
23.	LORRY WITH SERVICE PLATFORM	Hour	
24.	GENERATOR	Hour	
25.	POWER HAND TOOLS	Hour	

Signature :

Date :

DAYWORK SCHEDULES

MATERIALS

The materials are to be all to the quantities and descriptions stated in the specifications. The rates inserted herein are to include all loading, transport, unloading, storage, double-handling, fixing, laying, placing, spreading to specifications on site etc. , together with all overheads and profit. Payment for materials authorised by the Engineer for use on dayworks and not included in the following items shall be at net invoice costs received for supply and delivery to a central store or stockpile area on site. The net quantities and weights actually used and verified by the Engineer only shall be certified and paid under dayworks.

ITEM	DESCRIPTION	UNIT	RATE (Rs)
1.	PORTLAND CEMENT	T	
2.	LIME	T	
3.	COARSE AGGREGATE ANY SIZE	m ³	
4.	SAND OR FINE AGGREGATE	m ³	
5.	CRUSHER RUN 0/20	m ³	
6.	CRUSHER RUN 0/31.5	m ³	
7.	BITUMEN RC 70	Kg	
8.	BITUMEN MC 30	Kg	
9.	BITUMEN 60/70	Kg	
10.	MILD STEEL BARS	T	
11.	HIGH YIELD STEEL BARS	T	
12.	TIMBER FOR SHUTTERING	m ³	
13.	CRUSHER RUN	m ³	

Signature :

Date :

DAYWORK SCHEDULES**LABOUR**

The rates inserted herein are to include all costs of labour and maintenance of tools and small plants such as scaffolding, trestles, wheelbarrows, picks, shovels, handpumps, etc, any extra costs of overtime, insurances, accommodation, travelling time and expenses to , from and about the site, etc; together with all superintendence, overheads and profit.

ITEM	DESCRIPTION	UNIT	RATE (Rs)
1.	UNSKILLED LABOUR	Hour	
2.	SKILLED LABOUR	Hour	
3.	STEEL FIXER	Hour	
4.	MASON	Hour	
5.	CARPENTER	Hour	
6.	PIPE LAYER	Hour	

Signature :

Date :

DAYWORK SCHEDULES**ALL – IN – RATES**

For all materials, manufacture and delivery to site including laying, spreading and finishing as required.

ITEM	DESCRIPTION	UNIT	RATE (Rs)
1.	BITUMINOUS CONCRETE 0/14	Tonnes	
2.	BITUMINOUS CONCRETE 0/10	Tonnes	
3.	CONCRETE CLASS 15(40)	m ³	
4.	CONCRETE CLASS 20(20)	m ³	
5.	CONCRETE CLASS 25(20)	m ³	
6.	CONCRETE CLASS 30(20)	m ³	

Signature :

Date :

Priced Activity Schedule Authorised By:

Name:		Signature:	
Position:		Date:	

LIST OF PRICE

ITEM 1 – EXCAVATION FOR TRIAL PITS (ON ROADS)

This price includes the following.

- Loosening and digging in all materials including rock to expose existing services.
- Protection of these existing service
- Traffic control inclusive of all necessary signage
- Backfilling, Compaction and reinstatement of asphalt on completion to original condition or as required by the relevant Authorities,
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE**.

ITEM 2 – EXCAVATION IN ANY MATERIAL

This price includes the following.

- Clearing of site where necessary inclusive of removal of trees up to 0.3m girth
- Loosening, digging, trimming and levelling in all materials including rock and existing concrete or masonry drains/structures to line and level.
- Loading, carting away and disposal of all excess material to stockpile as instructed by the Engineer or to spoil tips located by the contractor and approved by the Engineer.
- Shaping and Compaction of the bottom of the excavation to 90% BS Heavy Compaction.
- Any Miscellaneous cost arising from due to the presence of existing services etc., but excluding the realignment of the existing services.
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE**.

ITEM 3 – SCARIFICATION AND COMPACTION

This price includes the following.

- Clearing of site, scarification up to a depth of 200mm, loosening and digging of any material from carriageway, shoulder or verge including topsoil.
- Loading, carting away and disposal of all excess material to stockpile as instructed by the Engineer or to spoil tips located by the contractor and approved by the Engineer.
- Shaping and Compaction of the subgrade to 90% BS Heavy Compaction or as directed by the Engineer.
- Any Miscellaneous costs arising
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE**.

ITEM 4 – MILLING OF ASPHALTIC CONCRETE SURFACE DEPTH NOT EXCEEDING 70MM

This price includes the following.

- Core sampling to determine thickness of damaged asphalt to be milled, where required.
- Cutting of existing asphaltic concrete neatly in straight lines with diamond tipped circular power saw or other method acceptable by the Engineer.
- Milling of asphaltic concrete surface to depth to be instructed by the Engineer but not exceeding 70mm, using **Milling Machine**
- Cleaning of milled surface to receive asphaltic concrete.
- Disposal of excess material to spoil tip as located by Contractor and Approved by Engineer.
- Possible recuperation and re-use of milled material according to Engineer's Instruction.
- Adequate surface preparation prior to spaying of tack coat.
- All Associated Preliminary and General Items.

The unit of measurement shall be **SQUARE METRE**.

ITEM 5 – CUT TO FILL

This price includes the following.

- Clearing of site and levelling of site where necessary inclusive of removal of trees up to 0.3m girth
- Loosening, digging, trimming and levelling in all material including rock
- Carry out Topographical surveys/mass-haul diagrams of the project and submit to the Engineer.
- Select suitable material for Fill.
- Hauling any distance suitable excavated materials, watering, and compaction to the lines and levels shown on the drawings or as directed by the Engineer.
- Breaking down of rocks and boulders to a maximum size of 100mm.
- Drainage of rain water and maintenance prior to laying of road bases.
- Any Miscellaneous costs arising
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE**.

ITEM 6 – SPALLS 200-300mm

This price includes the following.

- Excavation to be measured separately
- Supply and install rock spalls 200-300mm in size
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE**.

ITEM 7 – GRADED HARDCORE FILLING (0-100mm)

This price includes the following.

- Excavation to be measured separately
- Supply and transport to site as required and lay granulated crushed stone subbase 0-100mm in size as per specification.
- Fills to be approved by the Engineer.
- Levelling the surface (Whatever the condition) to the lines and levels as directed and compaction.
- Perform Benkelman Beam Deflection test, if required by the Engineer.
- Spreading out in layers, watering and compaction according to Specifications.
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE**.

ITEM 8 – ROAD BASE/CRUSHER RUN (0-20mm)

This price includes the following.

- Supply and transport to site as required and lay graded crusher run 0/20 in size as per specification.
- Levelling the surface (Whatever the condition) to the lines and levels as directed and compaction.
- Spreading out to 150mm thick, watering and compaction according to specification.
- Perform Benkelman Beam Deflection test, if required by the Engineer.
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE** placed after compaction.

ITEM 9 – ROAD BASE/CRUSHER RUN (0-20mm) WITH PRIME COAT

This price includes the following.

- Supply and transport to site as required and lay graded crusher run 0/20 in size, spraying the prime coat as per specification.
- Levelling the surface (Whatever the condition) to the lines and levels as directed and compaction.
- Spreading out to 150mm thick, watering and compaction according to specification.
- Perform Benkelman Beam Deflection test, if required by the Engineer.
- All associated Preliminary and General Items

The unit of measurement shall be **CUBIC METRE** placed after compaction.

ITEM 10 – SUPPLY AND LAY ASPHALTIC CONCRETE BASE COURSE 0/14 FOR RESHAPING WITH 4.5% TOTAL MIX BINDER CONTENT

This price includes the following.

- Preparatory works on the road to be reshaped including sweeping and carting away to any distance of all material to be disposed off site.
- Spaying of tack coat at the rate of 0.6 Kg/m²
- Supplying and transport to site of asphaltic concrete to a minimum thickness of 25mm
- Laying, Compacting and levelling the asphaltic concrete to lines and levels for any width including narrow surfaces and other areas by hand and trimming of the edges.
- All associated Preliminary and General Items

The unit of measurement shall be **TONNE**

ITEM 11 – SUPPLY AND LAY ASPHALTIC CONCRETE WEARING COURSE 0/10 WITH 6% TOTAL MIX BINDER CONTENT.

This price includes the following.

- Spraying tack coat at the rate of 0.6 Kg/m² of cutback bitumen.
- Supplying and transport to site of asphaltic concrete 0/10 according to specification.
- Laying, Compacting and levelling a layer of 40mm thick (minimum) of asphaltic concrete and levels for any width as shown on drawings and trimming of the edges.
- Reshaping thickness of wearing course to fill irregularities or depressions.
- All associated Preliminary and General Items

The unit of measurement shall be **SQUARE METRE**

ITEM 12 – SUPPLY AND LAY KERBS TYPE K1, K2, K3 and K4

This price includes the following.

- Excavation in all materials including rocks.
- Removing all excess excavated material from site.
- Supplying and Fixing of precast concrete kerbs to line and level; and casting of concrete hunching in-situ
- Test to be performed as per specifications and submitted to Engineer.
- Backfilling of excavations and reinstatement behind kerbs to required levels.
- Any other miscellaneous costs such as joint filling, etc.
- All associated Preliminary and General Items

The unit of measurement shall be **LINEAR METRE**

ITEM 13 – SUPPLY AND LAY GEOTEXTILE

This price includes the following.

- Supplying, transport to site, cut and lay geotextile as specified.
- All associated Preliminary and General Items.

The geotextile used in the works shall:

- I. sustain a tensile load of not less than 5 KN/m at break and have a minimum failure strain of 10% when determined in accordance with BS 6906: Part 1;
- II have a minimum puncture resistance of 1200N when determined in accordance with BS 6906: Part 4;
- III have a minimum tear resistance of 200N when determined in accordance with ASTM Standard D4533-85;
- IV have a size distribution of pore openings in accordance with BS 6906: Part 2, or other appropriate
- V allow water through it, in either direction, normal to its principal plane under a constant head of water of 100mm and a maximum breakthrough head of 50mm when determined in accordance with BS 6906: Part 3.

The unit of measurement shall be **SQUARE METRE**, placed after cutting and overlapping to manufacturer's and Engineer's Specification.

ITEM 14 – FELLS TREES AND REMOVE STUMPS

This price includes the following.

- Liaison with Forestry Department for clearance for felling trees
- Felling of trees and grubbing up roots
- Clearing away felled trees and roots to stockpile or spoil tips as directed by Engineer or disposed in areas approved by the Engineer.
- Backfilling of holes left by the roots with compacted material approved by the Engineer to existing ground level or subgrade level.
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **Nos.**

ITEM 15 – DEMOLITION OF MASONRY STRUCTURE, CONCRETE STRUCTURE, STONES KERBS AND WALLS

This price includes the following.

- Demolition of reinforced or unreinforced concrete or masonry structure including blockwalls
- Loading, carting away and disposal of all excess material to approved spoil trips.
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **CUBIC METRE**

ITEM 16– REINFORCED CONCRETE STRUCTURE

This price includes the following.

- Blinding Concrete Class 15/20 and Class 25/20
 - Preparatory works including scabbling of existing structure
 - Supply of all necessary plant and material in accordance with specification
 - Mixing, placing, testing and curing of concrete in accordance to specifications.
 - All Screeding to line & Levels.
- Formwork
 - Erection of necessary formwork to unexposed face
 - Cleaning and any other preparation requirements.\
 - Striking and removal of Formwork.
 - Necessary scaffolding, support , etc (as per laws in force In Mauritius)
- Reinforcement
 - Supply, cutting, bending and placing into position of reinforcement in accordance with specifications and drawings including spacer blocks, stools, laps , etc
 - Preparation and submission of bar bending schedule, if required by the Engineer.
 - Reinforcement to be free of any grease, oil, rust or any foreign material.
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **CUBIC METRE for concrete, SQUARE METRE for Formwork and KILOGRAM for reinforcement.**

ITEM 17 – BLOCKWALLS

This price includes the following.

- Excavation in any material including rock and removal of water for dry work
- Supply of material and plants
- Mixing and placing of mortar and concrete.
- Supply and placing 150mm wide concrete blocks, height above ground not exceeding 2.0m
- Placing of Blinding concrete, strip footing, RC Columns at 3m spacing and concrete coping.
- Rendering of all surface 12mm thick
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **SQUARE METRE**

ITEM 18 – MASONRY WALL

This price includes the following.

- Excavation in any material including rock and removal of water for dry work
- Supply, cutting and placing of approved rock for masonry works to line and level on concrete base.
- Backfilling and reinstatement behind completed wall
- Supply and place 75mm diameter class 6 uPVC weepholes one for every 4 sqm as per drawings including geotextile + Coarse Aggregate.
- Supply and place 75mm thick concrete coping layer + reinforcement
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **CUBIC METRE**

ITEM 19 – CONCRETE FOOTPATHS

This price includes the following.

- Supply, spread, level and compact 150mm thick crusher run 0/20 including application of binder
- Supply and placing 150mm thick class 20 concrete including of fixing A252 mesh
- Provide joints as directed by the Engineer.
- Place Polyethylene plastic sheet 2.5mm thick as instructed by the Engineer
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **CUBIC METRE**

ITEM 20 – MANHOLE RAISING

This price includes the following.

- Excavation in any type of material and removal of existing cover
- Demolition of any headwork or supporting slab or re-working the other edge of the existing manhole.
- Supply on site of all the necessary plant and material, erection of formwork fixing of reinforcement and placing of concrete.
- Curing of concrete and striking of formwork
- Replacing and adjusting cover to suit new road profile.
- Clearing of site, trimming of edges and all necessary reinstatement work
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **Number.**

ITEM 21 – DRAIN RAISING

This price includes the following.

- Excavation in any type of material and removal of existing cover
- Demolition of any headwork or supporting slab or re-working the other edge of the existing drain.
- Supply on site of all the necessary plant and material, erection of formwork fixing of reinforcement and placing of concrete.
- Curing of concrete and striking of formwork
- Replacing and adjusting cover to suit new road profile.
- Clearing of site, trimming of edges and all necessary reinstatement work
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **LINEAR METRE.**

ITEM 22 – ROAD MARKING

This price includes the following.

- Survey of existing road marking and submission of drawing to Engineer
- Preliminary cleaning and pre marking out the pavement
- Supply of Chlorinated or Thermoplastic based road marking paint as per specifications.
- Supply of traffic Cones, temporary traffic signs, etc. for the proper regulation of traffic as directed by the Engineer.
- Painting the road surface as directed by the Engineer
- Any miscellaneous cost which may arise.
- All associated Preliminary and General Items.

The unit of measurement shall be **LINEAR METRE.**

Payments:

All payments will be made on measured quantity of works satisfactorily completed.

And payments will be effected following joint site measurement of work (s)satisfactorily completed and as duly certified by the Head Public Infrastructure Department or a representative delegated by him.

1. Form of Bid Security (Bank Guarantee)

A scanned copy of the Bid Security should be uploaded as a template where so indicated when required by the Purchaser

.....*Bank's Name and Address of issuing Branch or Office*.....

Beneficiary: *Name and Address of Public Body*.....

Date:

BID GUARANTEE No.:

We have been informed that*name of the Bidder*..... (hereinafter called "the Bidder") has submitted to you its bid dated..... (hereinafter called "the Bid") for the execution of*name of contract*..... Invitation for Bids No.....*IFB number*..... ("the IFB").

Furthermore, we understand that, according to your conditions, bid must be supported by a bid security.

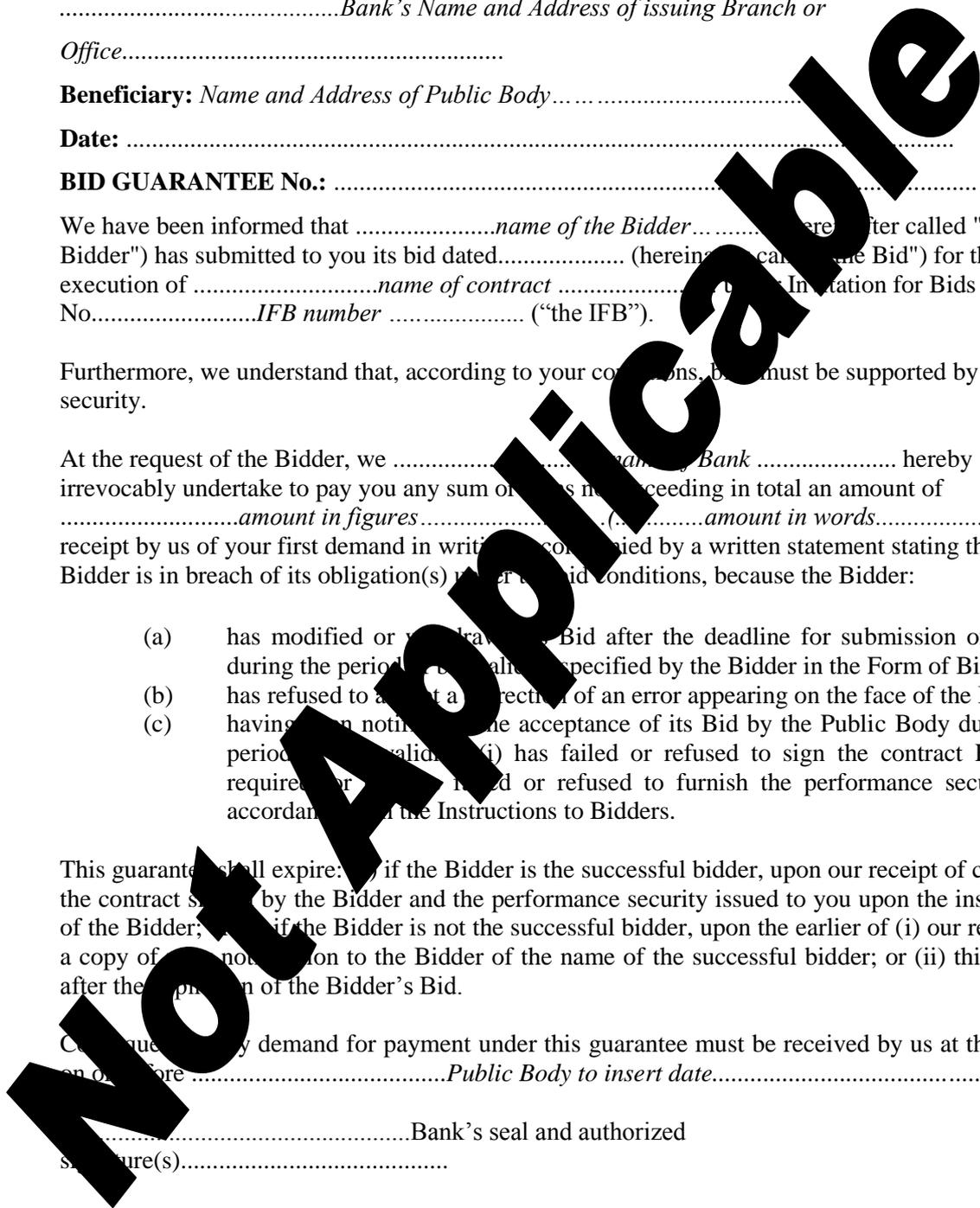
At the request of the Bidder, we*name of Bank*..... hereby irrevocably undertake to pay you any sum of money not exceeding in total an amount of*amount in figures*..... (*amount in words*.....) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has modified or withdrawn its Bid after the deadline for submission of its bid during the period of validity specified by the Bidder in the Form of Bid; or
- (b) has refused to accept a correction of an error appearing on the face of the Bid; or
- (c) having been notified of the acceptance of its Bid by the Public Body during the period of validity (i) has failed or refused to sign the contract Form, if required, or (ii) has failed or refused to furnish the performance security, in accordance with the Instructions to Bidders.

This guarantee shall expire: (i) if the Bidder is the successful bidder, upon our receipt of copies of the contract signed by the Bidder and the performance security issued to you upon the instruction of the Bidder; or (ii) if the Bidder is not the successful bidder, upon the earlier of (i) our receipt of a copy of notification to the Bidder of the name of the successful bidder; or (ii) thirty days after the expiration of the Bidder's Bid.

Our payment demand for payment under this guarantee must be received by us at the office of*Public Body to insert date*.....

.....*Bank's seal and authorized signature(s)*.....



Section IV - Evaluation Criteria

This section contains supplementary criteria that the Employer shall use to evaluate bids.

1. Evaluation

In addition to the criteria listed in ITB 33 the following criteria shall apply:

Selection shall be based on the highest mark obtained, subject to compliance with scope of works, specifications, quality standards, acceptable completion period in accordance with the General Terms and Conditions

In case a successful bidder fails to enter into a contract with the contracting Public Body, pursuant to Section 39 (5) of the Public Procurement Regulations, the next lowest bidder among the remaining bids shall be selected for award.

Works to be allocated per work order as per above shall not exceed MUR 15 M (VAT Excluded)

Schedule of Markings

Please refer to ITB clause 33.1 “Notes of Bidders” for evaluation and award of contract.

Item No	Description	Unit of Measure	MAX MARKS
1	EXCAVATION FOR TRIAL PITS (ON ROADS)	m ³	1
2	EXCAVATION IN ANY MATERIAL	m ³	5
3	SCARIFICATION AND COMPACTION	m ³	4
4	MILLING OF ASPHALTIC CONCRETE SURFACE DEPTH NOT EXCEEDING 70MM	m ²	2
5	CUT TO FILL	m ³	1
6	SPALLS 200-300MM	m ³	2
7	GRADED HARDCORE FILLING 0-100MM	m ³	2
8	ROAD BASE/ CRUSHER RUN	m ³	4

Item No	Description	Unit of Measure	MAX MARKS
9	ROAD BASE/ CRUSHER RUN WITH PRIME COAT	m ³	5
10	ASPHALTIC CONCRETE BASE COURSE FOR RESHAPING EXCEEDING 25MM THICK	TONNE	5
11	BITUMINOUS CONCRETE WEARING COURSE (0/10) WITH BINDER CONTENT 6% (40 mm thick)	m ²	25
12	PRECAST (OR CAST IN-SITU) CONCRETE KERBS		
12(a)	Kerb K1	M	2.5
12(b)	Kerb K2	M	2.5
12(c)	Kerb K3	M	2.5
12(d)	Kerb K4	M	2.5
13	SUPPLY AND PLACE GEOTEXTILE	m ²	2
14	FELL TREES AND REMOVE STUMPS		
14(A)	Diameter 100-150mm	No.	1
14(B)	Diameter 151-200mm	No.	1
14(C)	Diameter above 200mm	No.	1
15	DEMOLITION OF MASONRY STRUCTURES, CONCRETE STRUCTURES, STONES KERBS AND WALLS	M ³	3
16	REINFORCED CONCRETE STRUCTURES		
16(a)	BLINDING CONCRETE (CLASS 15)	M ³	2.5
16(b)	CLASS 25 STRUCTURAL CONCRETE	M ³	2.5
16(c)	FORMWORK	M ²	2.5
16(d)	HIGH TENSILE REINFORCEMENT	KG	2.5
17	BLOCK WALLS	M ²	2
18	MASONRY STRUCTURE	M ³	3

Item No	Description	Unit of Measure	MAX MARKS
19	CONCRETE FOOTPATHS	m ²	2
20	MANHOLE RAISING		
20(a)	manholes where the internal size of the chamber is less than or equal to 800 mm	NOS	1
20(b)	manholes where the internal size of the chamber is greater than 800 mm	NOS	1
21	DRAIN RAISING	m	5
22	ROAD MARKING		
(a)	White hot melt thermoplastic 1.5 mm thick.	m	0.5
(B)	Yellow hot melt thermoplastic 1.5 mm thick.	m	0.5
(c)	White chlorinated rubber paint road marking	m	0.5
(D)	Yellow chlorinated rubber paint road marking	m	0.5
TOTAL			100

IMPORTANT

The financial evaluation of the bids will be based on an assessment of the rates quoted.

A marking system will be used to assess the rates. For each item, the bidder having quoted the lowest rate will obtain the maximum mark. The other bidders will be allocated marks according to the following formula:

$$M = \frac{M_{\max} \times R_{\text{lowest}}}{R}$$

Where

- M is the mark to be allocated
- M_{\max} is the maximum mark allocated to the lowest rate
- R is the rate under consideration
- R_{lowest} is the lowest rate for the item under consideration

Bidder having scored the Total highest mark will be considered for award of Contract.

(a) Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section V (Employer's Requirements).

(b) Multiple Contracts

Pursuant sub-clause 1.1 of the Instructions to Bidders, if Works are grouped in multiple contracts, evaluation will be as follows: **Not Applicable**

(c) Completion Time: Not Applicable

An alternative Completion Time, if permitted under ITB 15.1, will be evaluated as follows:

(d) Technical Alternatives: Not Applicable

Technical alternatives, if permitted under ITB 15.1, will be evaluated as follows:

PART 2 – Employer’s Requirements

Section V - Employer's Requirements

Table of Contents

Specifications

Drawings

Specifications

SECTION 1 A(i) - ROAD WORKS

INDEX

ARTICLE NO

- 1.1 GENERAL
- 1.2 PREPARATION OF SUBGRADE SURFACE FOR EXISTING ROAD
- 1.3 PRECAUTIONS DURING RAINS
- 1.4 PROOF ROLLING SECTIONS
- 1.5 DRAINAGE LAYER
- 1.6 CRUSHED STONE SUB BASE AND BASE CONSTRUCTION
- 1.7 COMPACTION REQUIREMENTS FOR SUB BASE AND BASE COURSE
- 1.8 TOLERANCES FOR CRUSHED STONE SUB BASE AND BASE COURSE
- 1.9 SHOULDER CONSTRUCTION
- 1.10 PREPARATION OF CRUSHED STONE BASE FOR PRIME COAT
- 1.11 APPLICATION OF PRIME COAT
- 1.12 TACK COAT
- 1.13 SURFACE TREATMENT
- 1.14 BITUMINOUS CONCRETE BASE COURSE AND WEARING COURSE
- 1.15 ASPHALT THICKNESS
- 1.16 TRIAL AREA
- 1.17 JOINTS
- 1.18 WEATHER LIMITATIONS
- 1.19 DEFECTS
- 1.20 CRACK SEALING
- 1.21 COLD MILLING OF BITUMINOUS PAVEMENT
- 1.22 GRASSING, TOPSOILING AND LANDSCAPING
- 1.23 CONCRETE SURFACES OF FOOTPATHS AND SIDEWALKS

Article 1.1 - General

1.1.1 Terminology

-Subgrade Surface or Formation Level on embankments and in cuttings shall be the surface level of the earthworks after completion of the earthworks.

-The subgrade shall be the material immediately underneath the subgrade surface.

-The pavement shall be formed by the materials laid above formation level. It shall comprise the sub-base where required, the stone road base or the bituminous base course and the wearing course. The finished level shall be the surface of final layer of the pavement.

-On drawings or in Technical Specifications hereof

"Bituminous Concrete" applies for a hot premix bituminous concrete used for wearing course

"Bituminous Base" applies for a open graded base course bituminous concrete

"Crusher run" applies for a graded crushed stone material used for sub base or road base with grading between 0 and 25 mm (0/25) or 0 and 50 mm (0/50)

-Bituminous Surface Treatment applies for a film of bituminous binder covered by a layer of nominal single sized stone chippings.

-A sealing coat composed of a film of bituminous binder covered with a layer of fine aggregate shall complete double bituminous surface treatment on carriageways.

1.1.2 Works to Be Executed

The roadworks shall consist of the following operations:-

- (a) Preparation of subgrade surface
- (b) Construction of crushed stone sub base
- (c) Construction of crushed stone
- (d) Construction of bituminous mix base course
- (e) Construction of bituminous concrete wearing course
- (f) Construction of shoulder or footpath
- (g) Application of a surface treatment
- (h) Construction of verges and slopes of embankment and top soiling

(i) Strengthening of existing pavements

The pavement structure is defined on typical cross sections and layout plan and longitudinal profiles.

It is specified that no layer shall be laid until the underlying layer has been inspected and approved by the Engineer.

1.1.3 Programme to Be Furnished

The Contractor shall submit to the Engineer for his approval the programme and drawings specified in Article 1.10 of T.S.

It is advisable to complete drainage works before starting road/pavement works on a section.

The method of construction of the pavement shall be such that a subsequent layer shall be placed as soon as possible after the results of the tests and measurements (density, deflection etc...) carried out on the laid layer have been found as specified or as directed by the Engineer.

1.1.4 Typical Cross Section

-The typical cross sections shown on Drawings shall be applied on cross sections levelled as specified in Article 1.11 and to be approved by the Engineer.

-Some adaptations are to be foreseen, particularly the theoretical camber fixed at 2.5% in alignment which may vary between 2.5 and 3%. Nevertheless in alignment and for the same cross section, the camber on each half of the carriageway shall not differ by more than 0.5%.

-The nominal thickness specified on typical cross sections and on plan and longitudinal profiles are deemed to be the minimal thickness of material to be laid down.

Article 1.2 - Preparation of Subgrade Surface For Existing Road

The subgrade surface shall be cleaned of all foreign matter; and any loose material, potholes, ruts, corrugations, and other defects which may have appeared shall be corrected; if directed by the Engineer, the Contractor shall scarify, water, grade and recompact the subgrade to line and level. No payment shall be made for preparation of subgrade surface and the costs thereof shall be deemed included in the other rates and prices.

Article 1.3 - Precautions During Rains

Adequate measures shall be taken by the Contractor during period of rains to protect all work by providing drainage of all exposed surfaces. No placing of layer shall be permitted until the surface, on which the layer is to be laid, is dry.

Article 1.4 - Proof Rolling Sections

Before commencing any pavement work, the Contractor shall carry out compaction trials by establishing proof rolling sections. The purposes of these trials are to determine the proper compaction plant to be used (including number of rollers, wheel load, inflation pressure of tyres, rolling patterns, speed of rollers, distance between the asphalt paver and the compaction plants), the number of passes, the thickness of loose material for each layer, the temperature for spreading in order to achieve the required thickness of compacted material, the required density and a minimum value for the deflection under a 8.2 tons axle load.

The Contractor shall submit to the Engineer for approval a procedure for carrying out these compaction trials supplemented by any necessary laboratory and in-situ tests.

These trials and tests shall be completed before works with the corresponding materials will be allowed to commence.

The results of these trials such as defined above shall be submitted to the Engineer for his approval; such approval shall not relieve the Contractor of any of his duties and responsibilities under the Contract.

No payment shall be made for these trials and the costs thereof shall be deemed included in the other rates and prices.

Article 1.5 - Drainage Layer

Drainage layer materials shall be placed as shown on typical cross section or where required by the Engineer. The materials shall be spread on subgrade surface with a grader and compacted with vibrating roller or heavy self-propelled tyred roller. Depending on the type of the materials, compaction requirements and method of compaction shall be specified in accordance with results of proof rolling sections. Drainage layer in shoulders or as backfilling of masonry or drainage structures shall be hand-placed and compacted with hand-propelled vibrating roller.

Article 1.6 - Crushed Stone Sub Base and Base Construction

The crushed stone sub base and base materials (crusher run) shall comply with the requirements of Articles 2.11, 2.12, 2.13 and 2.14 of these Technical Specifications and shall be provided and laid to the lines, levels and cross section shown on the Drawings or as directed by the Engineer. The crushed stone sub base as well as the base course shall be placed in layers over the entire formation. The thickness of one layer shall never be less than ten (10) cm and more than twenty (20) cm for base material and less than twelve (12) cm and more than twenty five (25) cm for sub base.

Spreading of the approved material shall be carried out by plant or vehicles designed or equipped with suitable devices capable of depositing the material in a continuous uniform layer of the correct thickness, width, shaping, and surface tolerances.

The paver shall be capable of spreading the material to a thickness sufficient to provide a compacted layer of at least 20 cm over a width of at least 3.20 m.

During spreading of material, precautions shall be taken to avoid segregation. If segregation occurs, the Contractor shall remix the material by a method to be approved by the Engineer.

Where the addition of fine is necessary, it shall be thoroughly mixed in with the aggregate before the introduction of any water that might be required.

Where it is necessary to add water to adjust the moisture content, the water shall be added by an approved mechanical sprinkler and mixed into the full depth of the loose material by means of a harrow or other mixing equipment approved by the Engineer.

Compaction of crusher run layer shall be carried out only after the construction of edge concrete kerbs provided for retaining the material has been completed.

Equipment for compacting shall be composed of vibrating rollers with W/L ratio greater than 20 kg/cm and heavy tyred roller of more than 2.5 T by wheel. The thickness of the processed layer shall be checked continuously at all stages of the construction to ensure that the thickness of the final compacted layers is at all points within the tolerances specified in Article 5.15.

Article 1.7 - Compaction Requirements For Sub Base And Base Courses

The moisture content of the material shall be continuously checked before and during rolling and shall be in the range of -2% to + 2% of O.M.C. (O.M.C. Optimum Moisture Content)

The layers shall be compacted to a minimum density of 95% of B.S. Heavy Compaction for sub base and 98% of B. S. Heavy Compaction for base. These requirements must be fulfilled for 90% of measurements.

Compaction shall continue until: -

(i)The specified density is achieved when measured with a Nucleo-Gamma densometer type troxler or any other method as approved by the Engineer.

(ii)The compacted pavement layer contains not more than 15% voids for road base, or 20% voids for sub base, voids being air voids and voids filled with water.

All rolling shall be longitudinal and shall commence at the outer edges except that on super- elevated curves, rolling may progress from the lower to the higher edge.

The surface of the material shall on completion of compaction, be well closed, free from movement under the compaction plant and free from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be dug out and made good with new material to the full thickness of the layer and recompacted all at the Contractor's expense.

Article 1.8 - Tolerances For Crushed Stone Sub Base And Base Course

1.8.1 Surfaces

The finished surfaces of crushed stone sub base and base shall not show any departure from the required cross sections exceeding 1.5 cm (15 mm). When measured with a 3 metres straight edge, deformations shall not be greater than 1.5 cm (15 mm).

If the departures are greater than these tolerances, the Contractor shall at his own expense scarify, reshape, add water, if necessary, and compact such areas.

If for two consecutive working days more than 10% of the measurements do not comply with these requirements, the work shall be stopped in order to examine and improve the methods and equipment and if necessary substitute any defective equipment.

1.8.2 Deflection Measurement under A 8.2 Ton Axle Load

More than 90% of deflections measured on a length corresponding to a day's work shall be within the limit specified by the Engineer in accordance with the results of proof rolling sections.

If on a limited area localised in a homogeneous section (in regard of geotechnical conditions and strengthening solutions carried out) the characteristic deflections (D + 20 *) exceed the average level of deflections in this section by more than 25%, additional compaction shall be required. If, in the opinion of the Engineer, no significant improvement is obtained, excavation shall be ordered in order to replace the subgrade or sub base materials, at the own cost of the Contractor.

Article 1.9 - Shoulder Construction

The construction of shoulders and crushed stone footpath shall in all respects be the same as for sub base and base courses, except for compaction requirements which shall be fixed to 95% B. S. Heavy Compaction. Where crushed stone base (and sub base) is provided, construction and especially compaction of shoulder layers shall be carried out at the same time as the corresponding works on the carriageway. Where bituminous base course and wearing course are provided, the laying and first compaction of shoulder material shall be made before the construction of the bituminous courses.

Article 1.10- Preparation Of Crushed Stone Base For Prime Coat

The surface shall be thoroughly brushed by mechanical brooms and all loose sand, dust, dirt and other unsuitable material shall be removed, to the approval of the Engineer.

The finished base surface shall be true to line, grade and cross section as specified in Article 5.8. The base shall be in the condition of compaction and finishing as specified. Prime coat shall be applied when the surface to be treated is dry. The prime coat shall not be applied on dust or when the weather is rainy.

Article 1.11 - Application Of Prime Coat

1.11.1 On completion of the preparation of the base and approval of the surface by the Engineer, the prime coat of MC 30 or other approved binder as required in Article 2.34, shall be applied immediately by means of a pressure distributor at the rate of spread of 1.2 Kg/m².

The rate and number of application shall be such that the prime penetrates at least 1.5 cm the base course and dries to a uniform matt surface in 24 hours.

The area to be primed shall extend to the whole width of the base course, including shoulders to be covered by the wearing course.

The nozzles of the distributor shall be checked prior to spraying.

The base surface where too closely knit may be slightly moistened by a mechanical sprinkler.

During spraying of binder all elements such as, culvert head walls, kerbs and the like which are liable to be disfigured by splashing of bitumen shall be protected and any such feature which is accidentally marred by bitumen shall be cleaned off with a suitable solvent or made good.

Any areas insufficiently covered shall be re-sprayed by spray lance to the satisfaction of the Engineer.

Where the prime coat does not completely penetrate into the base, the excess should be blotted with sand or single sized aggregate 4/6.

The prime shall be completely cured before spreading asphaltic concrete or placing of paving slabs.

The prime coat shall be left undisturbed for a period of at least 24 hours, and shall not be opened to traffic until it has penetrated and cured sufficiently so that it will not be picked up by the wheels of passing vehicles. The Contractor shall maintain the prime coat until the next course is applied. Care shall be taken that the application of bituminous material is not in excess of the specified amounts and any excess shall be blotted. All areas inaccessible to the distributor shall be sprayed manually using the device for hand spraying from the distributor.

1.11.2 Where required by the Engineer, or in order to protect the base surface under traffic, the prime coat shall be covered with sand or single sized aggregate 4/6 at the rate of 6 litre/m².

Article 1.12 - Tack Coat

A tack coat shall be applied between the existing bituminous surface and the bituminous concrete base course or wearing course. The tack coat may also be ordered by the Engineer between the bituminous base course and wearing course.

The surface to be tacked shall be swept clean of all loose particles and dust immediately prior to the application of the tack coat, at the rate of 0.600 Kg/m² of RC 250 or 0.300 Kg/m² of residual bitumen from bitumen emulsion.

Article 1.13 - Surface Treatment

Following spraying and curing of prime coat, a surface treatment shall be applied where specified on drawings.

1.13.1 Average Rates

The rate of application of binder and chippings shall be determined on site according to type of binder and chippings. The following table gives the average rates upon which bill prices have to be based: -

	CUTBACK RC 250 KG/M SQ	CHIPPINGS Litre / M ²		
		2/4	4/6	10/14
Single Surface Treatment	1.0		8.0	
Double Surface Treatment				
1st Layer	1.3		6.0	
2nd Layer	1.2			11.0

1.13.1 Spraying Binder

The binder RC 250 or equivalent shall be sprayed mechanically by means of a pressure distributor after road base has been cleaned as specified for priming.

The distributor shall be such that the spraying is uniform on an adjustable width. The spraying pressure shall be uniform whatever the running speed may be. A competent foreman shall continuously supervise the spraying of binder.

All road furniture shall be protected.

1.13.2 Spreading Chippings

Chippings shall be spread mechanically immediately after the binder has been applied. A maximum delay of 5 minutes shall be authorised.

10/12 ton self-propelled tyred roller shall be exclusively used. They shall make 3 to 5 passes, subject to approval of the Engineer.

1.13.3 Completion

When the surface dressing has been completed, all surplus material shall be swept away by mechanical brooms.

The rates shall be checked every day for each layer of binder and chippings in cross section as well as in longitudinal direction. Nowhere the departure from the required rate shall exceed 10%.

Article 1.14 - Bituminous Concrete Base Course And Wearing Course

1.14.1 Mix Design

The Contractor shall carry out trial mixes to determine the job mix formulae (gradation of aggregates, precise proportions of bitumen and aggregates) at least 30 days before production of bituminous mixes are started and as soon as possible after commencement of aggregate production.

The study shall permit to check that, in spite of the normal fluctuations of a well-adjusted plant, the performances of the materials satisfy the requirement of these Technical Specifications.

The Contractor shall submit for the approval of the Engineer full details of his proposed aggregates grading and bitumen content together with details of the mix design and results of test carried out at ranges of bitumen contents from below the proposed bituminous content to above. Specimens at each bitumen content shall be made in quadruplicate.

The approved laboratory design mix shall be confirmed by full-scale plant trials using the full range of bitumen contents. The approved plant trial mix shall be termed the Job Standard Mix.

1.14.2 Mix Requirements

The Job Standard Mix shall be determined by the Contractor in conformity with the following requirements.

		Base Course	Wearing Course
Bitumen Content	(%)	4.3 – 5.0	5.7 – 6.2
Marshall Stability	(kN)	Min. 8.0	Min. 9.0
Flow	(mm)	1 - 4	1 – 4
Air Voids	(%)	3 – 8	3.5 – 4.5
Voids in Mineral Aggregate	(%)	14 - 18	16 – 20
Voids filled with Bitumen	(%)	67 – 77	75 – 82

The gradation and quality of aggregates and filler shall satisfy the requirements defined in Articles 2.14 and 2.15.

1.14.3 Working Mix

The Contractor shall maintain the composition of the working mix within the following tolerances from the Job Standard Mix.

- (1) Bitumen: 5% (five per cent) of the specified weight of bitumen
- (2) Filler: 1.5% (one and a half per cent) by weight of total mix
- (3) Aggregate retained on 5.00 mm B. S. Sieve: 7% by weight of total mix
- (4) Aggregate passing 5.00 mm B. S. Sieve but retained on 75 micron B.S. Sieve: 5% by weight of total mix.

The bituminous concrete shall be checked every day, 2 bitumen extractions shall be carried out. For Marshall test, at least 6 samples shall be taken as specified in Part III of T.S.

The Contractor shall not be allowed to modify the setting of the asphalt plant after production is started without informing the Engineer.

1.14.4 Asphalt Plant

The nominal capacity of the asphalt plant shall be at least 60 T/H when moisture content of aggregates is equal to 3%.

There shall always be sufficiently large stockpiles of all required sizes of aggregates to prevent delays because of low quantities.

The asphalt batch plant or continuous asphalt plant shall be submitted to the Engineer for approval: the storage tank shall be of sufficient capacity to keep the plant supplied with due allowance for delays in delivery; the bins for storage of aggregates shall be such that contamination is prevented; the plant shall be equipped with gauges, thermometers, mechanical, electrical, luminous, resonant devices and systems, timers in order to adjust, measure and control with a precision compatible with the Job Standard Mix approved by the Engineer.

The plant shall be operated under skilled supervision and maintained in a satisfactory working condition.

The Contractor shall keep accurate records of proportions and temperature of material incorporated, plant operation performed, tests performed, at all times.

The new "TSM" type or equivalent asphalt plant shall comply with special requirements as specified in "Complements Pour Utilisation Des T.S.E." Direction Des Routes Et De La Circulation Routiere - Ministere Des Transports - Paris/Novembre 81 - No. D 8122.

1.14.5 Control of Mixing and Asphalt Plant

The temperature of the binder at the time of mixing shall be in the range of 145 C to 155 C. The temperature of the bitumen shall never exceed 170 C.

The temperature of heated bitumen shall be kept within a range of 10 C around the required temperature for mixing.

The mixing time shall not be less than that recommended by the plant manufacturer, or such longer time as may be required to ensure adequate coating of aggregate and uniform distribution of the bitumen through the mix as directed by the Engineer. The plant shall not be operated at a higher speed than the manufacturer's rated capacity. The plant shall be such that the mineral filler shall be kept dry and be separately stored and weighed. It shall be possible to introduce the filler separately into the mixer if required by the Engineer. All aggregates on leaving the drier shall have a moisture content of less than 1 % by the mass.

The frequency for checking the precision of the components of the asphalt plant for delivery of materials (adjustable gates, gradation control unit, metering pump, scales etc...) shall be as specified in the following table which applies to traditional asphalt plant.

1.14.6 Transport

The mixed materials shall be transported from the asphalt plant to the site of the work in trucks having clean, tight, smooth bodies, which shall be treated to prevent adhesion of the mixture. Soapy water or lubricating oil but not in excess may be used for coating the bodies but gasoline, kerosene or other solvent shall not be used for this purpose.

The bodies of the trucks shall be covered and insulated to maintain the heat loss within the requirements.

1.14.7 Laying

The bituminous concrete shall not be laid when the base is wet, when there are pools and during rainfall. The surface shall be kept thoroughly clean, free from dust and foreign matter, using mechanical broom or blown off by compressed air. The bituminous concrete binder course as well as the wearing course shall be placed in one layer, except where reshaping work is provided. The temperature of the mix at delivery of the plant shall be approximately 140 C.

The bituminous concrete shall be spread and tamped by a self-propelled paver operated by a fully- trained and experienced man. The paver shall be capable of laying to a width of 4 meters.

The screed unit shall be adjusted before laying is started in order to produce a compacted layer with the required thickness as shown on the Drawings or as directed by the Engineer. During laying the screed unit shall be blocked; in other words adjustment of the thickness during laying using the so-called floating action of the screed unit shall not be authorised.

The mixed material shall be supplied continuously to the machine and laid as soon as possible after delivery.

The speed of paver shall be adjusted to that of the asphalt plant and hauling capacities so that the paving operation is maintained as continuously as possible during the work. The temperatures of mixes measured in the receiving hopper of the asphalt paver shall not be lower than 130 C.

Mixes which have a lower temperature shall be discarded.

Transverse joints in the wearing course shall be offset at least 500 mm from those in the base course. Longitudinal joints shall be offset at least 150 mm. At transverse joints between existing compacted asphalt and newly laid asphalt, the edge of the existing asphalt along the joint shall be neatly cut away in straight lines over a sufficient width to ensure that the full specified thickness of new asphalt is placed. The exposed edge in the existing work shall, if directed, be painted with hot bitumen or emulsion immediately in advance of placing the new work.

When the asphalt layers are laid in half widths, the longitudinal joints between them shall, if directed, be treated similarly to the transverse joints.

Cold joints shall be neatly cut away in straight lines except that they have been compacted to the required rate by means of a special equipment (lateral wheel). They shall be painted with hot bitumen or emulsion. The Contractor shall organise his work so that there are no exposed longitudinal joints left at the end of any day's work.

Before opening to traffic, new layer shall be linked up with the existing one by means of a chamfered edge with a slope not exceeding 8%. Before carrying on the layer this chamfered edge shall be cut away.

1.14.8 Compaction

The attention of the Contractor is drawn to Article 5.7. The roller operators shall be fully-trained and experienced men. An indicative composition of compaction equipment is:

- A heavy self-propelled tyred roller (> 3T/Wheel)
- A smooth wheeled (vibrating) roller (10T)

Rollers shall not stand on newly laid materials while there is a risk that the material will be deformed thereby. When the bituminous concrete is spread in areas that are inaccessible to the rollers, compaction shall be obtained by hot hand compactors.

During initial breakdown rolling and finish rolling, no vibratory compaction shall be resorted to. The exact pattern of rolling shall be established after trial compaction as approved by the Engineer. Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and/or removed and made good. The rollers shall not be permitted to stand on pavement freshly rolled. Necessary precautions shall be taken to prevent dropping of oil, grease, petrol or other foreign matter on the pavement either when the rollers are operating or standing.

The wheels of roller shall be kept moist to prevent the mix from adhering to them. But in no case shall fuel/lubricating oil nor excessive water poured on the wheels. Rolling shall commence longitudinally from edges and proceed towards the centre, except that on super elevated and unidirectional cambered portions, where it shall progress from the lower to upper edge parallel to the centre line of the pavement. The roller shall proceed on the fresh material with rear or fixed wheel leading so as to minimise the pushing of the mix and each pass of the roller shall overlap the proceeding by one half of the width of the rear wheel.

The layers shall be compacted while the mixed materials temperature is within 115 C to 130 C.

1.14.9 Control of Compaction

The density of the material of each layer shall be in conformity with the following requirements:

-The density shall be more than 97% of the density determined by the Marshall test, and more than 100% of the LCPC density.

-Densities measured by "Troxler" type apparatus shall be gauged with densities measured on drilled core-samples. If for two consecutive working days, more than 10% (ten per cent) of the measurements do not comply with these requirements, the work shall be stopped in order to examine and improve the methods and equipment used and if necessary substitute any defective equipment.

-Deflection measurements shall be carried out and requirements of Article 5.8.2 apply for bituminous concrete courses.

1.14.10 Tolerances

When measured with a 3 metres straight edge, deflection shall not be greater than 0.8 cm for bituminous base course and 0.5 cm for wearing course.

The thickness for each layer shall be controlled on the samples taken for control of compaction. The tolerances shall be within the range -10%, +20% of the thickness defined on the Drawings or as directed by the Engineer.

If for two consecutive working days, more than 10% (ten per cent) of the measurements do not comply with these requirements, the work shall be stopped in order to examine and improve the methods and equipment used and if necessary substitutes any defective equipment.

In any case for each working day, the average of all results shall be at least equal to the required thickness.

1.15 Asphalt thickness

The Contractor shall obtain confirmation and approval from the Project Manager of the type of material to be used and the thickness to be provided on each road, and the terminal points, before any material is laid.

1.16 Trial Area

The Contractor shall arrange for a trial area of bituminous concrete to be laid in an area to the required thickness using the plant and methods to be used for the permanent surfacing to the full width normally produced by the plant and not less than 50 metres long. Samples shall be taken and tested in accordance with the relevant clauses of Section 1 from a representative part of the road base, base course, and surfacing where directed by the Project Manager. In case the trial lay fails to meet the design standards, the mix and/or workmanship shall be adjusted and new trial lays repeated until a satisfactory and Specification complying layer is achieved, all to the expense of the Contractor. At the risk of the Contractor the trial area may be laid as part of the permanent work. In that case any layer proved by tests to be defective shall be removed by the Contractor at his own cost. The Contractor shall allow for the cost of complying with the above in his tender.

1.17 Joints

Transverse joints in the wearing course shall be offset at least 1 m from those in the base course. Longitudinal joints shall be offset at least 150 mm. At transverse joints between existing compacted surfacing and newly laid surfacing the edge of the existing surfacing along the joint shall be neatly cut away in straight lines over a sufficient width to ensure that the full specified thickness of new surfacing is placed. The exposed edge in the existing work shall if directed, be painted with hot bitumen immediately in advance of placing the new work. Where the bituminous layers are laid in half widths, the longitudinal joints between them shall, if directed, be treated similarly to the transverse joints.

1.18 Weather Limitations

Bituminous pavement materials shall not be mixed when the moisture content of the aggregate is such as to interfere with the uniformity of the mixing temperature or with continuous plant operations. It shall not be laid when the underlying layer is damp or dusty.

1.19 Defects

Any defects in the bituminous work, caused by faulty workmanship or materials shall be corrected and made good at the Contractor's own expense. Care shall be taken when starting and stopping the paver to prevent the formation of humps and depressions. Any material that becomes mixed with foreign bodies, or is in any way defective, shall be removed and replaced with fresh material and compacted as specified.

For wearing course where the surface levels of the newly laid bituminous concrete fall outside the tolerances specified, the entire thickness of the wearing course shall be considered defective and shall be trimmed off and removed and fresh layer relaid in accordance with the Specification, all at the Contractor's own costs. Skin patching of an area that has been rolled will not be permitted.

1.20 Crack Sealing

The prime shall consist of an "inverted emulsion" prime manufactured from a base bitumen of 80/100-penetration grade. An MSP/1 prime or equivalent shall be used.

1.20.1 Emulsion for cold applied sealant

The emulsion for the crack treatment shall consist of an Anionic Stable Grade Emulsion or Cationic Spray Grade Emulsion. When blended on site, "Revertex" or other rubber latex emulsion shall be added to the bitumen emulsion to give 8% net rubber on net bitumen content. If a proprietary brand blend is used, the constituents shall conform to the manufacturer's specification.

1.20.2 Blowing out cracks

The Contractor must provide a mobile compressor capable of discharging 3m³/min compressed air at 750kPa pressure. The compressed air shall be free of deleterious matter that may adversely affect the bond between the sealant and the cracks. The compressor shall be free of oil and diesel leaks. A lance shall be used to direct the force of the air into the cracks and must be manoeuvrable enough to follow the path of the crack accurately. If hot air is specified, the compressed air must be heated by a hot air lance capable of achieving a temperature of 300°C in the combustion chamber.

1.20.3 Prime injectors

A special prime injector for injecting prime into open cracks using compressed air propulsion shall be manufactured. Essentially the equipment shall consist of a blowpipe with nozzle to direct the jet of compressed air into the cracks, a venturi or similar device shall be fitted to the blow pipe for sucking in prime from the storage vessel. A suitable throttling valve shall be fitted on the prime supply line to adjust the prime flow, i.e. to adjust the compressed air to prime ratio. The blow pipe shall be of approximately 20mm diameter steel tubing, threaded at the open end so that suitable bitumen spray nozzles can be fitted. The other end shall have a suitable coupling to connect to the compressor, complete with a shut-off valve to isolate the injector from the compressed air source.

The injectors, blowpipes, storage vessel interconnecting piping, etc., shall all be capable of safely withstanding the pressure generated by the compressors. Design sketches of the equipment shall be submitted to the Project Manager for approval.

1.20.4 Sealant

The sealant shall be applied through an applicator manufactured specifically for this purpose. Essentially the equipment for the hot sealant shall consist of a mobile vessel capable of heating the sealant to the required application temperature by indirect heat, controlled by a thermostat to prevent overheating. A calibrated thermometer shall be fitted in an accessible position to accurately measure the sealant temperature in the tank. Special pumps, which can deliver the sealant to the crack in a controlled fashion, shall be used.

Proprietary brand seals shall be applied as specified by the suppliers.

Article 1.21 – Cold Milling of Bituminous Pavement

1.21.1 Controlled Milling Machine

The milling machine shall be self-propelled, capable of milling the pavement to a specified depth and smoothness to control the paving slope during its operation. The machine shall have the ability to remove the millings and cuttings from the pavement and load them into the trucks. On the other hand, the machine shall reduce the risk of dust pollution and not cause any damage to the pavement structure that is not being removed.

1.21.2 Cleaning Equipment

As part of the milling works, provision should be made for cleaning equipment that is suitable for the removal and cleaning of loose material from the pavement structure.

1.21.3 Straightedge

The straightedge shall be of aluminium or of any light metal type with blades of box or girder box cross section with flat bottom reinforced to insure rigidity and accuracy; it shall have handles to facilitate movement on the pavement.

1.21.4 Finished surface

The finished surface at the juncture with other pavements shall coincide with the finished surfaces of the abutting pavements,

The finished surface shall not deviate from the testing edge of a straightedge more than 6 mm in the traverse and longitudinal direction

Skin patching for correcting low areas will not be permitted. Sufficient amount of material will be required to be removed to allow for a minimum of 25 mm of asphalt concrete to be placed.

1.21.5 Cores

Cores shall be taken as instructed by the Engineer.

1.21.6 Carting Away of the milling material

The materials removed shall be placed in an approved disposal area and stockpiled in such a manner to prevent segregation or contamination to the Environment.

Article 1.22 - Grassing, Topsoiling and Landscaping

1.22.1 After completion of bituminous surfacing, the verges, central median and the slopes of cuttings and embankments shall be planted with indigenous grass suitable for this particular use.

The Contractor shall plant springs of grass at approximately 20 cm centres.

Topsoil shall be obtained from material resulting from site clearance or from spoil tips or from natural ground in close proximity to the works. It shall be lightly compacted.

Planting shall preferably be carried out at the beginning of a rainy season, but where this is not possible; the grass shall be kept watered. Grassing and landscaping shall be paid under the corresponding Items of Bill No.3

1.22.2 Landscaping shall be made by means of loose boulders, decorative bushes and trees, as directed by the Engineer.

The bushes and trees shall be supplied and planted by specialists sub-contractors.

Article 1.23 – Concrete Surfaces of footpaths and sidewalks

1.23.1 Strength

Footpaths shall be of concrete having minimum strength of 25 Mpa, minimum 265 kg cement content, a maximum 0.55 water: cement ratio, 60mm \pm 20 mm initial slump, normal setting plasticizing admixture to a final 110 mm \pm 20 mm slump, 20 mm aggregate. The amount of colour pigments added to a concrete mixture shall not be more than 7 % of the mass of the concrete but 5 % may be needed. The amount required depends on the type of pigment and colour desired. To maintain uniform colour, proportioning of all materials must be carefully controlled by mass.

To prevent streaking, the dry cement and colour pigment must be thoroughly blended before they are added to the mix. Mixing shall be longer than normal to ensure uniformity. Use of admixtures may be required for dispersal of pigment. All admixtures shall be normal setting and non-retarding.

1.23.2 Trial mixes

Trial mixes shall be assessed and refined until the concrete satisfies the requirements for strength, durability, colour and finish ability. These are required to establish the mix proportions for a concrete to satisfy:

- Strength class,
- Maximum water: cement ratio,
- Nominal aggregate size,
- Chloride content class,
- Consistence class,
- Cement type (Ordinary Portland Cement),
- Colouring agent to be used (red oxide).

The sources of the constituent materials shall not be changed without further trial mixes and prior to approval of Engineer. All equipment for the manufacture, transport, compaction and finishing shall be cleaned immediately prior to the production of the coloured concrete. The mixing process shall be sufficient to ensure effective dispersal of the pigment.

1.23.3 Contraction Joints

Contraction joints at a spacing to produce approximately square sections shall be provided.

1.23.4 Curing

Curing shall commence as soon as possible. Apply one coat of curing compound evenly across the entire surface at the manufacturer's recommended coverage rate. Curing compound shall be clear, non-yellowing, acrylic sealer with a minimum solids content of 20%. Curing compound shall be submitted for approval of Engineer. Concrete surface finish shall be brush finish to \pm 5 mm tolerances.

1A(ii). Specifications

Hot premixed asphalt will be generally used for:

- Resurfacing of Roads and other surface areas
- Laying of Hot premixed Asphalt on newly constructed roads - crusher run base amongst others.

1. Prime Coat

A prime coat of MC30 cut back bitumen to be applied at the rate of approx. 1.1 to 1.2 litre/m² to sprayed by manually controlled hose and power controlled sprayer to the satisfaction of the representative of the Council prior to the laying of the hot Bituminous asphalt at a minimum of 105⁰C.

2. Hot Premixed Asphalt

Supply, Lay and Compact Hot Premixed Asphalt - Bituminous concrete 0/10 and 0/14 to lines and levels for any width including trimming of edges all as per specifications.

Hot premixed asphalt is to comply with the relevant A.A.S.H.O specifications. Pavers to be used (where applicable) for laying of Hot Premixed Asphalt-Bituminous concrete 0/10 and 0/14. Tack coat to be sprayed at the rate specified.

3. Rolling

The rolling of the newly laid on asphalt to be done by a 8-10 tonne Vibrating roller, preferably of the tandem type, with slightly wet wheels.

Hand rollers to be used on narrow surfaces and other access where works have to be done by hand and trimming of edges to be carried out as required.

The rolling should be continued until there is no further movement under the wheels of the rollers i.e. until the asphalt has been thoroughly compacted.

4. Crossfall

The cross fall to be from the centre to the sides and rear, or as instructed on site. Appropriate camber to be respected as required. No water ponding will be allowed.

5. Transport, Plant and Equipment

Transport of Hot premixed asphalt to sites of works, rollers, sprayers, pavers and any other tools and equipment should be provided by the Contractor.

Note:

Potholes to be cut and dug out to a square or rectangular shape brushed and cleaned, replaced by crusherun 0-20, rolled and primed. All depressions to be filled by crusherun 0-20 rolled and primed with cold bitumen and corrugations and wavings are to be put level prior to lay and compact hot premixed asphalt. (Tack coat to be sprayed as required)

Contractors will be required to supply the hot premixed asphalt on simultaneous sites, or as instructed.

All costs incurred for certifications for Bitumen content & core tests to be borne by the successful Bidder.

ANY DAMAGES CAUSED TO ROAD FEATURES AND SERVICES TO BE MADE GOOD BY THE CONTRACTOR AND AT HIS OWN COSTS.

The site of works will be communicated to the successful bidder/contractor during the contract period accordingly.

All payments to be effected on measured works.

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## **OTHER SPECIFICATIONS**

### **Clearances**

The Contractor to seek and obtain appropriate clearance from such Authorities as the Central Water Authority, Waste Water Authority, Mauritius Telecom, Central Electricity Board, Police, Mauritius and fire rescue Services and Traffic Management & Road Safety Unit before starting any site works.

### **Programme of Work**

The work shall be carried out in accordance with a programme drawn up by the Contractor and agreed upon the Head Works Department.

### **Transport**

Transport of all materials to sites of works will be provided by the Contractor.

### **Materials ,Plant and Equipment**

Construction materials, tools and all required plant and equipment will be provided by the Contractor.

### **Materials and Plant of Contractor**

The Municipal Council will not be responsible for any damage caused to plant and materials.

### **Clearance of Site of Work on completion**

The site of works will be cleared of all surplus materials, and tidied up before the handing over and the contract will be considered as having been fulfilled only after the site would have been cleared to the satisfaction of the Head Works Department or his representative.

**Note:** Prospective Bidders/Contractors are required to acquaint themselves to site conditions in Port Louis prior to submitting their offers. Contractor to make his own arrangement for water and electricity for use on site and bear all costs thereof.

## **STANDARD SPECIFICATIONS**

The Government of Mauritius Standard Specifications issued by the Ministry of Public Infrastructure & Land Transport shall be deemed to form part of these documents, as every contractor registered with the Ministry of Public Infrastructure & Land Transport has, de facto, a copy of the said specifications.

However, should the Tenderer require a fresh copy of the Specifications in connection with this Tender, he/they should make an application in writing to the Permanent Secretary, Ministry of Public Infrastructure & Land Transport, Quantity Surveying Section, Phoenix.

All materials used in this project should be to the approval of the Head Public Infrastructure Department.

### **Additional Notes**

With reference to the 'Standard Specifications' issued by the 'Government of Mauritius', kindly note that:-

### **Page 35 of the Standard Specifications – Paragraph (c)**

An Approved Testing Authority is further defined as:-

- (i) Materials Testing Laboratory**
- (ii) Mauritius Standard Bureau**
- (iii) The Laboratory of the University of Mauritius**



## **SECTION 1B-GENERAL**

### **1B.1 *THIRD PARTY OBLIGATIONS***

The Contractor shall not demolish or otherwise interfere with any dwelling or building or anything connected therewith unless and until permitted to do so.

The Contractor shall take special care to prevent injury, damage, trespass on private lands, crops, fences, entrances and other properties including the adjoining sites of other contracts, adjacent to the works.

The Contractor must make all necessary arrangements in this connection with adjoining land owners and other contractors or with the officer appointed for the purpose in case of Government property, and assure the observance by his workmen of all regulations and laws appertaining thereto.

The Contractor shall make his own arrangements with the land owners concerned for access to the site of works. Similarly the Contractor shall make his own arrangements for access to and for procurement of, any materials for the construction of the works.

The Contractor shall indemnify the Employer against all claims from failure to fulfill the above obligations and against all other claims arising from failures of a similar nature.

### **1B.2**

#### ***WORKS EXECUTED BY EMPLOYER OR OTHER CONTRACTORS***

The Employer reserves the right to execute, on site, works not included under this Contract and to employ for this purpose either his own employees or another contractor whose contract may be either a sub-contract under this contract or an entirely separate contract.

The Contractor shall ensure that neither his own operations nor trespass by his employees shall interfere with the operations of the Employer, or his Contractor employed on such works and the same obligations shall be imposed on the Employer or Contractor in respect of work being executed under this Contract.

### **1B.3**

#### ***1.2 LIAISON WITH POLICE AND OTHER OFFICIALS***

The Contractor shall keep in close contact with the Authorities of the areas concerned regarding their requirements in the control of workmen, movement of traffic, passage through urban areas, or other matters and shall provide all assistance or facilities, which may be required by such officials, in the execution of their duties.

### **1B.4**

#### ***1.3 FIRST AID, WELFARE AND SAFETY PRECAUTIONS***

The Contractor shall provide, equip and maintain an adequate First Aid Station on the Site of the Works and provide all necessary transport and shall have experienced First Aid men available for attending minor accidents.

The Contractor shall allow in his prices and be responsible for the cost of all site welfare arrangements and health requirements.

Work is to be executed in a safe and responsible manner and the Contractor is to proceed in accordance with the provisions of the appropriate legislation. Particular attention is drawn to the need for adequate handrailing and fencing off dangerous areas, e.g. excavations on roads.

1B.5

#### *1.4 ALTERATIONS TO AND PRESERVATION OF SERVICES*

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

In all cases where such works are exposed, they shall be properly shored or hung up. Special care must be exercised in refilling to compact the ground under mains, cables, etc, and not to cover up exposed water meters and stopcock boxes, etc.

Poles supporting cables, adjacent to the Works, shall be kept securely in place until the works is completed, and then shall be made safe and permanent.

Should the Contractor expose any existing services which may interfere with or be damaged by the construction, he shall submit details of such services to the Engineer who will instruct the Contractor as to what measures are required to remove, alter, change or re-direct existing services. Precautions shall be taken to maintain the flow of water in streams, rivers, conduits and pipelines. The work required to protect services will be notified to the Contractor after approval by the relevant services authorities.

The foregoing requirements will apply equally to any work on services or roads completed by the Contractor in an earlier stage of the Contract.

Should any existing services be uncovered in the area of works, the Contractor shall be responsible for arranging, for the protection of such services including removal, modification or diversion if necessitated by the works, subject to the approval of the Engineer, to the services such as power lines, water lines, telephone lines, etc. (Prices and a provisional sum for these works are included in the Bill of Quantities).

The Contractor shall also seek the approval from the authorities concerned whenever required.

Any damage to, or interference with existing services, occasioned during the progress of the Works, shall be deemed to be the responsibility of the Contractor, who shall undertake to make good at his own expense any damage so caused to the existing services or other features and shall be liable in respect of all claims arising from such damage or interference however occasioned.

1B.6

#### *1.5 TRAFFIC DEVIATIONS, TRAFFIC CONTROL AND SIGNS*

The Contractor shall be responsible for the safe and easy movement of road and pedestrian traffic, by day and night through the sections of the existing road where he is working.

The Contractor shall bear the cost of all these temporary warning signs of EUROPEAN STANDARD as may be necessary for the safety and direction of the Public as required by the Laws of Mauritius or local by-laws, or as ordered by the Engineer. All such arrangement shall receive the approval of the Engineer.

Provisions and maintenance of traffic diversion will be the responsibility of the Contractor. The Contractor shall ensure that neither his own operations nor trespass by his employees shall interfere with the operation and maintenance of traffic diversions.

#### 1B.7

##### *1.6 PROGRAMME TO BE FURNISHED*

Within 3 (three) days after the issue of the Works Order, the Contractor shall submit to the Engineer for his approval:-

A general programme showing the timing, order of procedure and general methods for carrying out the works, with timing for mobilisation of equipment and plant and for purchase of important materials.

The organisation, staff, labour, equipment and plant proposed for the execution of the Contract.

#### 1B.8

##### *1.7 SETTING OUT*

The Contractor shall be responsible for the full and proper setting out of the Works where required. Throughout the Contract, both the general and detailed methods of the complete setting out of the Works shall be submitted by the Contractor for the prior approval of the Engineer.

The Contractor shall ensure that all plant operators, gangmen and key men working on the site are made aware both of the positions of all important line and level marks and of the importance of reporting the least disturbance of the same. In the event of any reference marks being damaged or misplaced during the Works, then the Contractor shall replace or reinstate such marks to the satisfaction of the Engineer.

The Contractor will be required to prepare and submit layout drawings, longitudinal and cross sections of the project road prior to the start of the works in any stretch of road. He shall also give the Engineer not less than 24 hours notice, of his intention to set out or take levels for any part of the work before and after the completion of wearing course, so that arrangements can be made for checking. The Contractor shall provide all the necessary instruments, appliances, labour etc. that the Engineer may require.

Throughout the Contract, both the general and detailed methods of the complete setting out of the Works shall be submitted to the Engineer for prior approval.

#### 1B.9

##### *1.8 TEMPORARY WORKS*

The Contractor shall be wholly responsible for obtaining a site for his camps, offices, stockpiles of aggregates, constructional plant and other temporary works, outside the road reserve and for making all payments in connection therewith.

All temporary buildings or stores and plant shall be located only on sites approved by the Engineer. The Contractor shall make his own arrangements with the land owners at his own expense.

All land to be permanently used or occupied by the Works will be provided by the Employer, in whole at the start of works or in part as the works progress.

The Contractor shall maintain all offices required by his Site Staff, workshops, storage sheds, etc. and clear away on completion of the Contract and leave the site in clean and tidy condition.

The Contractor shall provide latrines and ablutions for his employees, maintain them in a sanitary condition throughout the Contract and clear away on completion and leave the site in a clean and tidy condition. The Contractor shall be solely responsible for any living accommodation required by his employees.

When no longer required for the Contract all such provisions shall be left or dismantled and disposed of as directed by the Engineer and their sites shall immediately be cleaned and left as far as practicable in the same condition as that obtained immediately prior to occupation.

#### 1B.10

##### *1.9 MAINTENANCE OF EXISTING ACCESS AND SERVICES*

The Contractor shall provide at all times, access for vehicles and pedestrians to their premises for owners and occupiers of land along the route of the works. Provision must be made to ensure that sanitary services remain unimpeded at all times.

The Contractor shall be responsible for the maintenance of the existing roads of which he has been given possession.

#### 1B.11

##### *1.10 WATER AND ELECTRICITY SUPPLIES*

It is the Contractor's responsibility to provide water and electricity for both construction purposes and also for the camps and offices. The Contractor's attention is drawn to the fact that no separate payment will be made for the provision of water and electricity and the Contractor shall be deemed to have included for these in his rates and prices. The Engineer may reject any water which in his opinion is contaminated and not sufficiently clean for the purpose intended.

#### 1B.12

##### *1.11 NATURE OF GROUND AND CONDITIONS OF WORK*

The Contractor must satisfy himself as to the general circumstances at the site of the Works and the construction thereon, the surface of the ground and nature of the materials to be excavated, the possibility of subsidence from soft ground and bad broken materials, and falls of rock in or arising out of the Works, and the rates and prices in the Bills of Quantities will be held to cover all such contingencies.

1B.13

*1.12 FAULTY WORK*

Any work which fails to comply with his Specifications shall be rejected and the Contractor shall, at his own expense, make good any defects, as directed by and to the satisfaction of the Engineer.

1B.14

*1.13 PROTECTION OF WORKS*

The Contractor shall take all steps necessary to protect the Permanent Works and all stores and materials from the effects of weather, including floods and cyclones, theft, and shall be entirely responsible for any delay, damage or loss arising therefrom.

1B.15

*1.14 PROTECTION FROM WATER*

The Contractor shall keep the whole of the Works free from water and allow in his prices for all dams, cofferdams, pumping, piling, shoring, temporary drains, sumps, etc. necessary for the purpose and shall clear away and make good at his own cost and to the satisfaction of the Engineer all damage caused thereby.

1B.16

*1.15 UNAUTHORISED PERSONS*

No unauthorised persons are to be allowed on to any part of the Site and the Contractor shall take steps to prevent this and instruct his Foremen and Watchmen accordingly.

1B.17

*1.16 FILLING IN HOLES AND TRENCHES*

The Contractor immediately upon completion and approval of any work shall fill up all holes and trenches which may have been made or dug, level mounds or heaps of earth that may have been raised or made, and clear away all rubbish which may have become superfluous or have been occasioned or made by the execution of such work, and the Contractor shall bear and pay all costs, charges, damages and expenses which may be incurred or sustained on account or in consequence of any accident which may happen by reason of holes and trenches connected with the work being dug and left unfenced or material being left or placed in improper situations.

1B.18

*1.17 JOINT MEASUREMENT OF EXTRAS*

In such case as the Contractor shall find it necessary to execute any works, or, provide any materials which he feels entitled to claim as extras to the items listed in the Works Order he shall obtain written permission from the Engineer before commencing such work and shall make arrangements for the Works, or materials to be measured jointly with the Engineer, and the quantities agreed. Neglect to obtain authority to commence any such works, shall entitle the Engineer to disallow any claim for extras arising therefrom. The fact that joint measurement took place in no way commits the Engineer to recognising the validity of such claim, if it is considered unjustified. The Engineer shall at all times have full access to the

Contractor's time books and may daily check the item of any extra works with the Contractor's timekeeper or otherwise, but the fact of his agreeing upon any time shall in no way bind the Engineer to value the work other than by measurement if he thinks fit to do so.

## **SECTION 2 – SUB-STRUCTURES FOR ROADS**

### ***2.1 EXCAVATIONS***

Excavation shall consist of the loosening, digging, loading, hauling and disposal of all materials to the lines, levels, slopes and widths as shown in the drawings or as directed by the Engineer. It shall include compaction, finishing and shaping of all surfaces formed by such excavations.

Should any excavation be carried out to greater depth and dimension than necessary, the Contractor shall, at his own expense, reinstate and make good with approved material thoroughly compacted to a density not less than 95% BS Heavy Maximum Dry Density.

In wet weather, clay cuttings shall not be excavated and shall not be taken down to less than 25 cm above final level of the sub-grade.

The Contractor shall take all necessary precautions to prevent slips and falls to the sides of the excavation. But, if any should occur, the Contractor shall remove, at his own expense, all such fallen or displaced materials and replace, if required, with suitable materials compacted to a density not less than that of the adjoining ground at his own expense.

All necessary precautions should be taken to protect existing CWA, MT, CEB, or other services while carrying out excavation works. Should any damage occur to these services, same have to be made good at the Contractor's own cost to the satisfaction of the relevant Authorities.

### ***2.2 SOURCES OF MATERIAL***

The Contractor shall be responsible for locating and providing materials for use as sub-base and base. The Engineer's approval of the source and material must be obtained before the material is brought onto the site and incorporated in the Works. The Contractor shall submit within 30 days of the allocation of tender the name of the crushing plant, quarry and other sources for the approval of the Engineer.

### ***2.3 PREPARATION OF FORMATION***

The formation shall be cleared of all foreign matter, and any potholes, loose materials, ruts, corrugations, depressions and other defects which have appeared due to improper drainage, traffic or any other cause shall be corrected, and if directed by the Engineer, the Contractor shall scarify, water, grade and recompact the subgrade to line and level all at his own expense. The surface of the sub-base shall be similarly treated and no base shall be laid until the underlying layer has been inspected and approved by the Engineer.

*2.4 STONE SUB-BASE AND ROAD BASE MATERIAL*

The aggregate shall consist of crushed stone which is tough and durable, roughly cubical in shape and free from excess of flat and/or elongated, particles of clay, top soil or other deleterious matter and shall be to the approval of the Engineer. The sub-base and road base shall conform to the grading requirements given in the following tables:

*(I) Aggregates for Graded Crushed Stone Sub-base (0 – 31.5)*

The grading of crushed basalt for sub-base shall be within the following limits :

| NOMINAL SIZE OF THE SIEVE (mm) | PERCENTAGE OF WEIGHT PASSING |
|--------------------------------|------------------------------|
| <b>50</b>                      | <b>100</b>                   |
| <b>31.5</b>                    | <b>92 – 100</b>              |
| <b>20</b>                      | <b>79 – 91</b>               |
| <b>10</b>                      | <b>56 – 76</b>               |
| <b>6</b>                       | <b>42 – 64</b>               |
| <b>4</b>                       | <b>36 – 55</b>               |
| <b>2</b>                       | <b>25 – 42</b>               |
| <b>1</b>                       | <b>17 – 30</b>               |
| <b>0.5</b>                     | <b>10 – 21</b>               |
| <b>0.08</b>                    | <b>3 – 8</b>                 |

The Los- Angeles value shall not exceed 32.

The Sand equivalent value shall be more than 50.

*(II) Aggregates for Graded Crushed Stone Road- Base (0 – 20)*

The grading of crushed basalt for road-base shall be within the following limits:

| NOMINAL SIZE OF THE SIEVE (mm) | PERCENTAGE OF WEIGHT PASSING |
|--------------------------------|------------------------------|
| <b>31.5</b>                    | <b>100</b>                   |
| <b>20</b>                      | <b>90 – 100</b>              |
| <b>10</b>                      | <b>60 – 80</b>               |
| <b>6</b>                       | <b>45 – 64</b>               |
| <b>4</b>                       | <b>36 – 54</b>               |
| <b>2</b>                       | <b>25 – 40</b>               |
| <b>1</b>                       | <b>17 – 29</b>               |
| <b>0.5</b>                     | <b>12 – 21</b>               |
| <b>0.08</b>                    | <b>5 – 8</b>                 |

The Los- Angeles value shall not exceed 30.

The Sand equivalent value shall be more than 60.

The Flakiness index shall not exceed 40%.

All the materials shall be non-plastic.

All rolling shall be longitudinal and shall commence at the outer edges of the road, except that on super-elevated curves, rolling may progress from the lower to the higher edge. The surface of the material shall on completion of compaction, be well closed, free from movement under the compaction plant and free from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be dug out and made good with new material to the full thickness of the layer and recompact all at the Contractor's expense.

### *2.5 CONSTRUCTION LIMITATIONS*

The layer on which graded stone is to be laid on a sub-base or road base shall be cleaned of all foreign matter. Potholes, loose material, ruts, corrugations, depressions and other defects which have appeared due to improper drainage, traffic or any other cause shall be corrected and if directed by the Engineer, the Contractor shall scarify, water, grade and recompact the layer to line and level all at his own expense.

No graded stone shall be laid until the underlying layer has been inspected and approved by the Engineer. A sufficient number of rollers shall be provided so that the rate of compaction of crusher-run material does not exceed 15 cubic metres of aggregate per roller per hour or as approved by the Engineer. Rolling shall be suspended if and when such rolling causes wave like motions in front of the roller.

### *2.6 TOLERANCES*

The surface shall be checked with a 4 metre straight edge and no gap between the surface of the sub base, or of the road base and the straight edge shall exceed 15 mm. The average thickness of the layer measured at five points over a distance of 50 m, shall not be less than that specified and nowhere may the thickness be less than 90% of the specified thickness. The half width of the layer shall not be less than that specified and required by camber or superlevation nor exceed the specified width by more than 50 mm. The finished surface level of the stone sub-base and road base shall nowhere be higher than required but may be up to 15 mm lower.

### *2.7 REPAIR TO SOFT SPOTS*

The area to be repaired shall be marked out with a chalk or paint by drawing a rectangle around the damaged area. The materials within the marked area shall be excavated as specified in Section 2.1 and bottom of the excavated area shall be dressed flat and horizontal and compacted with a hammer.

The excavated area shall be backfilled and compacted in layers with graded stone material or sound and firm crushed spalls or maximum size of 200 mm as directed by the Engineer and according to specification.

### SECTION 3 - ASPHALT CONCRETE

#### 3.1 BITUMEN

The different types of bitumen shall conform to the following Specification:

- |                          |                       |
|--------------------------|-----------------------|
| (a) Straight Run Bitumen | ASTM D946             |
| (b) Cut-Back Bitumen     | ASTM D 2027 and D2028 |
| (c) Bitumen Emulsion     | BS 434                |

Any bitumen or bitumen emulsion delivered in leaking containers or deteriorated in the containers will be rejected.

During the course of Contract, the Contractor shall, at his own expense, satisfy the Engineer from time to time that the bitumen and bitumen products being used in accordance with these Specification. Any laboratory testing that he arranges to satisfy this clause, shall be carried out in an approved laboratory at no extra cost to the Employer.

#### 3.2 PRIME COAT

The surface of the road base shall be, if required by the Engineer, first brushed completely free from all loose particles and surplus fines by mechanical brooms or other approved means so as to expose a closely knit, compact mosaic of stone and any foreign material shall be removed well clear of the edges. It shall be sealed with a prime coat of MC 30 cutback bitumen applied at a rate of approximately 1 l/sq m where bituminous concrete is to be laid. The rate of application may be varied by the Engineer and only the actual quantity shall be paid for. The rate and number of applications shall be such that the prime penetrates at least 1.5 cm the base course and dries to a uniform mat surface in 24 hours. The area to be primed shall extend 150 mm outside the area to be covered by the bituminous concrete. The base surface where too closely knit may be slightly moistened by a mechanical sprinkler. During spraying of binder all road furniture, culvert head walls, kerbs and the like which are liable to be disfigured by splashing of bitumen shall be protected any such feature which is accidentally marred by bitumen shall be cleaned off with a suitable solvent or made good. Any areas insufficiently covered shall be resprayed by spray lance to satisfaction of the Engineer. Where the prime coat does not completely penetrate into the base, the excess should be blotted with sand or single sized aggregate 4/6. The prime shall be completely cured before spreading asphalt concrete or placing surface treatment.

The prime coat may only be applied after the Engineer has approved the surface. The finished surface of the road base course shall not be primed before 24 hours after the final compaction, but shall be primed within 14 days unless the Engineer instructs to the contrary. The bituminous base course and bituminous concrete road base shall not be laid less than 24 hours after the completion of the prime coat.

If the prime coat becomes contaminated or for some reason loses its tacking properties a tack coat may be ordered by the Engineer all in accordance with Sub-Section 5.05 and at the Contractor's expense.

### 3.3 TACK COAT

A tack coat shall be applied between the bituminous base course and wearing course or in the case of resurfacing works between the existing road surface and the reshaping course and between the reshaping course and the wearing course. The new track coat may also be ordered by the Engineer at the Contractor's expense if the coated surface becomes contaminated by the action of traffic or weathering. The surface of the length to be tacked shall be swept clean of all loose particles and dust with a mechanical broom immediately prior to the application of the tack coat which shall comprise either RC 70 or rapid setting, bituminous emulsion applied at the rate of 0.5/sq.m.

### 3.4 RESHAPING

Before carrying out the resurfacing of any of existing roads, a reshaping using an open grade bituminous concrete to correct ruts, corrugations, grades and other defects shall be carried out as directed by the Engineer.

### 3.5 AGGREGATE FOR ASPHALT CONCRETE

#### *Coarse Aggregates*

Aggregates for bituminous materials (wearing course and base course) shall be obtained from approved source of homogeneous stone, free from harmful material, and shall consist of crushed rock of 37.5 mm minimum size prior to crushing.

The aggregates shall be obtained by mixing 3 classes D/d of materials defined for each class by the maximum size (D mm) and minimum size (d mm) of particles.

Dimensions D and d will be chosen in the following series of sizes : 2 – 6.3 – 10 – 14 – 20 – 25

Before the works start, the Contractor shall submit to the Engineer's approval, the grading curve of reference for each class of material.

The grading curve of reference shall satisfy the following requirement :

- (i) Percentage by weight of material retained by sieve D mm shall not be more than 10 %
- (ii) All material shall pass sieve 1.25 D mm.
- (iii) Percentage by weight of material passing by sieve d mm shall not be more than 10%.
- (iv) All material shall be retained by sieve 0.63 d mm.

Percentage by weight of material passing sieve ( D +d) divided by two mm shall be within the range 33 – 67 %.

The total variations, by percentage, around the grading curve of reference for each class of material such as proposed by the Contractor at the commencement of works shall not exceed the following values :

*For Pavement Course (wearing course and base course)*

| NOMINAL SIZE OF SIEVE<br>(mm) | PERCENTAGE BY WEIGHT PASSING |                |
|-------------------------------|------------------------------|----------------|
|                               | WEARING COURSE               | BASE COURSE    |
| <b>25</b>                     | -                            | <b>100</b>     |
| <b>20</b>                     | -                            | <b>95 –100</b> |
| <b>16</b>                     | -                            | <b>91 -99</b>  |
| <b>12.5</b>                   | <b>100</b>                   | <b>75- 91</b>  |
| <b>10</b>                     | <b>94 – 100</b>              | <b>51 –79</b>  |
| <b>5</b>                      | <b>51 – 63</b>               | <b>38- 57</b>  |
| <b>2</b>                      | <b>32 –42</b>                | <b>23 –38</b>  |
| <b>0.6</b>                    | <b>16 –23</b>                | <b>10 –19</b>  |
| <b>0.08</b>                   | <b>7-9</b>                   | <b>5 -7</b>    |

The Los Angeles value shall not exceed 25 for pavement.

The Sand equivalent value measured on 0/2 portion shall be more than 50.

The Flakiness index shall not exceed 25 for pavement.

Coral sand shall not be used.

The loss after 5 cycles of the Sodium Sulphate Soundness test shall be less than 12%.

Clean, cubical, hard and moderately sharp crushed sand free from clay, loam, organic matter or any injurious material, may be used with the approval of the Engineer to replace all or part of the aggregate smaller than 2.35 mm B.S. test sieve.

Rounded sand may be permitted to replace up to half the aggregate smaller than 2.36 mm with the approval of the Engineer.

### **3.6 FILLER**

The filler for asphalt concrete shall be defined as the material passing the 75 micron B.S Sieve: For bituminous base course the filler may comprise either rock dust or a combination of rock dust and mineral filler. For bituminous wearing course the rock dust filler shall not exceed 2 per cent by mass of the total aggregate including filler. The remainder of the filler shall be mineral filler.

The proportion of rock dust and mineral filler in the filler shall not be varied without the consent of the Engineer once the design mix has been approved.

### 3.7 MINERAL FILLER

Mineral filler for bituminous concrete shall be rock dust or ordinary Portland Cement to BS 812. At least 75% by mass shall pass the 75 micron B.S test sieve and the bulk density in toluence shall not be less than 0.5 g/ml and not more than 0.9 g/ml as measured in accordance with BS 812.

### 3.8 BITUMINOUS BINDER

The bitumen binder for bituminous concrete shall be straight run bitumen penetration grade 60/70. The bitumen for the different penetration grades, when tested in accordance with BS 598, AASHTO T164 or ASTM D 2172 method, shall conform to the following requirements :

|                                                                                                             | PENETRATION GRADE |                 |                 |
|-------------------------------------------------------------------------------------------------------------|-------------------|-----------------|-----------------|
|                                                                                                             | 40/50             | 60/70           | 80/100          |
| <b>Penetration at 25<sup>0</sup> C 100g 5 sec (0.1 mm)</b><br><i>(BS 2000: Part 49, ASTM D5,AASHTO T49)</i> | <b>40 – 50</b>    | <b>60 - 70</b>  | <b>80 –100</b>  |
| <b>Specific gravity at 25<sup>0</sup> C (BS 598 : Part 104)</b>                                             | <b>1 – 1.1</b>    | <b>1 – 1.1</b>  | <b>1 – 1.07</b> |
| <b>Softening Point Ring Ball <sup>0</sup> C (BS 2000: Part 58, ASTM D2398, AASHTO T53)</b>                  | <b>47 –60</b>     | <b>43 – 56</b>  | <b>41 –51</b>   |
| <b>Solubility in carbon tetrachloride</b>                                                                   | <b>&gt;99.5</b>   | <b>&gt;99.5</b> | <b>&gt;99.5</b> |
| <b>Flash Point (Open Cup) <sup>0</sup> C (BS 4689, ASTM D92)</b>                                            | <b>&gt;250</b>    | <b>&gt;230</b>  | <b>&gt;230</b>  |
| <b>Wax Content %</b>                                                                                        | <b>&lt;4.5</b>    | <b>&lt;4.5</b>  | <b>&lt;4.5</b>  |
| <b>Ductility at 25<sup>0</sup> C (ASTM D 113,/AASHTO T51)</b>                                               | <b>600</b>        | <b>800</b>      | <b>1000</b>     |
| <b>Loss on heating 1630C 5hrs</b>                                                                           |                   |                 |                 |
| (i) % Loss                                                                                                  | <b>&lt;1</b>      | <b>&lt;1</b>    | <b>&lt;2</b>    |
| (ii) Retained penetration                                                                                   | <b>&gt;70</b>     | <b>&gt;70</b>   | <b>&gt;70</b>   |

### 3.9 ABSORPTIVE AGGREGATES

Where aggregates have a water absorption in excess of 1% as measured in accordance with BS 812 or ASTM C127, some absorption of bitumen will occur that will affect the voids in the mix. In this case the voids in the mix and voids filled with bitumen are to be calculated using the specific gravity of the coated uncompacted mix determined in accordance with ASTM D2041.

### 3.10 MIX REQUIREMENTS

The working mixes for base and wearing courses shall comply with the following requirements from the Marshall Stability test ASTM D1559, AASHTO T 245 based on 75 blows compacted specimens:

|                                              | Base Course/<br>Reshaping | Wearing Course |
|----------------------------------------------|---------------------------|----------------|
| Marshall Stability at 60 <sup>0</sup> C (kg) | 800                       | 1100           |
| Flow (mm)                                    | 2 – 4                     | 2 – 4          |
| Voids in mixed aggregates (%)                | 14 – 18                   | 16 – 20        |
| Voids in total mix (%)                       | 3 – 8                     | 3 – 5          |
| Voids filled with bitumen(%)                 | 67 – 77                   | 70 – 80        |

### 3.11 PREPARATION OF DESIGN MIX

At least two months prior to commencing work on each asphalt concrete layer and whenever changes occur in the nature or source of the bituminous concrete mix constituents, the Contractor shall submit to the Engineer full details of his proposed aggregates grading and bitumen content together with details of the Marshall mix design showing compliance with all of the above mix requirements. The Engineer will then either approve in writing or order changes to the submitted laboratory design mix. The approved laboratory design mix shall be confirmed by full scale plant trials using the full range of bitumen contents. The approved plant trial mix shall be termed the Job Standard Mix.

### 3.12 WORKING MIX

When the Job Standard Mix is approved by the Engineer, the Contractor shall maintain the composition of the working mix within the following tolerances from the Job Standard Mix.

- Bituminous binder Design mix + 0.1 to –0.2% by mass of total mix.
- Aggregate retained on 5 mm B.S Sieve : Design mix + 4% by mass of total mix
- Aggregate passing 5 mm B.S. Sieve but retained on 75 micron B.S. Sieve: Design + 3% by mass of total mix.
- Aggregate passing 75 micron B.S. Sieve: Design mix + 1.5% by mass of total mix.

The bituminous concrete shall be checked periodically and when ordered by the Engineer and shall comply with the above specified requirements.

### 3.13 MIXING AND LAYING

Bituminous concrete shall be prepared in a central mixing plant conforming to the requirements of ASTM designation D995. The mixing time shall not be less than that recommended by the plant manufacturer, or such longer time as may be required to ensure adequate coating of aggregate and uniform distribution of the bitumen through the mix. The

mixing time is to be approved by the Engineer. The plant shall not be operated at a higher speed than the manufacturer's rated capacity. The plant shall be such that the mineral filler shall be kept dry and be separately stored and weighed. It shall be possible to introduce the filler separately into the mixer if required by the Engineer. All aggregates on leaving the drier shall have a moisture content of less than 1% by mass.

The temperature of the bitumen shall be such that its kinematic viscosity is in the range of 150 to 300 centistrokes as it enters the mixer. At no time shall bitumen be heated in excess of 180 °C and any that is so heated shall be removed from site at the Contractor's expense. The temperature of the aggregates, excluding the filler which shall not be heated before entering the mixer shall on entering the mixer be within the same range as for the bitumen but at no time shall its temperature vary by more than 15 °C from that of the bitumen. The asphalt base and wearing courses shall be constructed in the layers of thickness shown on the drawings.

**The mixture shall be laid by an approved mechanical paver and the temperatures of the mix at the time of the laying shall be between 120 °C and 160 °C. The pour shall at all times be adjusted and operated to eliminate segregation of the mix and to provide an even flow of mix across the full width of screed. The vibrating tamper or screed of the paver is to be arranged to apply the same degree of compaction across the full width of paving.**

**The speed of the paver and rate of supply of mix shall be matched so as to avoid stopping the paver between successive loads: the paver shall be operated to move up to the trucks transporting the mix, which shall either be stationary or moving in the same direction as the paver at the time of contract. When laying bituminous on gradients steeper than 4% the paver shall be operated in a up-hill direction.**

### **3.14 COMPACTION**

**The mix shall be rolled immediately after laying and before its temperature has fallen below 105 °C. The mix shall be given an initial pass of a light tandem roller and then rolling shall continue with pneumatic rollers. Such rolling shall be continued only for so long as it is effective and does not have any detrimental effect. The above minimum rolling temperature may be lowered at the discretion of the Engineer, but shall in no case below 100 °C.**

**Rolling of the surface shall be continued until all roller marks are eliminated and a density has been obtained at least 98% of the density achieved on laboratory samples made from the plant mix used for the layer concerned and conforming to the design formula approved by the Engineer. The wearing course shall be given a finishing roll with a 12 T three wheeled steel roller. Care should be taken in the selection and use of rollers so as not to overcompact the layers.**

### **3.15 TRIAL AREA**

The Contractor shall arrange for a trial area of bituminous concrete to be laid in an area to the required thickness using the plant and methods to be used for the permanent surfacing to the full width normally produced by the plant and not less than 50 metres long. Samples shall be taken and tested in accordance with the relevant clauses of Section 1 from a representative part of the road base, base course and surfacing where directed by the Engineer.

In case, the trial lay fails to meet the design standards, the mix and/or workmanship shall be adjusted and new trial lays repeated until a satisfactory and specification complying layer is achieved, all to the expense of the Contractor.

At the risk of the Contractor the trial area may be laid as part of the permanent work. In that case any layer proved by tests to be defective shall be removed by the Contractor at his own cost. The Contractor shall allow for the cost of complying with the above in his tender.

### **3.16 JOINTS**

Transverse joints in the wearing course shall be offset at least 1 m from those in the base course. Longitudinal joints shall be offset at least 150 mm. At transverse joints between existing compacted surfacing and newly laid surfacing the edge of the existing surfacing along the joint shall be neatly cut away in straight lines over a sufficient width to ensure that the full specified thickness of new surfacing is placed. The exposed edge in the existing work shall if directed, be painted with hot bitumen immediately in advance of placing the new work. Where the bituminous layers are laid in half widths, the longitudinal joints between them shall, if directed, be treated similarly to the transverse joints.

### **3.17 TOLERANCES**

The compacted thickness and half-width of each layer of asphalt concrete shall not be less than that specified. For bituminous base courses the finished surface shall be checked with a 4.0 metre straight edge and there shall be no gaps between the asphalt base surface and the straight edge exceeding 8 mm.

For wearing course the final surface shall be a uniform texture and shall be checked with a 4.0 metre straight edge and there shall be no gap between the finished surface and the straight edge exceeding 4 mm. The surface level of the pavement at any point shall not deviate vertically from the true finished road surface as calculated from the vertical profile and crossfalls, shown on the Drawings or as directed by the Engineer, by more than + 6 mm.

### **3.18 WEATHER LIMITATIONS**

Bituminous pavement materials shall not be mixed when the moisture content of the aggregate is such as to interfere with the uniformity of the mixing temperature or with continuous plant operations. It shall not be laid when the underlying layer is damp or dusty.

### **3.19 DEFECTS**

Any defects in the bituminous work, caused by faulty workmanship or materials shall be corrected and made good at the Contractor's own expense. Care shall be taken when starting and stopping the paver to prevent the formation of humps and depressions. Any material that becomes mixed with foreign bodies, or is in any way defective, shall be removed and replaced with fresh material and compacted as specified.

For wearing course where the surface levels of the newly laid bituminous concrete fall outside the tolerances specified, the entire thickness of the wearing course shall be considered defective and shall be trimmed off and removed and fresh layer relaid in accordance with the Specification, all at the Contractor's own costs. Skin patching of an area that has been rolled will not be permitted.

### **3.20 TRANSPORTATION**

The bituminous materials shall be transported from the mixing plant to the spreader in tripper trucks having tight, clean, smooth beds and sides which have been treated to prevent adhesion of the mixture to the truck bodies. A thin film of soap water or approved lubricating oil may be used to prevent adhesion but gasoline, kerosene or other solvents shall not be used for this purpose. Deliveries shall be made so that spreading can be completed during daylight unless otherwise approved by the Engineer and appropriate and sufficient artificial lighting is provided. Hauling over freshly laid material will not be permitted.

### **3.21 PROTECTION**

After final rolling no vehicular traffic of any kind shall be permitted on the surfacing for at least 24 hours or such longer times as may be ordered by the Engineer. No rollers or other plant shall be left standing on completed work.

### **3.22 CARRIAGEAWAY**

The Contractor shall obtain confirmation and approval from the Engineer of the type of material to be used and the thickness to be provided on each road, and the terminal points, before any material is laid.

### 3.23 *DOUBLE BITUMINOUS SURFACE TREATMENT*

For surface treatment the rate of application of binder and chippings shall be determined on site according to type of binder and chippings. The following table gives the average rates upon which bill prices have to be based:

|                             | CUTBACK<br>RC 250<br>Kg/m <sup>2</sup> | CHIPPINGS<br>Litre/m <sup>2</sup> |     |       |
|-----------------------------|----------------------------------------|-----------------------------------|-----|-------|
|                             |                                        | 2/4                               | 4/6 | 10/14 |
| Single surface<br>Treatment | 1.0                                    |                                   | 8.0 |       |
| Double Surface<br>Treatment |                                        |                                   |     |       |
| 1 <sup>st</sup> Layer       | 1.1                                    |                                   |     | 11.0  |
| 2 <sup>nd</sup> Layer       | 0.9                                    |                                   | 8.0 |       |

The binder RC 250 or equivalent shall be sprayed mechanically by means of a pressure distributor after the road base has been cleaned as specified for priming.

The distributor shall be such that the spraying is uniform on an adjustable width. The spraying pressure shall be uniform whatever the running speed may be. A competent foreman shall continuously supervise the spraying of binder. All road furniture shall be protected.

Chippings shall spread mechanically immediately after the binder has been applied. A maximum delay of 5 minutes shall be authorised.

10/12 ton self propelled tyred roller shall be exclusively used. They shall make 3 to 5 passes, subject to approval of the Engineer.

When the surface dressing has been completed, all surplus material shall be swept away by mechanical brooms.

The rates shall be checked everyday for each layer of binder and chippings in cross section as well as in longitudinal direction. Nowhere the departure from the required rate shall exceed 10%.

## SECTION 4 – CONCRETE WORKS

### 4.1 MATERIALS

This Section deals with reinforced and unreinforced concrete works, formwork and falseworks of any kind, and the reinforcement.

#### *(1) Cement*

Ordinary Portland Cement and rapid hardening Portland Cement shall comply with the requirements of MS 36: Portland Cement (Ordinary and Rapid-Hardening).

Each consignment of cement shall be accompanied by the manufacturer's certificate giving results of tests. If such certificate is not available, representative samples shall be taken from different bags or containers of each consignment, suitably packed and sent for testing, to prove its compliance with the requirements of MS 36 to an approved laboratory or where directed by the Engineer, all at the Contractor's expense.

All bagged cement shall be stored in a waterproof shed on a wooden floor raised at least 150mm above the surrounding ground and any Cement which shall have become injuriously affected by dampness or other causes shall at once be removed from the Site. Cement which has been rebagged either by the importing agent or by the Contractor, whether through the breakage of the original bag or any cause, shall not normally be accepted, but may be used in special cases and in certain parts of the work, if the written approval of the Engineer is first obtained.

#### *(2) Aggregates*

Aggregates for concrete shall consist of naturally occurring material complying with the requirements of BS-882 Concrete Aggregates from Natural Sources. The fine aggregates for concrete shall consist of clean sharp sand or crusher dust or a mixture of sand and crusher dust and shall not contain any iron pyrites, coal, mica, shale or similar laminated materials, flaky or elongated materials, shells and other porous or fragile particles, soluble matters, sulphates, alkalis and other deleterious materials in such a form or in a sufficient quantity as to affect adversely the strength or durability of concrete, or in addition to the above for reinforced concrete, any materials which would attack the reinforcement.

Aggregates shall be clean and free from adherent coatings, such as clay. The fine aggregate shall comply in all respects with the requirements of BS 882 for fine aggregate.

The coarse aggregate shall consist of crushed or natural gravel or shingle or alternatively of broken hard, close grained stone of an igneous or other rock, to the approval of the Engineer. It shall be free from adherent coatings and shall, if necessary, be washed to achieve this, and shall conform to the following requirements:

(a) The amount of deleterious substance shall not exceed the following limits:

|                                                                                 | Max. Permissible<br>% by weight |
|---------------------------------------------------------------------------------|---------------------------------|
| Clay lumps                                                                      | 0.25                            |
| Material passing 75 micron BS Sieve                                             | 1.00                            |
| Calcium sulphate expressed SO                                                   | 0.25                            |
| Sodium Sulphate Soundness<br>(BS 1438 Appendix B)<br>Weight loss after 5 cycles | 12.00                           |
| Thin or elongated pieces (length greater<br>than 5 times average thickness)     | 15.00                           |
| Maximum Flakiness Index (BS 812 sieve<br>method)                                |                                 |
| For 35mm aggregates                                                             | 40                              |
| For 20mm aggregates                                                             | 35                              |

(b) The abrasion loss, as determined on representative samples in accordance with ASTM C131 shall not exceed 40%.

The aggregate crushing value, as determined on representative samples in accordance with BS 812, shall not exceed 35% as an average or 40% as an absolute maximum.

The drying shrinkage of the aggregate when tested in accordance with the British Building Research Establishment Standard test shall not exceed the following:

|                        |       |
|------------------------|-------|
| For precast            | 0.04% |
| For all other concrete | 0.06% |

### (3) Grading of Aggregate

#### *Fine Aggregate*

i) Grading of fine aggregates shall comply with Grading Zones given in the following table:-

Percentage by weight passing BS Sieve

| BS Sieve Size<br>mm | Grading Zone<br>1 | Grading Zone<br>2 | Grading Zone<br>3 | Grading Zone<br>4 |
|---------------------|-------------------|-------------------|-------------------|-------------------|
| 10                  | 100               | 100               | 100               | 100               |
| 5                   | 90-100            | 90-100            | 90-100            | 95-100            |
| 2.35                | 60-95             | 75-100            | 85-100            | 90-100            |
| 1.18                | 30-70             | 55-90             | 75-100            | 90-100            |
| 0.60                | 15-34             | 35-59             | 60-79             | 80-100            |
| 0.30                | 5-20              | 10-30             | 15-40             | 15-50             |
| 0.15                | 0-10              | 0-10              | 0-10              | 0-15              |

ii) Any fine aggregate which does not comply with the requirements of these Specification shall be immediately removed from the Site or placed in a stockpile for use in other parts of the Works, if it complies with the requirements thereof, as directed by the Engineer.

*Coarse Aggregate*

i) The Contractor shall arrange for the delivery of the coarse aggregate to Site in separate nominal sizes. The grading of such nominal size of aggregate shall be in accordance with the requirements indicated in the following table:

Percentage by weight passing B.S Sieve

| BS Sieve Size | Nominal size of single sized aggregate |        |        |        |        |
|---------------|----------------------------------------|--------|--------|--------|--------|
|               | 63mm                                   | 38mm   | 20mm   | 12mm   | 9.5mm  |
| 75mm          | 100                                    |        |        |        |        |
| 63mm          | 85-100                                 | 100    |        |        |        |
| 37.5mm        | 0-30                                   | 85-100 | 100    |        |        |
| 20mm          |                                        | 0-20   | 85-100 | 100    |        |
| 14mm          |                                        |        |        | 85-100 | 100    |
| 10mm          |                                        | 0-5    | 0-20   | 0-45   | 85-100 |
| 5mm           |                                        |        | 0-5    | 0-10   | 0-20   |
| 2.36mm        |                                        |        | 0-2    | 0-2    | 0-5    |

ii) For Class 15(40) concrete, volumetric proportioning of coarse aggregate and of fine aggregate will only be permitted at the Engineer's discretion.

For all other concrete mixes the Contractor will be required to produce coarse aggregate grading by weight batching the single sized aggregates.

iii) The single-sized aggregate shall be combined in proportions to give overall gradings for coarse aggregates in accordance with the requirements of BS 882 as set out in the following table:

Percentage by weight passing B.S Sieve

| BS Sieve Size | Nominal size of single sized aggregate |             |             |
|---------------|----------------------------------------|-------------|-------------|
|               | 30mm to 5mm                            | 20mm to 5mm | 12mm to 5mm |
| 63mm          | 100                                    |             |             |
| 37.5mm        | 95-100                                 | 100         |             |
| 20mm          | 30-70                                  | 95-100      | 100         |
| 14mm          |                                        |             | 90-100      |
| 10mm          | 10-35                                  | 25-55       | 40-85       |
| 5mm           | 0-5                                    | 0-10        | 0-10        |

- iv) **The amounts or proportions of each single-sized aggregate to be combined to form the coarse aggregate shall be varied from time to time as may be rendered necessary by the nature and source of the coarse and fine aggregates adopted by the Contractor, in order to produce at all times a concrete of the maximum density and workability with the minimum water cement ratio.**
- v) **No claim of any kind will be accepted in respect of any such variation in the amounts or proportions of the single-sized aggregates and the Contractor shall allow in his tender for such variations. Under no circumstances shall more than one single-sized aggregate be delivered to the place of gauging in one truck or lorry.**

#### ***(4) Storing of Aggregates***

**Aggregate shall be stored in single sizes in separate bins or on areas covered with tightly laid wood planks, sheet metal, hard compact gravel, concrete or other hard and clean surfaces, which surfaces shall be self-draining, and in such a manner that will preclude the inclusion of foreign material. Aggregate of different gradings and sizes and from different sources shall be stored in separate piles and if these piles are close together they shall be separated by bulkheads. Adequate stocks of fine aggregates shall be maintained to ensure uniformity of moisture content when used.**

**The Engineer shall have the power to reject any aggregate which does not conform to the above requirement. Rejected materials shall be immediately removed from site or disposed of at the expenses of the Contractor. The variation of grading between the approved samples and subsequent consignments of single-sized aggregate shall not exceed 5 per cent.**

#### ***4.2 NORMAL CONCRETE MIXES***

**Concrete mixes shall be designed in accordance with “Design of Normal Concrete Mixes’ 1976, published by the UK Department of the Environment, or in accordance with other approved method.**

#### ***4.3 STANDARD MIXES***

- (i) The concrete shall attain the strength shown in Table No. 5, both in the test cubes and throughout the whole of the placed work. The cement content must not fall below the minimum specified in Table No. 5.**
- (ii) Aggregates shall be batched by weight for all classes of concrete and hoppers shall be an approved adjustable type. With the written approval of the Engineer, volume batching may be permitted for batching aggregates for concrete Class 15(40). Where aggregates are batched by volume, stout gauge boxes, approved by the Engineer, shall be used. The volume of the gauge boxes shall take into account the bulking of the aggregates.**

- (iii) When bagged cement is used, the total volume or weight of aggregates per batch shall be such that a whole bag of cement is utilised; the use of cement from broken bags will not be permitted. When cement in drums or from a bulk-silo is used, the batching of the cement shall be by weight.

### CONCRETE SCHEDULES

| Concrete Class | Minimum Concrete Strength<br>Strength N/mm <sup>2</sup> |         | Minimum<br>Cement<br>Content<br>Kg/m <sup>3</sup> | Part of Works                       |
|----------------|---------------------------------------------------------|---------|---------------------------------------------------|-------------------------------------|
|                | 7 days                                                  | 28 days |                                                   |                                     |
| 15(40)         | 10                                                      | 15      | 250                                               | Blinding Layer<br>Surround to pipe  |
| 20(20)         | 14                                                      | 20      | 290                                               | Concrete Bedding<br>Backing to kerb |
| 25(20)         | 17                                                      | 25      | 340                                               | Kerbs Bases to<br>Post              |
| 30(20)         | 20                                                      | 30      | 400                                               | Culverts Bridge<br>Decks            |

#### Notes

1. The class of concrete is denoted by the specified minimum 28 days cube strength, in N/mm<sup>2</sup> of the works cubes. The maximum size of aggregate is 20mm for all mix classes except for class 15(40) where 40mm maximum aggregate size is allowed.
2. The design mixes are based on Portland cement complying with MS 36 or BS 4027, and natural aggregates complying with BS 882. No special cement or light weight aggregates are to be used.

#### 4.4 MIXING WATER

Mixing water for use with cement shall be from a source and of a quality approved by the Engineer. It shall be clean and free of oil, acid, alkali, salt, organic matter or other deleterious substances.

#### 4.5 WATER/CEMENT RATIO

The quantity of water used for each class of concrete shall be just sufficient to produce a dense concrete of adequate strength and workability for its purpose. The moisture content of the coarse and fine aggregate in stockpiles shall be periodically determined as directed by the Engineer, and due allowance for the water present in them shall be made when determining the amount of water to be added at the mixer.

#### ***4.6 MIXING ON SITE***

Unless otherwise authorised by the Engineer, concrete shall be machine mixed at the Site.

Concrete shall be thoroughly mixed in a batchmixer of an approved size and type which will ensure a uniform distribution of the materials throughout the mass. The mixer shall be equipped with adequate water storage and with a device for accurately measuring and automatically controlling the amount of water used in each batch. A mechanical means shall be provided for recording the number of revolutions for each batch and automatically preventing the discharge of the mixer until the materials have been mixed to the approval of the Engineer.

The entire contents of the mixer shall be removed from the drum before materials for a succeeding batch are placed therein. No mixer having a rated capacity of less than one batch shall be used nor shall a mixer be charged in excess of its rated capacity. All concrete shall be mixed for a period of not less than 1 minutes after all materials, including water, are in the mixer. During the period of mixing, the mixer shall operate at the speed for which it has been designed, but this speed shall not be less than 14 nor more than 20 revolutions per minute.

Prior to producing the first daily batch of concrete to be used in the works, or after the mixer has been cleaned, the mixer shall be operated with a sufficient quantity of water, cement and aggregates to thoroughly coat the inside of the mixer drum, to obviate a deficiency of these materials in the first batch of Works concrete produced. On completion of this coating process, the coating batch shall be removed from the mixer and deposited in an approved location away from the Works. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before further concrete is mixed. The mixing plant and concrete transporting equipment shall be thoroughly cleaned before changing from one type of cement to another. The contractor will allow in his tender for all costs involved in complying with the above requirements.

#### ***4.7 READY MIXED CONCRETE***

Ready mixed concrete, as defined in BS 5328 and batched off the site may only be used with the approval of the Engineer and shall comply with all requirements of the Specification. Ready mixed concrete shall be mixed and delivered to the site of the works by means of one of the following combination of operations:

- (a) Mixed completely at a central plant and the mixed concrete transported to the point of delivery in truck agitators.
- (b) Mixed partially at a central point and the mixing completed in a truck mixer.
- (c) Mixed completely in a truck mixer.

**Mixing at a central plant shall conform to the requirements for mixing on Site. The organization supplying premixed concrete shall have sufficient plant capacity and transporting apparatus to ensure continuous delivery at the rate required. Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed and the manufacturer's guaranteed capacity of the drum or container in terms of volume of mixed concrete and the speed of the rotation of mixing drum or blades.**

**Truck mixers, unless otherwise authorised by the Engineer, shall be of the revolving drum type, watertight, and so constructed that the concrete can be mixed to ensure a uniform distribution of the materials throughout the mass. All solid materials for the concrete shall be accurately measured as specified and charged into the drum at the proportioning plant.**

**Except as subsequently provided, the truck mixer shall be equipped with a tank for carrying mixing water.**

**Only the prescribed amount of water shall be placed in the tank unless the tank is equipped with a device by which the quantity of water added can be readily verified. The mixing water may be added directly to the batch, in which case a tank shall not be required. Truck mixers may be required to be provided with means by which the mixing time can be readily verified by the Engineer.**

**Concrete transported in a truck mixer, agitator, or other transportation device shall be discharged at the site and placed in its final position in the forms within 45 minutes after the introduction of the mixing water to the cement and aggregate or the cement to the aggregate except that in hot weather or under other conditions contributing to quick setting of the concrete, the maximum allowable time may be reduced by the engineer. The maximum volume of mixed concrete transported in an agitator shall be in accordance with the specified rating.**

#### ***4.8 HANDLING AND PLACING OF CONCRETE***

##### ***(1) General***

**In preparation for the placing of concrete, all sawdust, chips, and other construction debris and extraneous matter shall be removed from the interior of forms. Struts, stays and braces, serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. These temporary members shall be entirely removed from the forms and not buried in the concrete.**

No concrete shall be placed until the Engineer has approved the formwork and reinforcement. The Contractor shall give at least 24 hours notice to the Engineer of the times he proposes to concrete and the Engineer may order that no concreting shall take place until either he or his representative is present. No concrete operation shall fall in a weekend or on a public holiday except absolutely necessary and unless written approval of the Engineer is priorly obtained.

**(2) Handling**

Concrete shall be transported in watertight containers in such a manner that will avoid the segregation of the constituent materials. The time elapsing between the initial mixing of the concrete and final placing in the work shall not exceed 45 minutes when Portland Cement is used. Where other cements are used, the Engineer will stipulate the maximum time allowed. Concrete remaining unplaced at the end of this period shall not be placed in the Works but shall be removed from the Site and disposed of at the Contractor's expense.

**(3) Placing**

Concrete shall not be dropped through a height exceeding 1.5 metres. For lowering concrete through heights in excess of 1.5 metres special methods shall be used, such as chutes, tremies, bottom dumping hoppers or bagged placing and only with the approval of the Engineer. All containers, troughs, chutes and apparatus through and in which the concrete is passed shall be kept clean and entirely free from hardened concrete or cement and free from contamination by extraneous material, and where there is an interruption of concreting exceeding 30 minutes, these shall be cleaned and hosed down with water.

When Concrete is placed in horizontal layers it shall not be more than 300mm thick except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in 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 segregation between the batches.

Each layer shall be compacted so as to avoid the formation of construction joints with a preceding layer which has not taken initial set. When in-situ concrete has been in place for 4 hours no further concrete shall be placed against it for a further 20 hours.

The concrete placed immediately adjacent to existing concrete shall contain only two-thirds the normal quantity of coarse aggregate, and shall be thoroughly compacted and worked against the existing concretes. A competent steel fixer shall be in attendance the whole time concrete is being cast around reinforcement. Immediately following the discontinuance of placing concrete, all accumulations of mortar splashed upon the reinforcement steel and the surface of forms shall be removed.

Dried mortar chips and dust shall not be puddled into the unset concrete. If the accumulations are not removed prior to the concrete becoming set, care shall be exercised not to injure or break the concrete steel bond at and near the surface of the concrete, while cleaning the reinforcement steel.

#### **4.9 COMPACTION OF CONCRETE**

**Concrete during and immediately depositing, shall be thoroughly compacted to produce a dense homogeneous mass. The compaction shall be done by mechanical vibration subject to the following provisions:**

- i) The vibration shall be internal unless special authorisation of other methods is given by the Engineer or as provided herein.**
- ii) Vibrators shall be of a type and design approved by the Engineer. They shall be capable of transmitting vibration to the concrete at frequencies of not less than 4,500 impulse per minute.**
- iii) The intensity of vibration shall be such as to visibly affect a mass of concrete of 25mm slump over a radius of at least 450mm to 600mm.**
- iv) The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms.**
- v) Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures, and into the corners and angles of the forms. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly.**
- vi) The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued at any one point to the extent that localised areas of grout are formed. Application of vibrators shall be at uniformity spaced points and not farther apart than twice the radius over which the vibration is visibly effective.**
- vii) Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over the distances so great as to cause segregation, and vibrators shall not be used to transport concrete in the forms.**
- viii) Vibration may be supplemented by such spading as is necessary to ensure smooth surfaces and dense concrete within the forms.**

#### ***4.10 PROTECTION AND CURING OF CONCRETE***

Immediately after compaction and for 10 days thereafter concrete shall be protected against harmful effects of weather including rain, drying winds, rapid temperature changes, running or surface water and shockloads. It shall be protected by keeping it covered with damp hessian, straw, damp sand or other approved material and kept moist.

All curing methods to be used shall be subject to the approval of the Engineer. The formwork shall also be kept damp and, if struck earlier than seven days, shall be replaced for the remaining period with other approved damp material.

All concrete surfaces in contact with earth fill material shall be waterproofed with two coats of approved bituminous emulsion, either brushed or sprayed on, and on such surfaces curing membrane shall not be used. Care shall be taken to ensure that no bituminous paint where used is exposed to view after backfilling of the structures. All unsightly marks or spray shall be removed and the concrete made good at the Contractor's expense.

#### ***4.11 TOLERANCES***

The concrete work shall be constructed as accurately as possible and the following tolerances will be permitted in the finished concrete work:

- i) in the cross-sectional dimensions of structures not more than 3 mm.
- ii) in dimensions, other than cross-sectional dimensions of structures not more than 6mm.
- iii) in any surface the irregularity shall not exceed 5mm measured from a 3m long straight edge.
- iv) no member shall be out of line by more than 5mm.
- v) no wall shall be out of plumb by more than 5mm or, if battered, out of batter by more than 5mm.

#### ***4.12 SAMPLING AND TESTING***

Immediately on starting production on site, samples of concrete shall be taken as follows:

On each of the first 4 days of concreting, for each class of concrete, shall be made 6 test cubes from 2 separate samples. Three test cubes from each samples to be tested at 7 days, the other 3 at 28 days. One test result shall be the average crushing strength from the three cubes in the same sample, tested either at 7 days or at 28 days.

**For the concrete to be acceptable the following conditions must be satisfied.**

- a) not more than one individual result in the same test shall fall below the specified works cube strength.**
- b) no individual result to fall below 90% of the specified works cube strength.**
- b) no test result (average of three cubes in one sample) to fall below the specified works cube strength.**

**When at least 4 consecutive working days concrete production has been proved satisfactory, the frequency of testing may be reduced at the Engineer's discretion. The frequency and number of tests required by the Engineer for any concrete subsequently used in the Works will be at the discretion of the Engineer, and the Contractor will be deemed to have included for all costs required in the carrying out of the tests for trial mixes, and subsequent concrete quality control tests, in his tender for all parts of the Works, and for the whole duration of the contract.**

#### ***4.13 LOADING CONCRETE STRUCTURES***

**No concrete structure will be subjected to loading including its own mass which will induce a compress stress of one third of its compressive strength at time of loading or of the specified 28 days strength.**

#### ***4.14 FAULTY CONCRETE***

**Any concrete which, in the opinion of the Engineer, fails to comply with the Specification shall be declared defective, and shall be cut out, removed from the site and any steelwork, reinforcement or other material damaged by the cutting out shall be replaced to the approval of the Engineer and at the Contractor's expense. The Contractor may submit to the Engineer details of his proposals for rectifying the defects and shall comply with the Engineer's instructions regarding the method of carrying out the work. Notwithstanding the Engineer's approval, should the remedial work prove again unsatisfactory, the Contractor shall further make good all defective and rejected work at his own expense.**

#### ***4.15 PRECAST CONCRETE***

##### ***1) General***

**Precast concrete structural members shall generally comply with the requirements of British Standard Code of Practice 116, except where varied by the requirements of these Specification or the Drawings.**

**The Contractor shall set up on Site an adequate precasting yard undercover, capable of handling all the precast concrete works and shall provide a suitably qualified Engineer to supervise the working on the yard all to the satisfaction of the Engineer. The**

contractor shall provide full details and drawings showing his proposals for the precasting yard, and until approval is given in writing no work on erection of the yard or producing precast concrete shall commence.

### *2) Concrete Grades*

Concrete grades shall be all as shown on the Drawings and in accordance with the Schedule of Concrete Mixes.

### *3) Casting Method*

The precast units shall each be cast complete in one operation, on suitable and sufficient platforms and moulds, all to the satisfaction of the Engineer. Before casting is commenced the Contractor shall submit, for the approval of the Engineer fully detailed drawings showing the proposed layout of casting beds, together with the details of the method of assembling and dismantling of the moulds, and lifting assembly of the units.

In cases where the finished thickness of the concrete is small, and compaction by internal or surface vibration will be difficult, the mould may be constructed so that external vibration of the shutter will satisfactorily compact the concrete, or vibrating tables may be used. The soffit shutter shall be adequately supported to prevent any settlement which might cause cracking of the concrete.

Provision shall be made to hold firmly and maintain in position all projecting reinforcement, bolts, screwed sockets and lifting holes, so that they are correctly located in the completed unit or member concerned.

### *4) Weather Protection and Curing*

The precast units shall at all times be cast under suitable shelter to provide complete protection from the sun, rain and drying winds. They shall remain under the shelter for at least seven days or until the units are strong enough to be lifted from the casting beds, whichever is the longer period. Similar to in-situ concrete, all exposed precast concrete shall be protected and cured as described in Sub-section 6.12. Thereafter, the units may be transferred to a storage area or be erected in their final position.

### *5) Surface Finishes Generally*

The methods used for compacting the concrete must be such that pinholes or airholes on the surface are avoided. Upon removal of the formwork, any units having a concrete face with rough, uneven, segregated, honeycombed or imperfect finish, or which shall be permanently discoloured, may be rejected at the Engineer's discretion. Where carrying out of remedial work is approved by the Engineer, irregularities shall be eliminated by grinding, or where an area shows airholes, these shall be filled and thoroughly rubbed over to leave the desired surface. Unsightly encrustations and stains shall be removed from all exposed surfaces. Remedial work of all kinds must be carried out strictly in accordance with the Specification and any further instructions which may be given by the Engineer. Any units which are rejected shall be disposed of away from the Site at the Contractor's expense.

#### **6) *Lifting and Handling of Units***

No items may be lifted from the casting beds until they have gained sufficient strength to avoid damage through lifting, handling, stacking or erection. Notwithstanding any guidance given by the Engineer on the concrete strength necessary to prevent damage, the Contractor shall be entirely responsible for the sufficiency of strength of units before lifting. Any items found damaged or cracked during and after lifting operation will be rejected by the Engineer, and rejected items must not be incorporated in the works and must be disposed of and replaced at the Contractor's expense.

Before casting, the Contractor shall submit to the Engineer, for his approval, full details of the proposed method of hoisting precast units including the location of proposed lifting points. The contractor shall be responsible for the design and provision of extra reinforcement that may be required to facilitate the handling of the precast units and his tendered price shall include for this. The edges of precast units shall be protected by tenders of timber or other approved material during the lifting, handling and erection stages.

#### **7) *Stacking of Precast Units***

Where members are stored; they shall be firmly supported at such bearing positions that will ensure that stresses induced in them are always less than the permissible design stresses. Ample space is to be provided for the storage and stacking of the units. Units shall not be walked on or come into contact with the ground or with dirty or greasy hands or with ropes and cables. Nor shall wet slabs come into contact with dirty packs or pieces of timber which will discolour them. The units shall be stacked in such a way that the faces are protected both from damage and from staining. Where precast units have reinforcement left projecting, great care must be taken to ensure that any rust from these bars will not stain the finished concrete surfaces.

#### **8) *Tolerances***

The dimensional tolerances shall be in accordance with the requirements of British Standard Code of Practice 116, except where otherwise specified or indicated on the Drawings.

#### **4.16 *FORMWORKS***

All formwork shall be approved by the Engineer before casting in-situ concrete.

#### **4.17 *STEEL REINFORCEMENT FOR STRUCTURES***

All reinforcing steels shall conform to MS 10. The Contractor shall, when called upon by the Engineer, provide representative sample pieces for testing.

Alternatively, the reinforcement of concrete may comply with the following requirements:

|                       |         |
|-----------------------|---------|
| Hot rolled Mild Steel | BS 4449 |
| Medium Tensile Steel  | BS 4449 |
| High Tensile Steel    | BS 4449 |
| Cold Worked Steel     | BS 4461 |
| Steel Fabric          | BS 4483 |
| Stainless Steel       | BS 970  |

All reinforcement shall be from an approved manufacturer, and, if required by the Engineer, the Contractor shall submit a test certificate of the rolling. The Contractor shall when requested by the Engineer, provide sample pieces for testing in an approved Materials Testing Laboratory, all at the Contractor's expense.

All reinforcement shall be free from scale, rust, grease, paint or other substances likely to reduce the bond between the steel and the concrete.

When placed in the Works, reinforcement shall be free from coatings of dirt, detrimental scale, paint, oil or other foreign substance.

Reinforcement shall be stored off the ground and be protected from rusting, coatings of deleterious material and excessive distortions. Any bar that, in the opinion of the Engineer, has been adversely affected by storage shall be cleaned, or removed from the Site and replaced by the Contractor at his own expense.

Bar reinforcement shall be cut and bent to shapes shown on the Drawings and according to bending schedules, prepared by the Contractor and approved by the Engineer.

The reinforcement shall be fixed rigidly and accurately in the forms in accordance with the details shown on the Drawings so that the specified spacing and concrete cover are maintained throughout.

No concrete shall be deposited in the forms until the Engineer has inspected the reinforcement and has given permission to place concrete.

#### ***4.18 CONCRETE DRAINS***

Precast concrete drains shall be constructed to the cross section shown in the drawing in lengths not exceeding 2 metres, and the ends shaped so as to interlock with each other. The joints shall be mortared and rubbed down to a smooth finish. The top edge of the wall shall be carefully finished smooth and level so that any precast covers placed on it will not rock.

**In built-up areas where drains will be provided along the road, the Contractor will have to realign CWA house service connections under the drains as directed by the Engineer using 20,25,50 or 62 mm diameter polyethylene pipes and appropriate fitting.**

#### ***4.19 CONCRETE KERBS***

**Precast concrete kerbs, shall comply with the requirements of BS 340 and BS 368 and with the Drawings.**

**Specially cast radial curves shall be used on curves where the radius is 5m or less.**

**All kerbs shall be butt jointed and all joints shall be mortared. The quality of concrete, used in kerbs shall be in accordance with relevant sections in these Specification.**

**Special attention shall be given to the programming of the work so as to avoid clashes and possible removal of installed kerbs.**

#### ***4.20 TOLERANCE ON LAYING CONCRETE KERBS***

**Any concrete kerbs deviating in line or level by more than 3mm when tested with a 1 metre straight edge shall be made good by relaying to the satisfaction of the Engineer at the Contractor's own costs.**

#### ***4.21 CEMENT MORTAR***

**Mortar shall consist of 1 part cement to 3 parts sand with such minimum quantity of water as is necessary to produce the suitable plasticity for the work for which it is required and shall be used within one hour of mixing.**

#### ***4.22 CEMENT GROUT***

**Cement grout shall consist of cement and such minimum quantity of water as is necessary to produce the suitable plasticity for the work for which it is required. It shall be used while fresh and within thirty minutes of mixing.**

#### ***4.23 LIME MORTAR***

**Lime mortar shall consist of one part of hydrated lime to two and a half parts of sand, and such quantity of water as is necessary to produce the suitable plasticity for the work for which it is required, and, shall be used within one hour of mixing.**

#### ***4.24 HYDRATED LIME***

**Lime for stabilisation shall be Hydrated Calcium Lime (Not Magnesium) and shall generally comply with BS 890, Class B, and with a free lime content of 50 %.**

**Locally manufactured limes may be accepted by the Engineer in lieu of lime to BS 890 and contractors are advised to ascertain from the Engineer what local limes may be suitable. All percentages of lime specified are based upon hydrated Calcium Limes complying with BS 890 and an adjustment of these percentages may be required for some locally made limes.**

The Contractor shall submit with all consignments at his own expense, the manufacturer's data sheets certifying that it complies with BS 890.

#### ***4.25 BASALT SAND FOR MORTAR***

Sand for mortar shall comply with BS 812 and the grading shall be within the limits specified. Test for purity (ASTM C40) shall be made for each consignment, and at least once a day when sand is used.

#### ***4.26 MASONRY WORKS***

Stones for masonry works shall consist of sound undecomposed basalt obtained from approved boulders and be of even texture and colour.

The masonry shall be laid to line and in courses roughly levelled up. The bottom courses shall be composed of large selected stones and all courses shall be laid with bearing beds parallel to the natural beds of the material.

Each stone shall be cleaned thoroughly, saturated with water before being set and the bed which is to receive it shall be clean and well moistened. All stones shall be well bedded in freshly made mortar. The mortar joints shall be full and the stones carefully settled in place before the mortar has set.

Wherever possible, the face joints shall be properly pointed before the mortar becomes set. Joint which cannot be so pointed shall be prepared by racking them out to a depth of 5 cm before the mortar has set.

The face surfaces of stones shall not be smeared with the mortar forced in the joints or that used in pointing.

Vertical joints in each course shall break with those adjoining courses at least 15 cm. In no case shall a vertical joint be so located so as to occur directly above or below a header.

In case any stone is moved or the joint broken, the stone shall be taken up, the mortar thoroughly cleaned from beds and joints, and the stone is reset in fresh mortar.

Joints not pointed at the time the stone is laid shall be thoroughly wet with clean water and filled with mortar. The mortar shall be well driven into the joints and finished with an approved pointing tool. The wall shall be kept wet while pointing is being done and in hot and dry weather the pointed masonry shall be protected from the sun and kept wet for a period of at least four days after completion. After the pointing is completed and the mortar has set, the walls shall be thoroughly cleaned and left in a neat condition.

#### **4.27 PHOTOGRAPHS**

If for the purpose of the works, the contractor has to demolish any wall, fence, gate, shed, post, shrine or planted hedge located in a private property, he shall, as directed by the Engineer, take photographs of the existing structure before proceeding with any demolition work. A copy of each photograph taken shall be submitted to the Engineer.

#### **4.28 LABORATORY TESTS**

All tests required for the selection of materials, design of mixes, control of materials and workmanship in order to comply with the requirements of this Specification, may be carried out in a laboratory approved by the Engineer.

The Contractor shall submit with his tender the name of address of the laboratory where he intends to carry out other tests together with the list of tests to be carried out there.

All site tests and sampling shall be carried out by the Contractor's own qualified technicians but the Engineer or his representative shall be allowed at all times free access to and use of the testing facilities.

The Contractor should note that all tests to comply with quality of materials and workmanship are deemed included in the unit price for the works and that no extra claim would be entertained under laboratory tests.

The following laboratory tests shall be carried out by the Contractor for the following in accordance with the procedures given in the relevant standard:

(i) **Cement, Concrete and Concrete Aggregates**

| <i>Description of Test</i>          | <i>Relevant Specification</i> |
|-------------------------------------|-------------------------------|
| Particle size analysis of aggregate | BS 812                        |
| Aggregate crushing value            | BS 812                        |
| Flakiness                           | BS 882                        |
| Sampling fresh concrete             | BS 1881                       |
| Slump test of concrete              | BS 1881                       |
| Concrete cubes                      | BS 1881                       |

(ii) **Soil, Materials for Sub-bases and Bases, and Aggregates for Bituminous Surfacing**

| <i>Description of Test</i>    | <i>Relevant Specification</i> |
|-------------------------------|-------------------------------|
| Liquid Limit                  | BS 1377                       |
| Plastic Limit                 | BS 1377                       |
| Plasticity Index              | BS 1377                       |
| Linear Shrinkage              | BS 1377                       |
| Specific gravity of soil      | BS 1377                       |
| Specific gravity of aggregate | BS 1377                       |

|                                                                                                                                                                                                            |                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>Particle size analysis of soil</b>                                                                                                                                                                      | <b>BS 1377</b>                       |
| <b>Particle size analysis of aggregate</b>                                                                                                                                                                 | <b>BS 812</b>                        |
| <b>Field dry or wet density</b>                                                                                                                                                                            | <b>BS 1377</b>                       |
| <b>Moisture content of soil or<br/>Aggregate subject to the<br/>Engineer's approval<br/>by Speedy Moisture<br/>Content to maker's<br/>instructions with<br/>calibration against<br/>Oven-drying method</b> | <b>BS 1377 Test 1A</b>               |
| <b>Test for slit, clay and impurities<br/>of fine aggregate<br/>Sedimentation or decantation method<br/>(in case of discrepancies the<br/>Sedimentation method shall rule)</b>                             | <b>BS 812</b>                        |
| <b>Bulk density of filter in toluene</b>                                                                                                                                                                   | <b>BS 812</b>                        |
| <b>BS Compaction test on soil or<br/>aggregate 4.5 Kg hammer</b>                                                                                                                                           | <b>BS 1377</b>                       |
| <b>BS Vibrating hammer method test</b>                                                                                                                                                                     | <b>BS 1377</b>                       |
| <b>Aggregate crushing value</b>                                                                                                                                                                            | <b>BS 812</b>                        |
| <b>Los Angeles aggregate abrasion test</b>                                                                                                                                                                 | <b>BS 812 or<br/>ASTM C131 ,C535</b> |
| <b>California Bearing Ration (CBR)</b>                                                                                                                                                                     | <b>BS 1377</b>                       |

**One complete analysis shall be made of aggregates or material for aggregates prior to the opening of any borrow pit or the use of any stockpile for at least every 1,000 cubic metre of materials to be used.**

**(iii) Bituminous Materials**

**The following tests shall be carried out on each 400 tonnes of mix but at least thrice a day for each mix plant in use.**

**In addition the extraction of bitumen shall be carried out for each 200 tonnes of mix. In certain circumstances, such as the start of production of a new mix, these frequencies may be increased.**

| <b>On representative samples taken at the plant :</b> | <b>Relevant Specification</b>            |
|-------------------------------------------------------|------------------------------------------|
| <b>(i) Particle size analysis</b>                     | <b>BS 812</b>                            |
| <b>(ii) Extraction of bitumen</b>                     | <b>BS 598 : Part 102</b>                 |
| <b>(iii) Marshall stability and flow</b>              | <b>BS 598, ASTM D1559</b>                |
| <b>(iv) Specific gravity</b>                          | <b>ASTM D1188 or 2726 as appropriate</b> |

**(iv) Core Testing**

**On the compacted pavements, cores 100 mm diameter will be taken using rotary diamond coring drill. On these cores the following tests will be carried out: -**

The density to ASTM. D1188 or D2726, as appropriate, and voids content of the compacted mix shall be determined for every 75m intervals (max) or otherwise determined by the Engineer on site. Minimum of 2 cores if road is <75m long.

**(v) Bitumen**

Before ordering, the Contractor must furnish a test certificate as well as a sample quantity of 4 litres of the bitumen to be tested locally by an approved Laboratory.

Every 1,000 tonnes of bitumen on every consignment must be accompanied by a Certificate of Testing from the supplier. The Certificate shall be that of an approved laboratory. If required by the Engineer the following test shall be carried out at an approved laboratory for every 500 tonnes of delivery.

| <i>Description of Test</i>              | <i>Relevant Specification</i> |
|-----------------------------------------|-------------------------------|
| 1. Penetration Test                     | AASHO T49                     |
| 2. Viscosity – Temperature relationship | ASTM D2493                    |
| 3. Specific gravity                     | ASTM D70                      |
| 4. Softening point (Ring and Ball)      | ASTM D38                      |

**4.29 CONSTRUCTION CONTROL TESTING**

All earthworks and layers of pavement construction will be subject to quality control testing and the Contractor must allow in his tender for any disturbance or delays to the sequence of his operations occasioned by such control testing.

The Contractor shall request, in writing, the Engineer's approval for each section of each layer of earthworks and pavement construction. Such requests shall be made only when the Contractor has carried out the necessary tests and is fully satisfied that the section of the work concerned is in condition required by the Specification.

The Engineer shall thereupon without undue delay inspect the section of the Works, analyse the test results submitted and inform the Contractor in writing whether he is accepting or rejecting the section(s) or layer concerned.

Work on layers shall in no circumstances commence until the preceding layers have been approved and accepted by the Engineer in writing. The Contractor is wholly responsible for protecting and maintaining the condition of the work which has been submitted for approval until such time as the required written approval has been given by the Engineer.

Before the last layer of earthworks (the 150 mm of material beneath the top of subgrade ) is submitted for approval, all drainage and underground works shall have been substantially completed to the satisfaction of the Engineer.

**SECTION 5 – STRUCTURAL CONCRETE**

**INDEX**

ARTICLE NO.

- 5.1 STRUCTURAL CONCRETE
- 5.2 MIXING OF CONCRETE
- 5.3 HANDLING AND PLACING OF CONCRETE
- 5.4 CONSTRUCTION JOINTS
- 5.5 CURING CONCRETE
- 5.6 TOLERANCES
- 5.7 LOADING CONCRETE STRUCTURES
- 5.8 FORMS, FALSEWORK OR CENTERING
- 5.9 CONCRETE SURFACE FINISH
- 5.10 STEEL REINFORCEMENT
- 5.11 MORTAR
- 5.12 PRECAST CONCRETE
- 5.13 MEASUREMENT AND PAYMENT FOR CONCRETE WORKS

## **Article 5.1 - Structural Concrete**

### 5.1.1 Material

Structural concrete shall consist of Portland cement, aggregate and water which shall conform to the requirements of Part 2 of these Technical Specifications.

### 5.1.2 Concrete Mix Design

At least 30 days before commencing any concrete construction, the Contractor shall carry out trial mixes to determine the grading of aggregates, the relative proportion of fine and coarse aggregates, water and cement in order to produce a concrete of satisfactory strength and workability in accordance with these Technical Specifications.

The trial mixes shall be mixed in an approved type of concrete mixer similar to that which the Contractor proposes to use on site.

For each class of concrete the Contractor shall prepare 2 sets of 18 cubes (for compressive strength) and 2 sets of 18 cylinders (for indirect tensile strength). One set shall be tested at 7 days and the other set at 28 days. The results of these tests, called "preliminary tests" shall comply with the requirements of Table 2 in article 8.1.3 hereafter.

Should one cube crushed at 7 days or at 28 days fall below the specified requirements, the Contractor shall carry out further trial mixes altering the mix design and/or the source of aggregate, gradation, preparations of aggregate, cement, water until a satisfactory standard of concrete for each grade is attained.

The results of the concrete mix design shall be submitted to the Engineer for his approval.

The cost of such trials and tests shall be deemed to be included in the tendered rates and prices.

### 5.1.3 Classes of Concrete

Various classes of concrete are provided for in these Technical Specifications. Each class of concrete shall be used in that part of the structure where called for in Table 1 hereafter, on the Drawings or as directed by the Engineer.

**TABLE 1**

| CLASS | GRADATION<br>OF AGGREGATE<br>mm | PART OF THE WORKS                                                                                                                        |
|-------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 40    | 0 - 20                          | Slab deck of bridges, Parapets                                                                                                           |
| 35    | 0-20                            | Abutments,walls,footings and<br>foundation of bridges                                                                                    |
| 30    | 0 - 20                          | Wing walls of bridges, box culverts                                                                                                      |
| 25    | 0 - 20                          | Precast or in situ kerbs<br>Precast or in situ channels<br>Precast or in situ cover slabs<br>Precast or in situ footpath slabs<br>Drains |
| 20    | 0 - 20                          | Mass concrete filling, Benching                                                                                                          |
| 15    | 0 - 40                          | Blinding<br>Bedding<br>Base for masonry wall                                                                                             |

**TABLE 2**

|                                                                  | CLASS 40           |              | CLASS 30            |              | CLASS 25           |              | CLASS 15           |              |
|------------------------------------------------------------------|--------------------|--------------|---------------------|--------------|--------------------|--------------|--------------------|--------------|
|                                                                  | Preliminar<br>Test | Work<br>Test | Preliminary<br>Test | Work<br>Test | Preliminar<br>Test | Work<br>Test | Preliminar<br>Test | Work<br>Test |
| Minimum weight of cement per cubic metre of concrete - Kg        | 425                | 425          | 400                 | 400          | 350                | 350          | 250                | 250          |
| Minimum cube compressive strength at 28 days - N/mm <sup>2</sup> | 50                 | 40           | 40                  | 30           | 30                 | 25           | 17.8               | 15           |
| Slump                                                            | ←----- 5cm -----→  |              |                     |              |                    |              |                    |              |

Max Free water cement ratio shall be 0.45 or as instructed by the Engineer.

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## **Article 5.2 - Mixing of Concrete**

### 5.2.1 General

Concrete shall be mixed in an approved batch type machine at the Site. No hand mixing shall be allowed. Aggregates and water shall be cooled as necessary to produce concrete within the placing temperature limits stated hereinafter.

### 5.2.2 Mixing at Site

Concrete shall be thoroughly mixed in a batch mixer of an approved size and type manufactured in accordance with B.S. 1305 and having a mixing performance within the limits specified therein and which will ensure a uniform distribution of the materials throughout the mass.

The mixer shall be equipped with adequate water storage and a device for accurately measuring and automatically controlling the amount of water used in each batch. Their accuracy shall be maintained within the tolerances described in B.S. 1305 and checked against accurate weights and volumes. Preferably, mechanical means shall be provided for recording the number of revolutions for each batch and automatically preventing the discharge of the mixer until the materials have been mixed in the specified minimum time.

The entire contents of the mixer shall be removed from the drum before materials for a succeeding batch are placed therein. No mixer having a rated capacity of less than a 1-bag batch shall be used nor shall a mixer be charged in excess of its rated capacity.

All concrete shall be mixed for a period of not less than 1 1/2 minutes after all materials, including water, are in the mixer. During the period of mixing, the mixer shall operate at a speed for which it has been designed, but this speed shall be not less than 14 nor more than 20 revolutions per minute.

The first batch of concrete materials placed in the mixer shall contain a sufficient excess of cement, sand and water to coat the inside of the drum without reducing the required mortar content of the mix. Upon the cessation of mixing for a considerable period, the mixer shall be thoroughly cleaned before a fresh batch of concrete is made in it.

### 5.2.3 Ready-Mixed Concrete

Ready-mixed concrete as defined in B.S. 1926, batched off the Site, may be used only with the agreement of the Engineer and shall comply with all requirements of the Contract. Mixing at a central plant shall conform to the requirements for mixing at the site. The organisation supplying concrete shall have sufficient plant capacity and transporting apparatus to ensure continuous delivery at the rate required.

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The concrete shall be carried in purpose made agitators, operating continuously, or truck mixers. The concrete shall be compacted in its final position within 60 minutes of the introduction of cement to aggregates unless a longer time is agreed by the Engineer. The time of such introduction shall be recorded on the Delivery Note together with the weight of the constituents of each mix. When truck mixed concrete is used, water shall be added under supervision either at the site or at the central batching plant as agreed by the Engineer but in no circumstances shall water be added in transit. Unless otherwise agreed by the Engineer, truck mixer units and their mixing and discharge performance shall comply with the requirements of BS 4251. Mixing shall continue for the number and rate of revolutions recommended in accordance with BS 4251.

Each mixer, agitator and truck shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of volume of the mixed concrete, and the speed of the rotation of mixing drum or blades.

#### 5.2.4 Weather Precautions

If the weather forecast normally available is neither sufficient nor frequent enough, the Contractor shall at his own expense arrange for special detailed forecasts from the nearest meteorological authorities.

### **Article 5.3 - Handling and Placing of Concrete**

#### 5.3.1 General

In preparation for the placing of concrete all sawdust, chips and other construction debris and extraneous matter shall be removed from the interior of forms. Struts, stays and braces, serving temporarily to hold the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. These temporary members shall be entirely removed from the forms and not buried in the concrete.

No concrete shall be placed until the Engineer's approval has been given.

The Contractor shall give at least 48 hours' notice to the Engineer of the times he proposes to concrete and the Engineer may order that no concreting shall take place until either he or his representative and laboratory staff are present.

Concrete shall be transported in water-tight containers in such a manner that will avoid the segregation of the constituent materials. The time elapsing between the initial mixing of the concrete and finally placing in the work shall not exceed 30 minutes. Concrete remaining unplaced at the end of this period shall not be placed in the work but shall be removed from the Site and disposed of at the Contractor's expense.

The temperature of mixed concrete immediately before placing shall not be more, than 32°C or not less than 5°C.

Concrete shall not be dropped through a height exceeding 1.2 metres.

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For lowering concrete through heights in excess of 1.2 metres special methods shall be used, such as chutes, tremies, bottom dumping hoppers, or bagged placing and then only with the approval of the Engineer. All containers, troughs and chutes and apparatus through and in which the concrete is passed shall be kept clean and entirely free from hardened concrete or cement and free from contamination by extraneous material, and where there is an interruption of concreting exceeding 20 minutes, these shall be cleaned and bored down with water.

Concrete shall be placed so as to avoid segregation of the materials and the displacement of the reinforcement. Concrete shall be placed in horizontal layers not more than 20 cm thick except as hereinafter provided. When less than a complete layer is placed in one operation, it shall be terminated in 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 a construction joint with a preceding layer which has not taken initial set.

A competent steel fixer shall be in attendance the whole time concrete is being cast around reinforcement.

Immediately following the discontinuance of placing concrete, all accumulations of mortar splashed upon the reinforcement steel and the surfaces of forms shall be removed. Dried mortar chips and dust shall not be puddled into the unset concrete. If the accumulations are not removed prior to the concrete becoming set, care shall be exercised not to injure or break the concrete steel bond at and near the surface of the concrete, while cleaning the reinforcement steel.

#### 5.3.1.1 Pumping

The placing of concrete by pumping will be permitted only if authorised by the Engineer. The Contractor shall submit fill design mix for the Engineer's approval. The equipment shall be so arranged that no vibration will occur that might damage freshly placed concrete.

Where concrete is conveyed and placed by mechanically applied pressure the equipment shall be suitable in kind and adequate in capacity for the Work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is obtained. When pumping has been completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After this operation, the entire equipment shall be thoroughly cleaned. The placing of concrete by pumping method shall allow the Contractor no claim for extra cost in any way. This method shall be deemed to be included in the prices in the Bill of Quantities or elsewhere.

#### 5.3.2 Placing of Concrete in Foundations

Before placing concrete in foundations the bottom shall be thoroughly rammed and cleaned up to a neat horizontal plane, or such profile as is shown on the Drawings or as directed by the Engineer. No steps on batters shall be permitted unless shown on the Drawings or approved by the Engineer.

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Where shown on the Drawings or ordered by the Engineer that the sides of the concrete shall be cast against the existing ground without using shuttering, the faces of the earth shall be trimmed neat and true to line. Where such a hole is over-excavated due to the Contractor's method of working, the void shall be filled with concrete of the same class as specified for the foundation at the Contractor's expense.

### 5.3.3 Placing of Concrete in Culverts

The base slab or footings of box culverts shall be placed and allowed to set before the remainder of the culvert is constructed.

Before concrete is placed in the sidewalls, the culvert footings shall be thoroughly cleaned of all shavings, sticks, sawdust, or other extraneous material and the surface carefully chipped and roughened in accordance with the method of bonding construction joints as specified in article 8.4.2 hereinafter.

The concrete in the walls shall be placed and allowed to set before the top slab is placed.

Each wing wall shall be constructed as a monolith. Construction joints, where unavoidable, shall be horizontal and so located that no joint will be visible in the exposed face of the wing wall above the ground line.

### 5.3.4 Placing of concrete in Bridge decks

It shall be as per general requirements but it shall also include the following: The concrete shall be uniformly levelled and screeded to produce a plain surface. When the concrete has sufficiently hardened to prevent laitance being worked, it shall be floated to produce a uniform surface free from screed marks and exposed aggregate. Finally the surface shall be textured by brushing or otherwise to the waterproofing manufacturer's requirements as agreed by the Engineer. The accuracy of the finished surface shall be such that it does not deviate from the required profile by more than 10mm over a 3m gauge length or have any abrupt irregularities more than 3 mm.

### 5.3.5 Compaction of Concrete

Concrete, during and immediately after depositing, shall be thoroughly compacted. The compaction shall be done by mechanical vibration subject to the following provisions:

(a) The vibration shall be internal unless special authorisation of other methods is given by the Engineer.

(b) Vibrators shall be of a type and design approved by the Engineer. They shall be capable of transmitting vibration to the concrete at frequencies within the range of 9000 to 20000 impulses per minute.

(c) The intensity of vibration shall be such as to visibly affect a mass of concrete of 2.5 cm slump over a radius of at least 30 cm.

(d) The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms.

(e) Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and embedded fixtures, and into the corners and angles of the forms.

Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete, but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localised areas of grout are formed.

Application of vibrators shall be at points uniformly spaced and not further apart than twice the radius over which the vibration is visibly effective.

(f) Vibration shall not be applied directly or through the reinforcement to sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to cause segregation, and vibrators shall not be used to transport concrete in the forms.

(g) Vibration shall be supplemented by such spading as is necessary to ensure smooth surfaces and dense concrete along form surfaces and in corners and locations impossible to reach with the vibrators.

(h) Sufficient numbers of vibrators in usable condition shall be on site so that in the event of breakdowns spare equipment is available.

#### 5.3.6 Faulty Concrete work

The Contractor shall on the order of the Engineer remove and reconstruct any such portion of the work which, in the opinion of the Engineer, is unsatisfactory as regards quality of concrete incorrect dimensions of the cast portion, badly placed or insufficient reinforcement, honey-combing or other such cause as shall render the construction not up to the standard required and which, in the opinion of the Engineer, may prejudicially affect the strength or durability of the construction.

### **Article 5.4 - Construction Joints**

#### 5.4.1 General

Construction joints shall be made only where located on the plans, or shown in the pouring schedule, unless otherwise approved by the Engineer.

If not detailed on the plans, or in the case of emergency, construction joints shall be placed as directed by the Engineer. Shear keys or inclined reinforcement shall be used where necessary to transmit shear or to bond the two sections together.

#### 5.4.2 Bonding

Before depositing new concrete on or against concrete which has hardened, the forms shall be re-tightened. The surface of the hardened concrete shall be roughened as required by the Engineer, in a manner that shall not leave loosened particles of aggregate or damaged concrete at the surface. It shall be thoroughly cleaned of foreign matter and laitance, and saturated with water.

The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished true to line and elevation.

When the placing of concrete is temporarily discontinued, the concrete, after becoming firm enough to retain its form, shall be cleaned of laitance and other objectionable material to a sufficient depth to expose sound concrete.

To avoid visible joints as far as possible upon exposed faces, the top surface of the concrete adjacent to the forms shall be smoothed with a trowel. Where a "feather edge" might be produced at a construction joint, an inset form shall be used to produce a blocked out portion in the preceding layer which shall produce an edge thickness of not less than 15 cm in the succeeding layer. Work shall not be discontinued within 45 cm of the top of any face.

#### **Article 5.5 - Curing Concrete**

Concrete surfaces exposed to conditions causing premature drying shall be protected by covering as soon as possible with canvas, straw, burlap, sand or other satisfactory material and kept moist. Curing shall continue for a period of not less than seven days after placing the concrete. Details of the method to be used shall be subject to the approval of the Engineer.

The formwork shall also be kept damp, and if struck earlier than seven days, shall be replaced for the remaining period with other approved damp material.

Concrete surfaces of structures which are to be buried in the ground shall be cured as specified above, but care shall be taken to avoid excessive water from curing running into the foundation of the footings.

#### **Article 5.6 - Tolerances**

The concrete work shall be constructed as accurately as possible with the following tolerances:

- (a) In the cross-sectional dimensions not more than 3 mm
- (b) In dimensions, other than cross-sectional dimensions, not more than 6mm
- (c) In any surface, the irregularity shall not exceed 5 mm measured from a 3 metre long straight edge
- (d) No member shall be out of line by more than 5 mm
- (e) No wall shall be out of plumb by more than 5 mm or if battered, out of batter by more than 5 mm.

### **Article 5.7 - Loading Concrete Structures**

No concrete structure shall be loaded until the concrete is at least 28 days old and has achieved the specified cube strength and only then with the approval of the Engineer, and subject to such conditions as he may lay down.

### **Article 5.8 - Forms, Falsework or Centering**

#### 5.8.1 Forms

All forms shall be built mortar tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations. Forms shall be constructed and maintained so as to prevent warping and the opening of joints due to shrinkage of the lumber.

The forms shall be substantial and unyielding and shall be so designed that the finished concrete will conform to the proper dimensions and contours. The design of the forms shall take into account the effect of vibration of concrete as it is placed. They shall be so constructed that they can be removed from the moulds before any concrete is deposited in them.

Form clamps, bolts and anchors shall be used to fasten forms. The use of wire ties to hold forms in position during placing of concrete shall not be permitted. Bolts and clamps shall be of such type that they can be entirely removed or cut back to a depth of at least 2 cm from the finished surface of the concrete without injury to the concrete. The cavities shall be filled with grout and the surface left sound, smooth, even and uniform in colour. All forms for the outside surfaces shall be constructed with stiff wailers at right angles to the studs and all form clamps shall extend through and fasten such wailers.

All forms shall be treated with approved mould or similar oil or be soaked with water immediately before placing concrete to prevent adherence of concrete. Any material, which will adhere to or discolour concrete, shall not be used.

All forms shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods, which shall be as specified in Article 8.8.4 hereinafter. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer shall order the work stopped until the defects have been corrected.

All formwork shall be approved by the Engineer before concrete is placed within it. The Contractor shall provide the Engineer with copies of his calculations of the strength and stability of the formwork or falsework, but notwithstanding the Engineer's approval of these calculations, nothing shall relieve the Contractor of his responsibility for the safety or adequacy of the formwork.

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### 5.8.2 Falsework and Centering

Detailed plans for falsework or centering shall be supplied by the Contractor for the Engineer's consent at least 45 working days in advance of the time the Contractor begins construction of the falsework.

All falsework shall be designed and constructed to provide the necessary rigidity and to support the loads from the weight of green concrete and shuttering and incidental construction loads.

Notwithstanding the approval by the Engineer of any designs for falsework submitted by the Contractor, the Contractor shall be solely responsible for the strength, safety and adequacy of the falsework or centering.

Falsework or centering shall be founded upon a solid footing safe against undermining and protected from softening. The Engineer may require the Contractor to employ screw jacks, or hard wood wedges to take up any settlement in the formwork either before or during the placing of concrete.

Falsework shall be set to give the finished structure the required grade. The Contractor shall submit to the Engineer all camber details / calculations which are required for the construction of the post tensioned decks, parapets, etc...

The Contractor shall make available to the Engineer a copy of the latest edition of the following British standards within 4 weeks from the issue of the order to start the works:

BS 5268: Structural use of timber, part 2: Code of practice for permissible stress, design, materials and workmanship

BS 5973: Code of practice for access and working scaffolds and special scaffold structures in steel.

BS 5974: Code of practice for temporarily installed suspended scaffolds and access equipment.

BS 5975: Code of practice for falsework.

### 5.8.3 Forms for construction joints

Where permanent or temporary joints are to be made in horizontal or inclined members, stout stopping off boards shall be securely fixed across the mould to form a watertight joint. The form of the permanent construction joint shall be as shown on the Drawings. Temporary construction joints shall have blocks of timber at least 8 cm thick, slightly tapered to facilitate withdrawal and securely fixed to the face of these stopping off board. The areas of the key or keys so formed shall be at least 30% of the area of the member. The blocks shall be kept back at least 5 cm from the exposed face of the concrete.

Where reinforcement passes through the face of a construction joint the stopping off board shall be drilled so that the bars can pass through, or the board shall be made in sections with a half round indentation in the joint faces for each bar so that when placed the board is a neat and accurate fit and no ground leaks from the concrete through the bar holes or joints.

#### 5.8.4 Removal of Forms and Falsework

In the determination of the time for the removal of forms, falsework and housing, consideration shall be given to the location and character of the structure, the weather and other conditions influencing the setting of the concrete and the materials used in the mix.

Forms shall be removed in such a manner as will not injure the concrete and no formwork shall be removed before the concrete has sufficiently set and hardened.

The minimum periods which shall elapse between the placing and compacting of normal Portland cement concrete for the various parts of the structure are given in the following table, but compliance with these requirements shall not relieve the Contractor of obligation to delay the removal of the forms if the concrete has not set sufficiently hard:

| PARTS OF WORK                              | DELAY   |
|--------------------------------------------|---------|
| Sides of walls and footings                | 1½ day  |
| Soffits of beams and slabs (props left in) | 7 days  |
| Removal of props (beams and main slabs)    | 16 days |

Concrete shall not be subject to disturbance / vibration between 4 hours and 36 hours after compaction except with the agreement of the Engineer.

#### 5.8.5 Verifying of Reinforcement and Tendons concrete covers

The Contractor shall provide an electromagnetic cover measuring devices to verify the depths of the reinforcement and Tendons after concreting and removing of forms. The Contractor shall carryout this work under the Engineer's supervision and shall produce and submit all necessary reports. BS 4408: Part 1 shall be consulted for this purpose.

### **Article 5.9 - Concrete Surface Finish**

#### 5.9.1 Unexposed Surface Finish

Unexposed surface finish, unless otherwise specified, shall be considered as a final surface finish on the surfaces which are buried in the ground, or covered with embankment or surfaces which are to be enclosed. The removal of fins and form marks and the rubbing of mortared surfaces to a uniform colour will not be required for unexposed surface finish.

All formwork bolts or other devices shall be removed to a depth of 3 cm from the surface, and all holes, cavities and honey-combing in the surface shall be cleaned out and roughened to form a good key. These holes shall then be filled with cementitious (Non shrinkable) grout and approved by the Engineer

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The irregularities in the finish shall be no greater than those obtained from the use of wrought thickened tongue and grooved boards arranged in uniform pattern.

#### 5.9.2 Exposed Surface Finish

Exposed surface finish shall be considered as final surface finish on all surfaces of the retaining walls.

The formwork shall be lined with a material approved by the Engineer to provide a smooth finish of uniform texture and appearance. This material shall leave no stain on the concrete and shall be so joined and fixed to its backing that it imparts no blemishes.

It shall be of the same type and obtained from one source as far as possible. The Contractor shall make good any imperfections in the resulting finish as required by the Engineer. Internal ties and embedded metal part will be allowed only with the Engineer's specific approval. The Contractor shall ensure that permanently exposed concrete surfaces are protected from rust marks, spillage and stains of all kinds.

### **Article 5.10 - Steel Reinforcement**

#### 5.10.1 Bar Bending Schedule

Bar bending schedules are incorporated in the Drawings but the Contractor shall be responsible for their accuracy and shall satisfy himself as to errors or omissions and all other things regarding their suitability for the work. When new bar bending schedules are required or the existing ones required to be amended the Contractor shall prepare such lists and submit them to the Engineer for his approval.

#### 5.10.2 Fabrication

Bar reinforcement shall be bent to shapes shown on the Drawings and bending schedules. All bars shall be bent cold, unless otherwise permitted by the Engineer. All hooks, bends, etc., unless otherwise shown on the Drawings, shall be to BS EN ISO 3766:2003. Bar reinforcement shall be bundled and each bundle of steel shall be tagged with identifying tags, showing the size and mark of the bar.

#### 5.10.3 Placing and Fastening

The reinforcement shall be accurately placed and held in the positions as shown on Drawings and subject to the approval of the Engineer.

The minimum spacing centre to centre of parallel bars shall be 2 1/2 times the size of the bar, but in no case shall the clear distance between bars be less than 1 1/2 times the maximum size of coarse aggregate in the concrete.

Distances from the forms shall be maintained by means of blocks or plastic spacers or other approved supports. Blocks for holding reinforcement from contact with the forms shall be precast mortar blocks of approved shape and quality and dimensions or approved metal chairs.

Layers of bars shall be separated by metal chairs or stirrups or other approved supports.

#### 5.10.4 Splicing and Lapping

All reinforcement shall be provided in full lengths as indicated on the drawings and bending schedule. splicing of bars, except where shown on the Drawings, shall not be permitted without the written approval of the Engineer. Splices shall be staggered, as directed by the Engineer.

In lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain a clearance specified in the code of practice for reinforced concrete BS 8110.

Sheets of mesh or bar mat reinforcement shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at ends and edges. The edge lap shall not be less than 40 diameters of the mesh reinforcement bar or two meshes in width whichever is the greater or as directed by the Engineer.

#### 5.10.5 Approval before concreting

The Contractor shall in all cases request the approval of the steel work by the Engineer in sufficient time to allow an inspection to be made and shall not commence concreting until such approval and his intention to commence concreting shall not be less than one clear normal working day and the Engineer may require a longer period if, in his opinion, the reinforcement is of such complexity as to require it.

Such approval shall not relieve the Contractor of his responsibilities under the contract.

#### **Article 5.11 - Mortar**

The mortar for jointing masonry works shall be a mix of

- 1,000 litres of sand passing the 5 mm B.S. Sieve
- 450 kilograms of Portland Cement
- sufficient water to obtain a workable mix.

The mortar shall be mixed using concrete mixers. Hand mixing will not be allowed.

#### **Article 5.12 - Precast Concrete**

Precast concrete members, kerbs, channels, cover slabs, paving slabs, etc., shall generally comply with the requirements of British Standard Code of Practice BS 8110, except where varied by the requirements of this specification or the drawings.

The Contractor shall set up an adequate precasting yard undercover, capable of handling all the precast concrete works and shall provide a suitable qualified Engineer to supervise the working of the yard all to the satisfaction of the Engineer. The Contractor shall provide full details and drawings showing his proposals for the precasting yard and until approval is given in writing no work on erection of the yard or producing precast concrete shall commence.

#### 5.12.1 Concrete Mixes

Concrete mixes shall be as shown on the drawings and in accordance with the Specifications.

#### 5.12.2 Formwork

The precast units shall each be cast complete in one operation, on suitable and sufficient platforms and moulds, all to the satisfaction of the Engineer. Before casting is commenced the Contractor shall submit, for the approval of the Engineer fully detailed drawings showing the proposed layout of casting beds, together with the details of the method of assembling and dismantling of the moulds. In cases where the finished thickness of the concrete is small, and compaction by internal or surface vibration will be difficult, the mould may be constructed so that external vibration of the shutter will satisfactorily compact the concrete, or vibrating tables may be used. The soffit shutter shall be adequately supported to prevent any settlement which might cause cracking of the concrete.

Provision shall be made to hold firmly and maintain in position all projecting reinforcement, bolts, screwed sockets, etc., so that they are correctly located in the completed unit or member concerned.

#### 5.12.3 Weather Protection and Curing

The precast units shall at all times be cast under suitable covering to provide complete protection from the sun, rain and drying winds. They shall remain under the cover for at least four days or until the units are strong enough to be lifted from the casting beds, whichever is the longer period. During this period, all exposed concrete shall be protected and cured as described in article 8.5. Thereafter, the units may be transferred to a storage area or be erected in their final position.

#### 5.12.4 Surface finishes generally

The methods used for compacting the concrete must be such that pinholes or airholes on the surface are avoided. Upon removal of the formwork, any units having a concrete face with rough, uneven, honeycombed or imperfect finish, or which shall be permanently discoloured, will be rejected at the Engineer's discretion. Where carrying out of remedial work is approved by the Engineer, irregularities shall be eliminated by grinding, or where an area shows air holes, these shall be filled and thoroughly rubbed over to leave the desired surface.

Unightly encrustations and stains shall be removed from all exposed surfaces. Remedial work of all kinds must be carried out strictly in accordance with the Specification and any further instructions which may be given by the Engineer. Any units which are rejected shall be disposed of away from the Site at the Contractor's expense.

#### 5.12.5 Lifting and Handling of Units

No items may be lifted from the casting beds until they have gained sufficient strength to avoid damage through lifting, handling, erection or stacking. Notwithstanding any guidance given by the Engineer on the concrete strength necessary to prevent damage, the Contractor shall be entirely responsible and any items so damaged or cracked will be rejected by the Engineer. They may not be included in the works and must be disposed of, to the approval of the Engineer, at the Contractor's expense.

Before casting, the Contractor shall submit to the Engineer, for his approval, full details of the proposed method of hoisting precast units including the location of proposed lifting points. The Contractor shall be responsible for the design and provision of extra reinforcement that may be required to facilitate the handling of the precast units and his price for precast units should include for this.

The edges of precast units shall be protected by fenders of timber or other approved material during the lifting, handling and erection stages.

#### 5.12.6 Stacking of precast units

Where members are stored, they shall be firmly supported at such bearing positions that will ensure that the stresses induced in them are always less than the permissible design stresses.

Ample space is to be provided for the storage and stacking of the units. Units shall not be walked on or come into contact with the ground or with dirty or greasy hands or with ropes and cables. Nor shall wet slabs come into contact with dirty packs or pieces of timber which will discolour them.

The units shall be stacked in such a way that the faces are protected both from damage and from staining.

### **Article 5.13 - Measurement and payment for concrete works**

#### 5.13.1 In situ Concrete

The unit of measurement for in-situ concrete shall be per cubic metre, measured in place in the work, as set forth in the Bill of Quantities, and shall distinguish between the various classes of concrete and position in the work.

The rate for in-situ concrete shall include for complying with the provisions of the Specification herein described. Reinforcement and shuttering will be paid for separately.

#### 5.13.2 Precast Concrete Units

Precast concrete units will be measured either by number, or in linear metre as indicated in the Bill of Quantities. The rate for precast concrete shall include for complying with the provisions of the specifications herein described and in addition any shuttering and reinforcement, unless specifically shown separately in the Bill of Quantities.

#### 5.13.3 Measurement and Payment for Formwork

Formwork shall be measured as the area of concrete actually in contact with the mould, except that in the case of small fillets and chambers of size 30mm x 30mm and less, the overall area of the concrete shall be taken as though the fillets and chambers had been omitted. Formwork for temporary construction joints will not be paid for and will be deemed to be included in the Contractor's rates for concreting.

The formwork for in-situ concrete will be paid for separately according to the type of finish and according to whether it is vertical, horizontal and/or inclined as set out in the Bill of Quantities.

Formwork will not be measured and paid for to blinding concrete.

#### 5.13.4 Measurement and payment for Reinforcement

Reinforcement shall be paid for the net calculated weight of reinforcement shown on the Drawings or ordered by the Engineer, and no allowance will be made for waste, rolling margins, binder wire, or spacer bars.

When laps are made for splices for the convenience of the Contractor other than those shown on the Drawings, the extra steel shall not be measured.

#### 5.13.5 Joints

Items for joint surfaces are measured where joints are expressly itemised in the Bill of Quantities, with or without formwork and with or without filler material.

The unit of measurement shall be per linear metre or per square metre as set forth in the Bill of Quantities.

#### 5.13.6 Waterproofing/Impregnation

The unit of measurement for waterproofing/impregnation shall be per square metre, measured in place in the work, as set forth in the Bill of Quantities (if applicable).

The measured area shall be that of the covered surface, without deduction for holes and openings each less than 0.5 m<sup>2</sup>.

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## **6 – MISCELLANEOUS ITEMS**

### **6.1 TRAFFIC SIGNS**

#### **GENERAL**

The sign plates shall be manufactured from Aluminium alloy sheet of at least 3 mm thickness (11 gauge)

The sign plates are to be stiffened and the stiffening may be in the form of a flange at least 15 mm deep on all edges or by means of Aluminium sections.

Material for fixing, such as brackets, sockets, caps, clips, screws, bolts, nuts and washers shall be to the Engineer's approval. Brass or copper will not be allowed for use in contact with Aluminium.

The signs are to be fixed on galvanised posts of 60mm external diameter. The fixing method shall be such that it shall be possible to adjust the direction of the traffic signs at any time on site without having to move the post in its concrete base.

#### **REFLECTIVE SHEETING ON ROAD SIGNS**

The reflective sheeting used on road signs shall consist of spherical lens elements embedded with a transparent plastic having a smooth, flat outer surface with a protected pre-coated adhesive which shall be pressure sensitive for manual application or lack free heat activated for mechanical vacuum-heat application.

The reflective sheeting shall be sufficiently flexible so as to permit application over and conformance to a moderate embossed surface. It shall show no damage when bent 90° over a 50 mm diameter mandrill.

The sheeting shall be solvent resistant so as to be capable of withstanding cleaning with petrol, diesel fuel, mineral spirits, turpentine and methanol.

The sheet shall show no cracking or reduction in reflection after being subjected to the dropping of a 25 mm diameter steel ball from a height of 2 meters onto its surface.

The adhesive shall permit the reflective sheeting to adhere securely within 48 hours after application at temperatures of up to 95° C.

The reflective material shall be weather resistant and following cleaning, shall show no definite fading, darkening, cracking, blistering or peeling and not less than 75 of the specified wet or dry minimum brightness values when exposed either to an accelerated weathering period of 12 hours or a natural exposure period of 2 years, in accordance with an approved testing procedure.

The minimum reflective brightness values of the retro-reflective sheeting as compared to Magnesium Oxide (MgO) shall be:

| COLOUR | ANGLE OF INCIDENCE | ANGLE OF DIVERGENCE | REFLECTIVE VALUE COMPARED WITH MgO |
|--------|--------------------|---------------------|------------------------------------|
| Red    | -4°                | 0.5°                | 15                                 |
|        | 20°                | 0.5°                | 10                                 |
|        | 50°                | 0.5°                | 3                                  |
| White  | 4°                 | 0.5°                | 75                                 |
|        | 20°                | 0.5°                | 70                                 |
|        | 50°                | 0.5°                | 70                                 |
| Yellow | -4°                | 0.5°                | 45                                 |
|        | 20°                | 0.5°                | 35                                 |
|        | 50°                | 0.5°                | 10                                 |
| Blue   | -4°                | 0.5°                | 6                                  |
|        | 20°                | 0.5°                | 4.5                                |
|        | 50°                | 0.5°                | 0.5                                |

The brightness of the reflective sheeting when totally wet by rain, shall be not less than 90% of the values.

### ***COLOURS FOR ROAD SIGNS***

Standard colours to be used for signs, posts and fittings shall be as described in the relevant BS as follows:-

|                                       |                   |
|---------------------------------------|-------------------|
| Red                                   | BS 381C No. 537   |
| Blue                                  | BS 4800 No. 0.013 |
| Grey for post fittings and back signs | BS 2660 No. 9-101 |
| Black and White                       | B.S 873 CB & 3C   |

### ***RUST INHIBITIVE PRIMING PAINT***

Rust inhibitive paint shall comply with BS 2523: Lead Based Priming Paints.

### ***6.2 ROAD MARKING WITH PAINT***

The paint to be used for road surface marking shall be specifically manufactured for such purpose. It shall be suitable for applying by brush, low pressure spraying equipment and high pressure spraying equipment to give a chemically stable film of uniform thickness. It shall be either chlorinated rubber and shall be stored and applied in accordance with the manufacturer's instructions. Unless otherwise agreed by the Engineer, paint shall be applied without the use of thinners or other additives. The paint shall not "no lead paint" when tested as per BS 3900: Part B3.

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Lines and letters shall be painted on the road on locations shown on the Drawings or ordered by the Engineer. The setting out of lines shall be made by the Contractor and shall be to the Engineer's approval. Works and symbols shall be set out by the Contractor according to Drawings provided by means of stencils.

### **COLOUR**

(i) White

The colour of white markings shall when laid be approximately to BS colour No. 102 of BS 381C. The pigment used shall be titanium dioxide type A Anatase or type R (Rutile) complying with BS 239.

(ii) Yellow

The colour of yellow markings shall when laid be approximately to BS colour No. 355 of BS 38/C.

### **CHLORINATED RUBBER PAINTS**

The chlorinated rubber paints used for the permanent road markings shall comply with the following:

- (i) Maximum % by weight of chlorinated rubber – 20%
- (ii) Maximum % by volume of pigment at 20° C :- 50%
- (iii) Minimum colouring (prime) pigment content % by weight :-

|              |     |
|--------------|-----|
| White paint  | 16% |
| Yellow paint | 10% |
- (iv) Surface drying time determined in accordance with BS 6044 :- less than 5 minutes.
- (v) Hard drying time determined in accordance with BS 6044, Appendix D : - less than 15 minutes at 23° C.
- (vi) Adhesion to concrete or bituminous surfaces must, in the opinion of the Engineer, be good.

Prior to application of paints or thermoplastic, the road surface to be marked shall be thoroughly cleaned of all loose material and shall be completely grease-free and dry. Where ordered by the Engineer, the prime coat shall be used to increase adhesion.

The spraying rate for cold paint will vary with the roughness of the surface, but shall be such as to give continuous coverage and at minimum wet film thickness of 400 microns provide a dried film of low sheen. The paint shall provide a suitable binding media for reflectorisation. Immediately after application of the cold paint, glass spheres shall be spread on top at a rate of approximately 0.65 kg per litre of paint; unless otherwise specified.

### **6.3 HOT-MELT THERMOPLASTIC**

The Thermoplastic Material shall be to BS3262 : part 1:1987 with the following characteristics:-

|                                                                              |                           |
|------------------------------------------------------------------------------|---------------------------|
| Softening Point :-                                                           | Not less than 65°         |
| Luminance Factor:-                                                           | Not less than 50%         |
| Heat Stability:-                                                             | Not less than 45%         |
| Flow Resistance:-                                                            | Not less than 25%         |
| Skid Resistance:-                                                            | Not less than 45          |
| Binder Content:-                                                             | Between 18.0 % and 22.0 % |
| Solid Glass Bead Content:-                                                   | 20%                       |
| Combined Minimum Aggregate, pigment, extender and solid glass bead content:- | Between 78% and 82%       |

The grading of combined aggregate, pigment, extender and solid glass bead must be within the following limits:-

| <i>B.S Sieves</i> | <b>Limits</b> |
|-------------------|---------------|
| 2.80 mm           | 100           |
| 600 micron        | 65-95         |

The minimum thickness of the thermoplastic layer shall be 1.5 mm.

### **6.4 CAT'S EYES**

The Contractor shall take delivery from the stores of the Road Development Authority or from any other place of omni-directional, bi or uni directional reflectors to be fixed on site as directed by the Engineer.

### **6.5 FELLING OF TREES**

Bushes, trees and roots shall be cut down, grubbed up or otherwise removed in a manner to be directed by the Engineer. Trees, defined as having a girth of 0.6metre and over, measured one metre from the ground, shall be taken down in stages, the higher branches being first sawn or loped off then the corresponding position of the trunk shall be sawn off and the sequence repeated. Holes left by the removal of roots shall be backfilled and compacted to 90% B.S. Heavy Compaction with approved material up to the existing ground level or up to the top of the sub- grade level if the area is to be excavated, whichever is the lesser. The Contractor must seek the approval of the Forestry Department prior to the removal of any tree.

### **6.6 RAISING OF MAN-HOLES/DRAINS**

All works shall be done in the presence or with the authorisation of the Authority concerned (CWA, CEB, MT, WWA) and following strictly their methodology and specifications.

### **6.7 GUARD-RAILS**

Guard Rails supplied by the Contractor shall be accompanied by a Certificate from the manufacturer stating that the materials supplied to conform to the following:-

The steel posts shall conform to the requirements of AASHTO M183 and galvanising shall be in accordance with AASHTO M111. The guard rails shall be galvanised, corrugated sheet steel beams conforming to the requirements of AASHTO M180-778 Class A, with a base metal nominal thickness of 2.67 mm and Type 1, with zinc coated of 550 g/m<sup>2</sup> minimum spot and of W-Beam shape.

Guard rail shall be erected at the location designated by the Engineer. The engineer shall approve the depth and size of holes prior to the fixing of the posts. Posts shall be spaced as shown in the drawings and shall be set plumb and to the established lines and grades. End sections shall be anchored to the ground by means of RCC post as indicated in the Drawings or by the Engineer. The guard rail as installed and finished shall not deviate in the horizontal direction and in levels from the specified lines and grades by more than 5 mm.

### **6.8 HAND-RAILS AND METAL GRATINGS**

Nuts and bolts not designated as high strength shall conform to the requirements of ASTM A307 and steel tubing shall conform to the requirements of ASTM A500, Grade B. Anchor bolts, nuts and all steel portions of railings and gratings shall be galvanised. Galvanising shall conform to the requirements of AASHTO M111 (ASTM A123) and galvanising of nuts and bolts shall conform to the requirements of AASHTO M232 (ASTM A153). Minor abrasions to galvanised surfaces shall be repaired with zinc rich paint.

All exposed welds shall be finished by grinding or filling to give a smooth surface.

Metal railings shall be carefully adjusted prior to fixing in place to the approval of the Engineer. After fixing of hand-rails or metal gratings, all sharp protrusions shall be removed and the railing or grating cleaned of discolouring foreign materials.

## **SECTION 7- DRAINAGE**

### **INDEX**

#### ARTICLE NO

- 7.1 GENERAL
- 7.2 DRAINAGE PROGRAMME
- 7.3 DRAINAGE EXCAVATION
- 7.4 TIMBERING AND SHORING OF EXCAVATIONS
- 7.5 TRENCHES AND HOLES EXCAVATION AND BACKFILLING
- 7.6 LINED TRAPEZOIDAL DITCH
- 7.7 UNLINED TRAPEZOIDAL DITCH
- 7.8 PIPE CULVERTS
- 7.9 BOX CULVERTS
- 7.10 GULLIES AND MANHOLES
- 7.11 MASONRY WORKS
- 7.12 RIP RAP
- 7.13 RAINWATER DOWNSPOUTS
- 7.14 WATER PROOFING

### **Article 7.1 - General**

The present section includes the construction of:

- Drains
- Pipe and box culverts including head works, wing walls and cover slabs
- Gullies and Manholes
- Retaining walls, paving slabs
- Masonry works (including retaining walls, stone facing, rainwater downspout etc)
- Riprap

### **Article 7.2 - Drainage programme**

The Contractor shall submit to the Engineer for his approval immediately after the signature of the Contract a carefully prepared programme for the drainage works which shall allow for completion of all drainage systems necessary for drainage during construction, before works are started.

### **Article 7.3 - Drainage Excavation**

The Contractor shall excavate all drainage systems to the lines, levels, gradients and dimensions shown on the drawings or as directed by the Engineer.

Excavation for drainage systems shall be carried out in accordance with the requirements of the section <earthworks> of these technical specifications.

Should excavations be executed to greater depth or dimensions than necessary through the incidence of boulders or through other causes, the Contractor shall backfill and make good, with approved materials thoroughly compacted, to the correct level and dimensions and to the approval of the Engineer.

The material excavated for drainage systems shall be, if suitable, set aside for use as backfill and if unsuitable or in excess, run to spoil tips.

### **Article 7.4 - Timbering and Shoring of Excavations**

The sides of excavations such as trenches, holes shall, where required, be timbered and shored to the satisfaction of the Engineer. The Contractor shall remain liable for any damage or injury consequent upon removal of timbering or shoring.

Where directed by the Engineer the timbering and shoring shall be left in excavations and measured and paid for except if, in the Engineer's opinion, the necessity for leaving the timber in has arisen from carelessness or neglect on the part of the Contractor.

### **Article 7.5 - Trenches and Holes Excavation and Backfilling**

7.5.1 The trenches and holes excavations shall be of sizes sufficient to enable the bottom to be compacted as required, the bed to be laid, the pipes and concrete to be placed accurately and proper backfilling and ramming to be carried out.

7.5.2 Where required the bottom of such excavations shall be compacted to 95% B.S H.M.D.D.

7.5.3 Where rock is met at level of the intended bottom of the trench or hole, it shall be cut to a depth of 20 cm below this level and replaced with sand, granular material or other material to the approval of the Engineer.

7.5.4 Trenches and holes shall be kept free from water until any works such as concrete or joints therein are sufficiently set; the Contractor shall construct any temporary drains that the Engineer may deem necessary.

7.5.5 Where seepage of water occurs in trenches or holes, bedding and backfilling shall be carried out using sand, granular material or crushed stones or other material as directed by the Engineer.

7.5.6 Material for backfilling shall be to the approval of the Engineer and shall be deposited in layers not exceeding 15 cm of loose material, compacted with power rammers, the moisture content of the material being adjusted to facilitate thorough compaction. The density of each compacted layer shall not be less than 95% of B.S H.M.D.D.

### **Article 7.6 - Lined trapezoidal ditch**

Lined trapezoidal ditches shall be built in masonry to the cross-section as shown in the drawing or as directed by the Engineer, and the invert level shall be finished to a steady longitudinal gradient not less than 0.5% and the fall shall be in all cases towards a culvert.

### **Article 7.7 - Unlined trapezoidal ditch**

Unlined trapezoidal ditches shall be constructed to the cross section as shown on the drawing or as directed by the Engineer.

The invert level shall be finished to a steady longitudinal gradient of not less than 1% and the full shall be in all cases towards a culvert.

### **Article 7.8 - Pipe Culverts**

Pipe culverts shall be placed after cleaning their inside. Any damaged pipe shall be rejected.

Pipes shall be embedded in class 15 concrete to the line and level as shown on the drawings or as directed by the Engineer.

The method, tools for placing the pipes, joints to be used shall be to the approval of the Engineer.

A properly fitted plug shall be well secured at the end of each pipe already laid and shall be removed only when the next pipe line is being laid or on completion of the pipe line or culvert.

Where required by the Engineer, bedding shall curve upward along the culvert to correct for expected settlement and to ensure tightness in the lower half of the joints.

The flow line of the pipes shall be within a range of 0.5 cm of the specified level shown on the drawings or as directed by the Engineer.

Backfilling shall be brought up evenly on both sides of the pipe. Special care shall be taken to compact thoroughly the material under the haunches of the pipe and to ensure that backfilling material is in intimate contact with the pipe.

Jointed pipes shall be tested as directed by the Engineer.

Masonry works shall comply with the requirements of Article 6.11 and the end of all pipes shall be neatly built into the walls and finished with cement mortar.

No separate payment shall be made for excavation of pipe culverts and the cost thereof shall be deemed to be included in the rate for provision and laying of the pipe.

### **Article 7.9 - Box Culverts**

Box culverts shall be built to the lines, levels and dimensions shown on the drawings or as directed by the Engineer. The base shall rest on firm soil and if the nature of the soil encountered requires the foundation to be lowered, the extra depth excavated shall be filled up with class 15 concrete containing 25% of plums.

The bottom of the excavation shall be filled with class 15 blinding concrete.

The top of the base slab shall be finished smooth to a steady gradient and the fall shall be as directed by the Engineer. The base slab and the cut-off walls shall be executed in class 30 concrete.

The supporting walls and the wing walls shall be built with class 30 concrete. All exposed surfaces shall have a smooth off shutter finish and construction joints shall be rubbed down to a smooth finish. The supporting walls and the wing walls may be built in masonry at the option of the contractor.

The top of the supporting walls shall be finished smooth to a perfectly level surface (by a layer of concrete in the case of masonry walls) so that no rocking of the precast apron slabs occurs once the latter is fixed in position.

The apron slabs shall be cast to have a smooth off shutter finish to the dimensions and levels given in the drawings or as directed by the Engineer in class 30 concrete. These slabs may be cast in-situ or precast at the option of the contractor. If they are precast, they

shall, in all respects, comply with the requirements for precast concrete given in Article 8.12.

### **Article 7.10 - Gullies and Manholes**

Gullies and Manholes shall be built to the lines, levels, dimensions, and details given in the drawings or as directed by the Engineer. The bottom of the excavation shall be blinded with class 15 concrete. The base slab and the walls shall be built with class 30 concrete. The internal surfaces shall be of off-shutter finish with the construction joints rubbed down to make a uniform level surface. The top edge of the wall shall be carefully finished smooth and level so that no rocking of the precast cover slabs occurs.

### **Article 7.11 - Masonry Works**

The stones for masonry works shall be in accordance with the requirements of Article 2.24.

The masonry shall be laid to line and in courses roughly levelled up. The bottom courses shall be composed of large selected stones to be approved by the Engineer and all courses shall be laid with bearing beds parallel to the natural beds of the material.

Each stone shall be cleaned and thoroughly saturated with water before being set and the bed which is to receive it shall be clean and well moistened. All stones shall be well bedded in freshly made mortar. The mortar joints shall be full and the stones carefully settled in place before the mortar has set.

Wherever possible, the face joints shall be properly pointed before the mortar becomes set. Joints which cannot be so pointed shall be prepared for pointing by racking them out to a depth of 5 cm before the mortar has set.

The face surfaces of stones shall not be smeared with the mortar forced of the joints or that used in pointing.

Vertical joints in each course shall break with those adjoining courses at least 15 cm. In no cases shall a vertical joint be so located as to occur directly above or below a header.

In case any stone is moved or the joint broken, the stone shall be taken up, the mortar thoroughly cleaned from bed and joints, and the stone reset in fresh mortar.

Joints not pointed at the time the stone is laid shall be thoroughly wet with clean water and filled with mortar. The mortar shall be well driven into the joints and finished with an approved pointing tool. The wall shall be kept wet while pointing is being done and in hot or dry weather the pointed masonry shall be protected from the sun and kept wet for a period of at least four days after completion. After the pointing is completed and the mortar has set, the wall shall be thoroughly cleaned and left in a neat condition.

### **Article 7.12 - Riprap**

The stones for riprap shall be as specified in Article 2.24. They shall be laid with closed joints from the bottom of the slope of the embankment or existing ground, upward, the larger stones being laid at the bottom.

### **Article 7.13 - Rainwater Downspouts**

The stones for rainwater downspouts shall be as specified in Article 2.24. They shall be laid and bedded in class 15 concrete to the lines, levels and dimensions given in drawings or as directed by the Engineer.

### **Article 7.14 Waterproofing**

#### 7.14.1 General

Proprietary waterproofing systems incorporated in the Permanent Works shall have a current British Board of Agreement Roads and Bridge Certificate or equivalent approved certificate.

The system will be as per the advice of the manufacturer with regard to site conditions including climatic and environmental limitations together with compatibility of materials and details at the interface of the waterproofing system with the drainage outlets and bridge deck movement joints. No departure from the specified constituent materials and methods of installation as stated on the British Board of Agreement Roads and Bridges Certificate will be permitted.

Proprietary waterproofing systems shall be installed only by applicators approved by the manufacturers.

The formation of defects affecting the integrity of the membrane including pinholes (continuous or non-continuous), blowholes and blisters in the waterproofing shall:

- (i) Be made good by repair in accordance with the Waterproofing System Data Sheets and the manufacturer's installation procedure and to the satisfaction of the Engineer before any subsequent layers are applied; or
- (ii) Require the system to be replaced where directed by the Engineer.

For sheet membranes bonded with oxidized bitumen the heating and the temperature of the bitumen shall comply with the manufacture's requirements within the limits stated in BS 8000.

A means of checking the bitumen temperature shall be provided.

Sheet membranes shall wherever possible be laid in the direction that the additional protective layer or surfacing will be laid and compacted by roller.

Unless otherwise specified in the British Board of Agreement Roads and bridges Certificate, joints between sheets shall be lapped with end laps of at least 150mm and side laps of at least 100mm. The joints shall be arranged so that:

- (i) At no point are there more than 3 thicknesses of sheeting and,
- (ii) Water will drain away from the exposed edge.

Proprietary waterproofing systems shall be laid to follow the contours of the concrete surface. Laps, ridges and ripples in waterproofing sheeting, and peaks and steps at butt joint in waterproofing boards, shall not be greater than 10mm in height.

#### 7.14.2 Additional Bituminous protection

All proprietary waterproofing systems shall be protected with a bituminous layer of sand asphalt complying with BS594: Part 1 recipe Type F wearing course mixture designation 0/3 thickness 25mm. An additional warning layer of red coloured slurry seal shall be applied to this bituminous protective layer. This slurry seal will comply with the following specification, aggregate shall be light colour.

| Aggregate Sieve | Grading % Passing |
|-----------------|-------------------|
| 6.3             | 100               |
| 5               | 90-100            |
| 2               | 60-87             |
| 1               | 40-67             |
| 424mm           | 22-38             |
| 300             | 18-30             |
| 150             | 10-20             |
| 75              | 5-15              |

5% of the total mix is to be unreactive red pigmat and regarded as part of the filler. Cement is to be included as a fluxing agent at minimum 0.75% of the total mix which is also to be regarded as part of the filler content.

The emulsion may be anionic A4 or cationic K3 (depending on reaction with filler) and at a rate of 15-25% of the total mix, additional water up to a maximum of 10% of the mix may be added. Rate of application will be of the order of 250 m<sup>2</sup>/m<sup>3</sup>. Mixing may be by concrete mixer and spreading by hand application using a spreader box, rolling may be required by pneumatic tyred roller after initial curing.

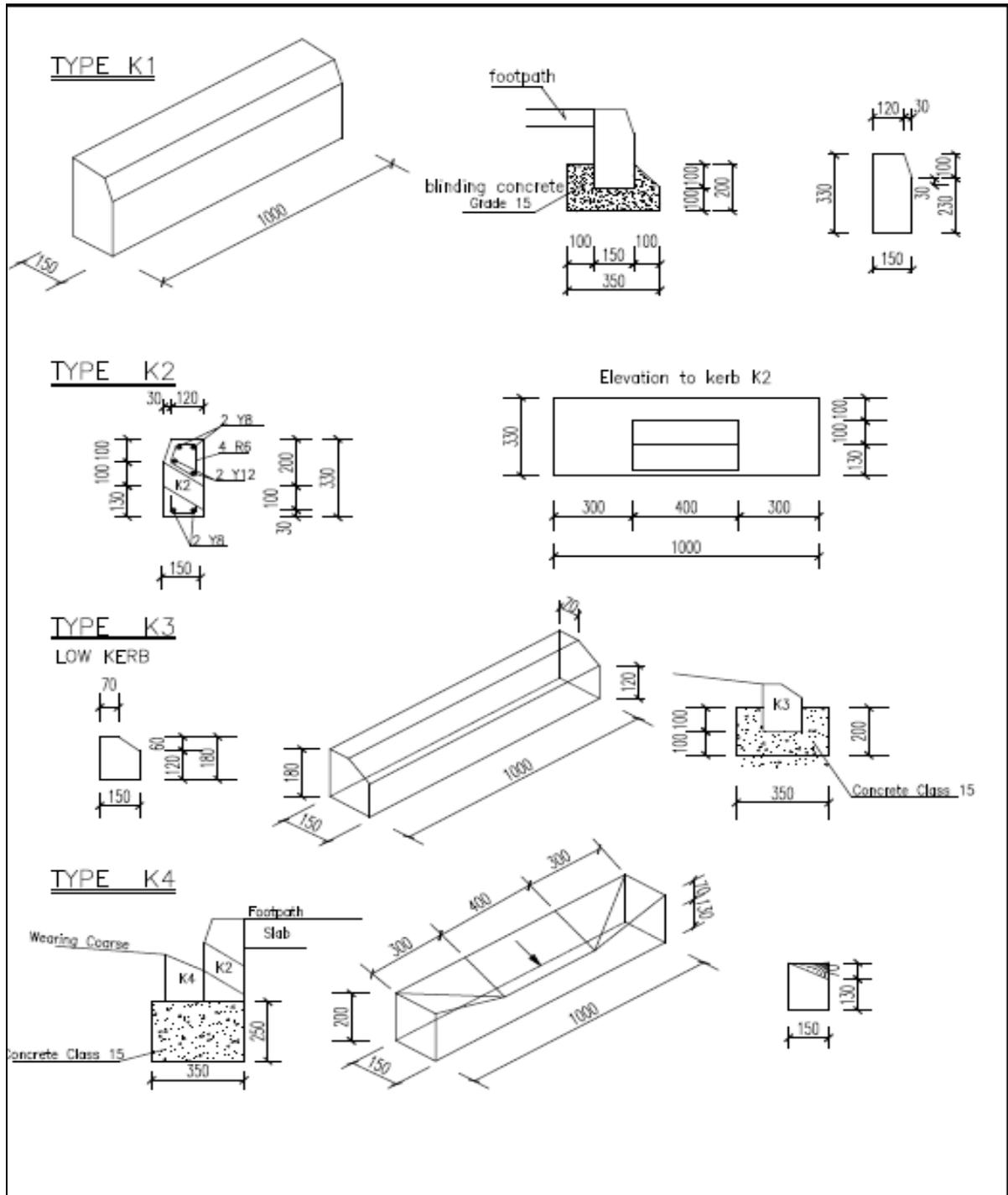
The additional protective layer or surfacing laid on the waterproofing system shall be firmly bonded to the system. Where a tack coat for the additional protective layer or surfacing is not provided as part of the waterproofing system a satisfactory bond to the membrane shall be obtained from:

- (i) A separate compatible tack coat; or
- (ii) The binder within the directly applied additional protective layer or surfacing. Where the tack coat is the type activated by the heat of the succeeding bituminous layer the rolling temperature of this layer shall be sufficient to ensure adhesion.

# Drawings

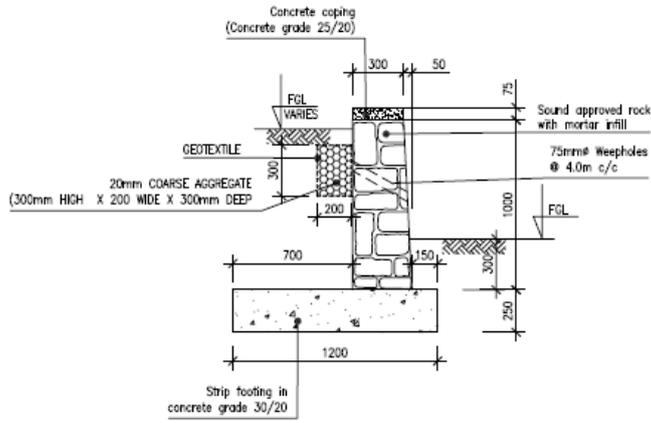
KERB DETAILS

(KERB TYPES K1, K2, K3 & K4)

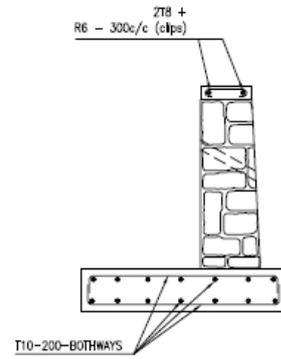


# Section V- Employer's Requirements

## Masonry wall Details



TYPICAL SECTION THROUGH RETAINING WALL



REINFORCEMENT DETAILS

## **PART 3 – Conditions of Contract and Contract Forms**

## Section VI. General Conditions of Contract

The General Conditions of Contract (GCC) applicable for this procurement is available on the web site of the Procurement Policy Office [ppo.govmu.org](http://ppo.govmu.org) under Ref. No. **W/SBD28/05-17 dated 09<sup>th</sup> May 2017** and **W/GCC10/05-14 dated 06<sup>th</sup> May 2017**

The GCC can be used for both ad measurement contracts and lump sum contracts.

## Section VII. Particular Conditions of Contract

*Except where otherwise indicated, all PCC should be filled in by the Employer prior to issuance of the Bidding Documents. Schedules and reports to be provided by the Employer should be annexed.*

**These clauses should be read in conjunction with the General Conditions of Contract**

| <b>A. General</b>   |                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GCC 1.1 (r)</b>  | The Employer is<br><br><i>The Chief Executive Officer</i><br><br><i>The District Council of Black River</i><br><br><i>Geoffroy Road, Bambous</i>                                                                                                                                                                               |
| <b>GCC 1.1 (v)</b>  | The Intended Completion period of the works <b>would be specified in works orders which would be issued as and when required within Thirteen (13) months after signature of contract.</b><br><br>The value of works which would be allocated to the contractor would be any amount up to a maximum of Rs <b>15m (Excl VAT)</b> |
| <b>GCC 1.1 (y)</b>  | The Project Manager is<br><br><i>The Head, Public Infrastructure Department,</i><br><br><i>The District Council of Black River</i>                                                                                                                                                                                             |
| <b>GCC 1.1 (aa)</b> | The Site is located at Areas within the jurisdiction of The District Council of Black River                                                                                                                                                                                                                                    |
| <b>GCC 1.1 (dd)</b> | The Start Date shall be within <b>7 days after handing over of site</b>                                                                                                                                                                                                                                                        |
| <b>GCC 1.1 (hh)</b> | The Works consist of Resurfacing and Construction of Roads/Lanes and associated works                                                                                                                                                                                                                                          |
| <b>GCC 2.2</b>      | Sectional Completions are: As would be specified in the works orders/handling over certificate or as instructed by the Project Manager or his representative.                                                                                                                                                                  |
| <b>GCC 2.3(i)</b>   | The following documents also form part of the Contract:<br><br>Scope of works<br>Performance Security<br>Insurance Policies<br>Addendum (if any)<br>The Contract Agreement<br>The Letter of Acceptance                                                                                                                         |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <p>The Letter from the Bidder<br/> The Bid Submission Form<br/> The General Conditions of Contract<br/> The Particular Conditions of Contract<br/> The Employer's Requirements<br/> Filled Priced Activity Schedule<br/> Specifications<br/> The Bidder's Qualifications</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>GCC 3.1</b>  | <p>The language of the contract is English</p> <p>The law that applies to the Contract is the law of Mauritius.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>GCC 5.1</b>  | The Project manager <b>may</b> delegate any of his duties and responsibilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>GCC 8.1</b>  | Schedule of other contractors: <b>Not Applicable</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>GCC 13.1</b> | <p>Except for the cover mentioned in (d)(i) hereunder, the other insurance covers shall be in the joint names of the Contractor and the Employer and the minimum insurance amounts shall be:</p> <p>(a) for the Works, Plant and Materials: <i>(for the full amount of the works including removal of debris, professional fee etc...)</i> <b>Rs 15.0M</b></p> <p>(b) for loss or damage to Equipment: <i>(for the replacement value of the equipment that the contractor intends to use on site until the taking over by the Employer.</i> <b>Rs 5.0M</b></p> <p>(c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract <i>for an amount representing the value of the properties that are exposed to the action of the contractor in the execution of the works. It will extend to the property of the Procuring Entity as well).</i> <b>Rs 5.0M</b></p> <p>(d) for personal injury or death:</p> <p>(i) of the Contractor's employees: <i>[The Contractor shall take an adequate insurance cover for its employees for any claim arising in the execution of the works].</i> <b>Rs 5.0M</b></p> <p>(ii) of other people: <i>[This cover shall be for an adequate amount for Third Party extended to the Employer and its representatives].</i> <b>Rs 5.0M</b></p> <p>(e) for loss or damage to materials on-site and for which payment have been included in the Interim Payment Certificate, where applicable. <b>NOT APPLICABLE</b></p> <p>The Contractor shall choose to take the insurance covers indicated above as separate covers or a combination of the Contractor's All Risks coupled with the Employer's liability and First Loss Burglary, after approval of the</p> |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                | Employer. All insurance covers shall be of nil or the minimum possible deductibles at sole expense of the contractor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>GCC 14.1</b>                | Site Data are: No site data is available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>GCC 20.1</b>                | The Site Possession Date(s) shall be: As defined in Works Orders                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>GCC 23.1 &amp; GCC 23.2</b> | Appointing Authority for the Adjudicator: <b>No Adjudicator shall be appointed for this Contract.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>GCC 24.</b>                 | <p>In case a dispute of any kind arises between the Employer and the Contractor in connection with, or arising out of, the contract or the execution of works or after completion of works and whether before or after repudiation or other termination of Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Employer’s Representative, the matter in dispute shall, in the first place, be referred in writing to the employer’s representative, with a copy to the other party.</p> <p>The Employer and the Contractor shall make every effort to resolve the dispute amicably by direct informal negotiation. If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Public Body or the Contractor may give notice to the other party of its intention to refer the matter to:</p> <p>“commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.</p> |
| <b>GCC 24.3</b>                | Hourly rate and types of reimbursable expenses to be paid to the Adjudicator: <b>Not applicable.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>GCC 24.4</b>                | <p><i>For large contracts with domestic contractor or for contract with foreign contractor:</i></p> <p>Any dispute or difference in respect of which a notice of intention to commence arbitration has been given shall be finally settled by arbitration in accordance with Mauritian Laws by an Arbitrator to be appointed by both parties to the dispute or in any case of disagreement, by an Arbitrator to be appointed by a judge in Chambers of Mauritius. The Arbitrator fees will be borne by the losing party. Any decision of the Arbitrator shall be final and binding to both parties”.</p> <p><i>[In case the public body has opted not to have recourse to Arbitration as per clause GCC 24 insert “ Not Applicable” in here.]</i></p>                                                                                                                                                                                                                                                                                                                                                                    |
| <b>B. Time Control</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>GCC 25.1</b>                | The Contractor shall submit for approval a Program for the Works within 21 days from the date of the Letter of Acceptance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GCC 25.3</b>           | The period between Program updates is <b>15 days</b> .<br><br>The amount to be withheld for late submission of an updated Program is <b>NOT APPLICABLE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>C. Quality Control</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>GCC 33.1</b>           | The Defects Liability Period is: <b>365</b> days.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>GCC 39.1</b>           | “Payment shall be made as per progress of works without payment for materials on site”.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>GCC 39.7</b>           | Interim Payment for Plant and Material on site <b>is not</b> applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>D. Cost Control</b>    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>GCC 41.1 (l)</b>       | <i>The term “exceptional adverse weather conditions” is hereby defined as any one of the following events:</i><br><br><i>(i) Above 20 mm of rainfall recorded in day at the nearest rain station.</i><br><br><i>(ii) An Official declaration of “Torrential Rain” by the Meteorological Department of Mauritius and</i><br><br><i>(iii) Cyclone warning class 3 or above.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>GCC 43.1</b>           | The currency of the Employer’s country is: <b>Mauritian Rupees.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>GCC 44.1</b>           | The Contract “ <i>is not</i> ” subject to price adjustment in accordance with GCC Clause 44, and the following information regarding coefficients <i>does not</i> apply.<br><br>The coefficients for adjustment of prices are:<br><br>(a) For currency [ <i>insert name of currency</i> ]:<br><br>(i) [ <i>insert percentage</i> ] percent non adjustable element (coefficient A).<br><br>(ii) [ <i>insert percentage</i> ] percent adjustable element (coefficient B).<br><br>(b) For currency [ <i>insert name of currency</i> ]:<br><br>(i) [ <i>insert percentage</i> ] percent non adjustable element (coefficient A).<br><br>(ii) [ <i>insert percentage</i> ] percent adjustable element (coefficient B).<br><br>The Index I for local currency shall be [ <i>insert index</i> ].<br><br>The Index I for the specified international currency shall be [ <i>insert index</i> ].<br><br>[ <i>These proxy indices shall be proposed by the Contractor, subject to</i> |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | <p><i>acceptance by the Employer]</i></p> <p>The Index I for currencies other than the local currency and the specified international currency shall be <i>[insert index]</i>.</p> <p><i>[These proxy indices shall be proposed by the Contractor, subject to acceptance by the Employer.]</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>GCC 45.1</b>                  | The proportion of payments retained is: <b>10% which shall be retained from any payment. Half of the retention money will be released after formal taking over of the Works and the remaining shall be released after the Defects Liability Period subject to the Contractor making good all defects.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>GCC 46.1</b>                  | <p>The liquidated damages for the whole of the Works are <b>Rs 2,000</b> per day for each works order.</p> <p>The maximum amount of liquidated damages for the works is <b>10%</b> of the value of the works for each works order.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>GCC 47.1</b>                  | <b>Not Applicable</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>GCC 48.1</b>                  | The Advance Payments shall <b>Not be A plicable</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>GCC 49.1</b>                  | <p>The Performance Security amount is 10% i.e. <b>Rs 1.5m</b> of the contract price (including contingencies and VAT) in the form of a Bank Guarantee as per the format in section VIII. The duration of the Performance Security shall be extended up to 28 days after the Defects Liability Period for the Last Works Order to be issued under this rate contract.</p> <p>The Performance Security shall be in form of a bank guarantee, issued by a bank registered and licensed to do business in Mauritius and approved by the Employer. Performance Security offered by insurance companies or other institutions will not be acceptable.</p> <p>The Employer shall not provide for any compensation in case No Work Order is issued to any contractor or the total value of Work Order issued to any contractor under this rate contract is less than MUR 10M.</p> <p>Poor Performance or non-performance by a Contractor will result in forfeiture of the Performance Security, cancellation of the Work Order and award of the works to the next lowest Contractor in the rate contract.</p> <p>Where the Performance security and the insurance covers expire before the end of the date of completion of works, the contractor shall renew the insurance covers and the security to cover the period up to the completion of works and shall extend these to cover the maintenance period at no extra cost. The contractor shall inform the client in writing of the steps taken.</p> |
| <b>E. Finishing the Contract</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>GCC 55.1</b>                  | <b>Not Applicable</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                     |                                                                                                                                                              |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GCC 55.2</b>     | <b>Not Applicable</b>                                                                                                                                        |
| <b>GCC 57.2 (g)</b> | The maximum number of days is: <b>To be determined as per the value of each works order.</b>                                                                 |
| <b>GCC 59.1</b>     | The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is <b><u>15%</u></b> . |

## Section VIII - Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

### Table of Forms

|                                          |            |
|------------------------------------------|------------|
| <b>Letter of Acceptance .....</b>        | <b>107</b> |
| <b>Contract Agreement .....</b>          | <b>108</b> |
| <b>Performance Security .....</b>        | <b>110</b> |
| <b>Form for Preference Security.....</b> | <b>51</b>  |
| <b>Advance Payment Security .....</b>    | <b>112</b> |

# Letter of Acceptance

*[ on letterhead paper of the Employer]*

..... *[date]* .....

To: ..... *[ name and address of the Contractor]* .....

Subject: ..... *[Notification of Award Contract No]* .....

This is to notify you that your Bid dated . . . . *[insert date]* . . . . for execution of the . . . .  
. . . . .*[insert name of the contract and identification number, as given in the Appendix to Bid]* .  
. . . . . for the Accepted Contract Amount of the equivalent of . . . . . *[insert amount in numbers and words and name of currency]*, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by *(insert name of Public Body)*.

You are requested to furnish the Performance Security within 21 days in accordance with the General Conditions of Contract, using for that purpose of the Performance Security Form included in Section VI (Contract Forms) of the Bidding Document.

Authorized Signature: .....

Name and Title of Signatory: .....

Name of Agency: .....

Attachment: Contract Agreement

## Contract Agreement

THIS AGREEMENT made the . . . . .day of . . . . ., . . . . ., between . . . . . [name of the Employer]. . . . . (hereinafter “the Employer”), of the one part, and . . . . . [name of the Contractor]. . . . . (hereinafter “the Contractor”), of the other part:

WHEREAS the Employer desires that the Works known as . . . . . [name of the Contract]. . . . . should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
  - (a) the Letter of Acceptance
  - (b) the Bid
  - (c) the Addenda Nos . . . . . [insert addenda numbers if any]. . . . .
  - (d) the Appendix to the General Conditions of Contract
  - (e) the General Conditions of Contract;
  - (f) the Specification
  - (g) the Drawings; and
  - (h) the completed Schedules,
3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

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

Signed by: \_\_\_\_\_  
for and on behalf of the Employer

Signed by: \_\_\_\_\_  
for and on behalf the Contractor

in the  
presence of: \_\_\_\_\_  
Witness, Name, Signature, Address, Date

in the  
presence of: \_\_\_\_\_  
Witness, Name, Signature, Address, Date

## Performance Security

.....*Bank's Name and Address of Issuing Branch or Office*.....

**Beneficiary:** .....*Name and Address of Public Body*.....

**Date**.....

**PERFORMANCE GUARANTEE No.:**.....

We have been informed that .....*name of the Contractor*.....  
(hereinafter called "the Contractor") has entered into Contract No.....*reference number of the Contract*..... dated..... with you, for the execution of ..... *name of Contract and brief description of Works* .....(hereinafter called "the Contract").

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

At the request of the Contractor, we ..... *name of Bank* .....hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ..... *amount in figures (amount in words)*..... such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire not later than twenty-eight days from the date of issuance of the Certificate of Completion/Acceptance Certificate, calculated based on a copy of such Certificate which shall be provided to us, or on the.....day of ....., ....., whichever occurs first. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

.....*Seal of bank and*

*Signature(s)*.....

Sample Form of Preference Security

Form of Preference Security  
(Bank Guarantee)

To: \_\_\_\_\_ [name of  
Employer]  
\_\_\_\_\_ [address of  
Employer]

WHEREAS \_\_\_\_\_ [name of Contractor] and  
addresses of the contractor] (hereinafter called "the Contractor"), has been taken in  
pursuance to Contract No. \_\_\_\_\_ dated \_\_\_\_\_ to execute  
\_\_\_\_\_ [name of Contract and brief description of  
Works], (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the  
Contractor shall furnish you with a Bank Guarantee by a local commercial bank for the  
sum specified therein as security for compliance with his obligation stated in Sub-Clause  
49.2 of the Conditions of Contract;

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

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible  
to you, on behalf of the Contractor, up to a total of \_\_\_\_\_ [amount  
of Guarantee]<sup>9</sup>, we undertake to pay you upon your first written demand and without  
your having to substantiate such demand any sum within the limit of  
\_\_\_\_\_ [amount of Guarantee].<sup>1</sup>

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

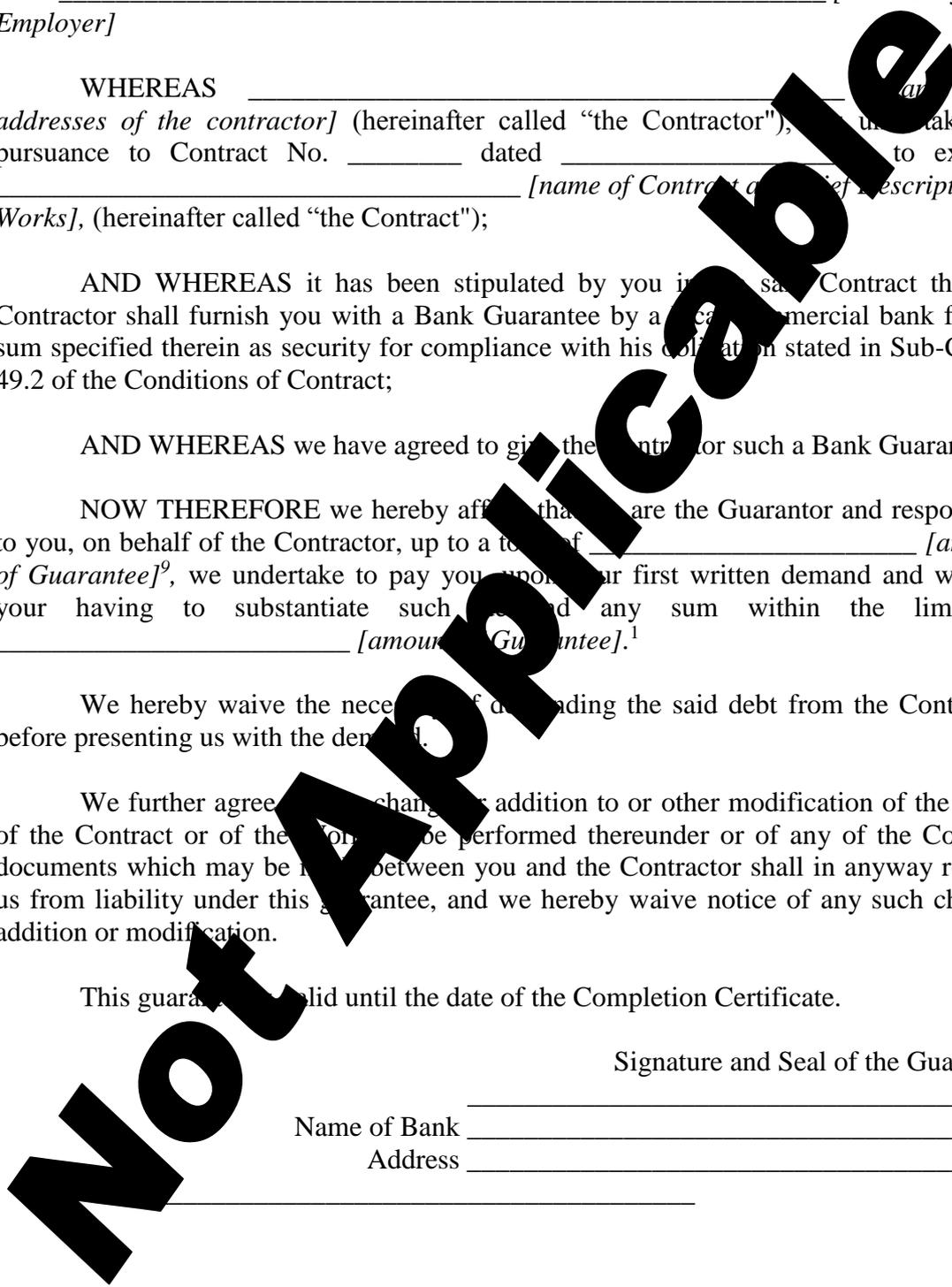
We further agree that any change or addition to or other modification of the terms  
of the Contract or of the work to be performed thereunder or of any of the Contract  
documents which may be made between you and the Contractor shall in anyway release  
us from liability under this guarantee, and we hereby waive notice of any such change,  
addition or modification.

This guarantee shall be valid until the date of the Completion Certificate.

Signature and Seal of the Guarantor

Name of Bank \_\_\_\_\_  
Address \_\_\_\_\_

<sup>9</sup> Amount to be inserted by the Guarantor in accordance with Sub-Clause 49.2 of the General Conditions of Contract



# Advance Payment Security

*[Bank’s Name, and Address of Issuing Branch or Office]*

**Beneficiary:** ..... *[Name and Address of Employer]* .....

**Date:** .....

**Advance Payment Guarantee No.:** .....

We have been informed that . . . . . *[name of the Contractor]*. . . . . (hereinafter called “the Contractor”) has entered into Contract No. . . . . *[reference number of the Contract]*. . . . . dated . . . . . with you, for the execution of . . . . . *[name of contract and brief description of Works]*. . . . . (hereinafter called “the Contract”).

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum . . . . . *[name of the currency and amount in figures]*<sup>1</sup>. . . . . ( . . . . . *[amount in words]*. . . . . ) is to be made against an advance payment guarantee.

At the request of the Contractor, we . . . . . *[name of the Bank]*. . . . . hereby irrevocably undertake to pay you any sum or sums not exceeding a total amount of . . . . . *[name of the currency and amount in figures]*\*. . . . . ( . . . . . *[amount in words]*. . . . . ) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number . . . . . *[Contractor account number]*. . . . . at . . . . . *[name and address of the Bank]*. . . . .

The maximum amount of the guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the . . . day of . . . . . , . . . . . , whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

..... *[Seal of Bank and Signature(s)]*. . . . .

**N**  
All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

1 The Guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.

2 Insert the expected expiration date of the Time for Completion. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to

*the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: “The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Employer’s written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.*