



BIDDING DOCUMENTS

Issued on: 24 MAY 2024

for

**IMPLEMENTATION OF BEACH
MANAGEMENT PLAN**

Phase II

**THE DESIGN AND BUILD OF A
PANORAMIC VIEWPOINT
AT LA PRAIRIE PUBLIC BEACH**

Procurement Reference No.:

BA/ONB/04/2023-24

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Invitation for Bids

Implementation of Beach Management Plan (Phase II)

*Design and Build of a Panoramic Viewpoint at
La Prairie Public Beach*

Procurement Reference No: BA/ONB/04/2023-24

INVITATION FOR BIDS

Date: 24 May 2024

Procurement Reference No. **BA/ONB/04/2023-24**

1. The Beach Authority ("the Employer") invites sealed bids from eligible bidders for design-build/turnkey and completion of a new and undiscovered panoramic viewpoint in the south west region of Mauritius and associated Architectural, Civil and landscaping works ("the Works").
2. Bidders may obtain further information from, and inspect and acquire the bidding documents, at public procurement portal: **publicprocurement.govmu.org** OR **<http://www.beachauthority.mu>**¹
3. All bids must be accompanied by a *signed bid securing declaration form in the format contained in the bidding document*, and must be delivered to **The General Manager, Bid Box. Beach Authority, 7th Floor, Ebene Heights Building, Plot 34, Ebene Cybercity, Ebene** at or before **Monday 24 June 2024 at 10:30 hrs. (local time) at latest.**

Bids will be opened immediately thereafter in the presence of bidders' representatives who choose to attend.²

4. In the comparison of bids, the Employer will grant a margin of preference to

[Alternative B]⁶ eligible domestic contractors including eligible joint ventures with foreign contractors in accordance with the procedures outlines in the bidding documents.

¹ The text of the Invitation for Bids and the texts of the other documents herein must indicate which agency will act as the Employer.

² Coordinate with sub-Clause 27, 1, Instructions to Bidders, Bid Opening.

**SECTION 1
INSTRUCTIONS TO BIDDERS
(SINGLE STAGE BIDDING PROCEDURE)**

Notes on the Instructions to Bidders

Section 1 should provide the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Employer. It should give information on bid submission, opening and evaluation, and on the award of contract.

Matters governing the performance of the Contractor under the Contract, payments under the Contract, or matters affecting the risks, rights, or obligations of the parties under the Contract are normally not included in this section, but rather in the sections on general or particular conditions of contract. If duplication of a subject is inevitable in the different sections of the documents, the user should exercise care to avoid contradiction or conflict between clauses dealing with the same topic.

Section 1 - Instruction to Bidders

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Section 1. Instructions to Bidders

1. Scope of Bid

A. General

- 1.1 The **Beach Authority** (hereinafter referred to as "the Employer"), wishes to receive bids for **design-build and completion of panoramic viewpoint at La Prairie public beach as a second phase of the Beach Management Plan**, as defined in these bidding documents (hereinafter referred to as "the Works").

The intent of the Authority is to create a new and undiscovered viewpoint on a portion of land which is found at approximately 55m above mean sea level and which has been proclaimed as public beach.

The site is heavily dense with trees, plants and vegetations. There is currently no proper access from the ground/road level to the peak of the site.

The Bidder will be required to implement the following main components:

- a. Submit a preliminary design plan and preliminary drawings of the project for the Client's approval design
- b. Carry out appropriate topographical survey to determine the most suitable path leading to the peak of the viewpoint
- c. Felling of trees, lopping of branches and clearing of bushes and vegetations along the pathway and the platform
- d. Determine and design the most appropriate way to access the viewpoint with either steps, terracing or otherwise
- e. Design and fixing of handrails on both sides along pathway
- f. Design and fixing of handrails at the 1st level which is approximately 48 m from the ground level
- g. Implementation of a selfie point at the 1st level
- h. Construction of an open roof mirador with vandal-proof and non-corrosive materials
- i. Fixing of handrails and landscaping works around the mirador
- j. Construction of a stele and fixing of an inauguration plate
- k. Design and fixing of a 3D signage to depict the path and amenities implemented under the project

The bidder is expected to create a landscape on the peak of the site that will project an extensive view of the captivating

2. Public Entities Related to Bidding Documents & to challenge & appeal

3. Corrupt or Fraudulent Practices

beauty of the south west coastal area within safe and secure confines of the public beach.

1.2 The successful bidder will be expected to complete the design within **two months** of the date of signature of Contract Agreement and to complete the Works within **six months** of approval of the whole design.

2.1 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, and the Independent Review Panel, set up under section 45 of the Public Procurement Act 2006 (hereinafter referred to as the Act.)

2.2 Sections 43, 44 and 45 of the Act provide for challenge and review mechanism. 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.

3.1 It is the policy of the Government of the Republic of Mauritius to require Public Bodies, as well as bidders, suppliers, and contractors and their agents (whether declared or not), personnel, subcontractors, sub-consultants, service providers and suppliers, observe the highest standard of ethics during the procurement and execution of contracts. ³ In pursuance of this policy, the Government of the Republic of Mauritius:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party⁴;

(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

³ In this context, any action taken by a bidder, supplier, contractor, or any of its personnel, agents, sub-consultants, sub-contractors, service providers, suppliers and/or their employees to influence the procurement process or contract execution for undue advantage is improper.

⁴ “Another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes Purchaser’s staff and employees of other organizations taking or reviewing procurement decisions.

obligation;⁵

- (iii) “collusive practice” is an arrangement between two or more parties⁶ 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 party⁷ or the property of the party to influence improperly the actions of a party;
- (v) “obstructive practice” is
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede the Employer’s investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (bb) acts intended to materially impede the exercise of the Employer’s inspection and audit rights provided for under sub-clause 4.2 below.
- (b) 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; and
- (c) will sanction a firm or an individual, at any time, in accordance with prevailing legislations, including by publicly declaring such firm or individual ineligible, for a stated period of time: (i) to be awarded a public contract; and (ii) to be a nominated^b sub-contractor, consultant,

⁵ “Party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

⁶ “Parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, noncompetitive levels.

⁷ “Party” refers to a participant in the procurement process or contract execution.

^b A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which either has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific

manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a public contract.

3.2 Furthermore, bidders shall be aware of the provision under sub-clause 15.2 (f) of the Conditions of Contract, Part II.

3.3 In pursuance of this policy, Bidders shall permit the Employer to inspect any accounts and records and other documents relating to the Bid submission and contract performance, and to have them audited by auditors appointed by the Employer.

3.4 Bidders, suppliers and public officials shall also 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

3.5 The Employer commits itself to take all measures necessary to prevent fraud and corruption and ensures 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.

4. Eligible Bidders

4.1 A Bidder, and all parties constituting the Bidder, shall have the nationality of an eligible country subject to section 17 of the Act. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.

(a) With a view to facilitating participation by bidders, the public body shall accept the submission by bidders of equivalent documentation when particular documents required by the bidding documents are not available or issued, for example, in a foreign bidder's country of origin.

(b) Public bodies may also accept certifications from bidders attesting to compliance with eligibility requirements.

4.2 Public bodies may require the submission of signed

and critical experience and know-how that are accounted for in the evaluation of the bidder's pre-qualification application or the bid; or (ii) appointed by the Purchaser.

statements from the bidders, certifying eligibility, in the absence of other documentary evidence establishing eligibility.

Eligibility requirements may concern:

- (a) business registration, for which evidence may include the certificate of company registration;
- (b) tax status, for which documentation of tax registration and tax clearance are relevant;
- (c) certifications by the bidder of the absence of a debarment order and absence of conflict of interest; and
- (d) certification of status regarding conviction for any offence involving fraud, corruption or dishonesty.

4.3

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.

4.4

- (a) A firm 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 firms 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

4.5 Government-owned enterprises in the Republic of Mauritius shall be eligible only if they can establish that they: (i) are legally and financially autonomous; (ii) operate under commercial law; and (iii) that they are not a dependent agency of the Government.

4.6 (1) While submitting any bid, a foreign individual, firm, company or institution, shall specify whether or not any agent has been appointed in Mauritius, and if so:

- (a) the name and address of the agent;
- (b) the figure of the commission amount payable to the agent, type of currency and mode of payment;
- (c) any other condition agreed with the agent; and income tax registration certificate of the local agent and acceptance letter of the agent.

(2) If a bid submitted stated that there is no local agent, and if it is proved thereafter that there exists an agent or if a bid has stated an amount for a commission and it is proven that there exists a higher amount for that commission, action shall be taken against him for suspension and debarment in accordance with section 53 of the Act.

4.7 (1) In accordance with CIDB Act 2008, Consultants, Contractors and Sub-contractors, whether local or foreign under an existing or intended joint venture operating in the construction industry have the statutory obligation to be registered with the Construction Industry Development Board (CIDB), as appropriate, prior to bidding for the project.

(2) Bidders are strongly advised to consult the website of the CIDB cidb.govmu.org for further details concerning registration of contractors/consultants.

4.8 Bidders shall provide such evidence of their continued eligibility satisfactory to the Public Body, as the Public Body

shall reasonably request.

5. Eligible Materials, Equipment and Services

- 5.1 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries as defined in Sub-Clause 4.1 above and all expenditures made under the Contract will be limited to such materials, equipment, and services. At the Employer's request, bidders may be required to provide evidence of the origin of materials, equipment, and services.
- 5.2 For purposes of Sub-Clause 5.1 above, "services" means the works and all project-related services including design services.
- 5.3 For purposes of Sub-Clause 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing or substantial or major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

Alternative A: To be used when the estimated cost of the project is below Rs. 100M.

6. Qualification of the Bidder

- 6.1 To be qualified for award of Contract, bidders shall:
- (a) ensure that the person signing the bid on behalf of the bidding firm is duly authorized to commit the company in the procurement process
- (b) have adequate financial capacity and technical capability to undertake the Contract. This will include the updating and reassessment of information which may previously have been considered during prequalification and an assessment of bidder's proposals regarding work methods, scheduling and resourcing which shall be provided in sufficient detail to confirm the bidder's capability to complete the works in accordance with the Employer's Requirements and the time for completion.⁸
- (c) for the case of a construction project, be 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 in the following class **SMALL** in **Civil Engineering Works**.

⁸ If considered necessary, reference may also be made to work in hand, future commitments, and current litigation.

(d) have to ascertain that sub-contractors, consultants and sub-consultants proposed for executing works or assignments in the construction sector are duly registered with the CIDB - in accordance with CIDB Act 2008.

6.2 Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements:

- (a) the bid, and in case of a successful bid, the Form of Contract Agreement, shall be signed so as to be legally binding on all partners;
- (b) one of the partners shall be authorized to be in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;
- (c) the partner in charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture and the entire execution of the Contract;
- (d) all partners of the joint venture shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Bid Form and the Form of Contract Agreement (in case of a successful bid); and
- (e) a copy of the agreement entered into by the joint venture partners shall be submitted with the bid.

6.3 Bidders shall also submit proposals of work methods and schedule in sufficient detail to demonstrate the adequacy of the bidder's proposals to meet the Employer's Requirements and the completion time referred to in Sub-Clause 1.2 above.

7. One Bid per Bidder

7.1 Each bidder shall submit only one bid either by itself, or as a partner in a joint venture. A bidder who submits or participates in more than one bid will cause all those bids to be rejected.

8. Cost of Bidding

8.1 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, regardless of the conduct or outcome of the bidding process.

9. Site Visit

9.1 **The bidder is advised to visit and examine the Site of Works and its**

surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the design-build and completion of the Works. The costs of visiting the Site shall be at the bidder's own expense.

- 9.2 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 9.3 The Employer may conduct a Site visit concurrently with the Pre-Bid Meeting referred to in Clause 21.

B. Bidding Documents

10. Content of Bidding Documents

- 10.1 The bidding documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause 12:

	Invitation for Bids
Section 1	Instructions to Bidders
2	Part I - General Conditions
3	Part II - Conditions of Particular Application
4	Employer's Requirements
5	Form of Bid and Appendix to Bid
6	Sample Forms
7	Schedules
8	Drawings

- 10.2 The bidder is expected to examine carefully the contents of the bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Pursuant to Clause 30, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

11. Clarification of Bidding Documents

- 11.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the employer address provided in the Invitation for Bids. The Employer will respond in writing within 7 days prior to the deadline set for submission of bids to any **request for clarification**, provided that such request is received 14 days prior to the deadline for submission of bids. Should the Employer deem it necessary to amend the Bidding Document

12. Amendment of Bidding Documents

as a result of a request for clarification, it shall do so following the procedure under ITB 12.

- 12.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by issuing addenda.
- 12.2 Any addendum thus issued shall be part of the bidding documents pursuant to Sub-Clause 10.1, and shall be communicated in writing or by fax to all purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by fax to the Employer.
- 12.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids, in accordance with Clause 24.

C. Preparation of Bids

13. Language

- 13.1 The Bid as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the English. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in English, in which case, for purposes of interpretation of the Bid, such translation shall govern.

Notwithstanding the above, documents in French submitted with the bid may be accepted without translation.

14. Documents Comprising the Bid

- 14.1 The bid submitted by the bidder shall comprise the following:
- 1) Bid Form and Appendix to Bid;
 - 2) Bid Securing Declaration;
 - 3) Information on Qualification;
 - 4) Confirmation of Eligibility;
 - 5) Schedules of Prices:
 - Preliminary Design, Drawings and Documentation
 - Civil Works, Installation and Other Services;
 - Grand Summary; and
 - 6) Schedule of Payment;
 - 7) Schedule of Coefficients and Indices for Price Adjustment;
 - 8) Schedule of Major Items of Equipment;
 - 9) Schedule of Major Items of Constructional Plant;
 - 10) Schedule of Key Personnel;
 - 11) Schedule of Subcontractors;
 - 12) Schedule of Compliance with the Bidding Document; and
 - 13) Any other materials required to be completed and submitted by bidders in accordance with these

Instructions to Bidders.

15. Bid Form and Price Schedules

- 15.1 The Bidder shall complete the Bid Form and the appropriate Price Schedules furnished in the bidding documents in the manner and detail indicated therein, following the requirements of Clauses 16 and 17;

16. Bid Prices

- 16.1 Unless specified otherwise in Employer's Requirements, Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the facilities and, where so required by the bidding documents, the acquisition of all permits, approvals and licenses, etc, operation maintenance and training services and such other items and services as may be specified in the bidding documents, all in accordance with the requirements of the Conditions of Contract.

- 16.2 Bidders shall give a breakdown of the prices in the manner and detail called for in the Schedules of Prices.

- 16.3 In the Schedules, Bidders shall give the required details and a breakdown of their prices, including all taxes, duties, levies, and charges payable in the Employer's country as of twenty eight (28) days prior to the deadline for submission of bids, as follows:

(a) Preliminary Design including all necessary drawings and documentation for the Work.

(b) Plant and equipment to be supplied from outside the Employer's country (Schedules of Prices: II) shall be quoted on a CIF port-of entry. In addition, the FOB price and import duties and taxes shall also be indicated separately.

© Plant and equipment manufactured or fabricated within the Employer's country (Schedules of Prices: III) shall be quoted on an EXW (ex-factory, ex-works, ex-warehouse or off-the-shelf, as applicable) basis and shall be inclusive of all costs as well as duties and taxes paid or payable on components and raw materials incorporated or to be incorporated in the facilities. In addition VAT shall be indicated separately.

(d) Civil Works, Installation and Other Services shall be quoted separately (Schedules of Prices: IV) and

shall include rates or prices for all labour, contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, including local transportation, operations and maintenance services, the provision of operations and maintenance manuals, training, etc. where identified in the bidding documents, as necessary for the proper execution of the Civil Works, Installation and Other Services.

- © Recommended spare parts shall be quoted separately (Schedules of Prices: VI) as specified in either subparagraph (b) or (c) above in accordance with the origin of the spare parts.

16.4 The terms EXW, CIF, and FOB shall be governed by the rules prescribed in the current edition of Incoterms, published by the International Chamber of Commerce, Paris.

16.5 Prices quoted by the bidder shall be subject to adjustment during performance of the contract to reflect changes in the cost of labor, fuel, material, equipment and transport components in accordance with the procedures specified in *Sub Clause 13.17 of the Conditions of Particular Application*. The price adjustment provision will not be taken into consideration in bid evaluation. Bidders are required to indicate the source of labor, equipment and material indices in the Schedule of Coefficients and Indices for Price Adjustment.

16.6 The bidder shall submit his bid price exclusive of VAT.

17. Bid Currencies

17.1 Prices shall be quoted in the following currencies:

- (c) the prices shall be quoted either in the currency of the bidder's home country, or in any other freely convertible currency:

- (d) a bidder expecting to incur a portion of its expenditures in the performance of the Contract in more than one currency, and wishing to be paid accordingly, shall so indicate in its Bid; and

- (e) ©if some of the contract expenditures related to Civil Works, Installation and Other Services pursuant to Clause 16.3(d) are to be incurred in Mauritius, such expenditures shall be quoted in either foreign and/or local currency, depending upon the currency in which the costs are to be incurred.

17.2 Bidders shall indicate their expected foreign currency requirements in the Appendix to Bid.

17.3 Bidders may be required by the Employer to clarify their local

and foreign currency requirements, and to substantiate that the amounts included in the Schedule of Prices and shown in the Appendix to Bid are reasonable and responsive to Sub-Clause 16.1 in which case a detailed breakdown of its foreign currency requirements shall be provided by the bidder.

17.4 During the progress of the Works, the foreign currency portions of the outstanding balance of the Contract Price may be adjusted by agreement between the Employer and the Contractor to reflect any changes in foreign currency requirements for the contract, in accordance with *Clause 13.15 of the Conditions of Particular Application*. Any such adjustment shall be effected by comparing the amounts quoted in the bid with the amounts already used in the Works and the Contractor's future needs for imported items.

18. Bid Validity

18.1 **Bids shall remain valid for a period of 90 days after the closing date for submission of bids specified in Sub-Clause 24.1.**

18.2 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 in writing or by fax. A bidder may refuse the request without forfeiting its bid security or having the bid securing declaration executed. A bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to extend the validity of its bid security or bid securing declaration for the period of the extension, and in compliance with Clause 18 in all respects.

19. Bid Security – Not Applicable

19.1 Not Applicable

19.2 The bid security shall be from a local commercial bank/insurance company or from an overseas reputable bank. The format of the bank/insurance guarantee shall be in accordance with the sample form of bid security included in Section 6; other formats may be permitted, subject to the prior approval of the Employer. The bid security shall remain valid for 30 days beyond the original validity period for the bid, and beyond any period of extension subsequently requested under Sub-Clause 18.2.

19.3 Any bid not accompanied by an acceptable bid security shall be rejected by the Employer as nonresponsive.

19.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 28 days after the expiration of the period of bid validity.

19.5 The bid security of the successful bidder will be returned

when the bidder has signed the Contract Agreement and furnished the required performance security.

- 19.6 The bid security may be forfeited
- (a) if the bidder withdraws its bid, except as provided in Sub-Clause 26.1 ;
 - (b) if the bidder does not accept the correction of its bid price, pursuant to Sub-Clause 31.2; or
 - (c) in the case of a successful bidder, if it fails within the specified time limit to
 - (i) sign the Contract Agreement, or
 - (ii) furnish the required performance security, or
 - (iii) furnish the required domestic preference security.⁹

Alternative to Bid Security

Alternative B: To be used when a Bid Securing Declaration (BSD) is required.

19. Bid Securing Declaration

- 19.1 The Bidder shall furnish as part of its bid a Bid Securing Declaration, accepting that if it withdraws or modifies its bid during the period of validity of the bid or does not accept correction of arithmetical error or if it is awarded the contract and fails to sign the contract or to submit a performance security before the deadline defined in the bidding documents, it may be disqualified for a period of time from being eligible for bidding in any public contract.

The Bid Securing Declaration shall be in the format contained in section 6, signed and duly endorsed by the Bidder.

Alternative Proposals by Bidders

Alternative A: To be used when alternative proposals are not permitted.

20. Alternative Proposals by Bidders

- 20.1 Bidders shall submit offers which comply with the documents including the basic Employer's Requirements as indicated in the bidding documents. Alternatives will not be considered. The attention of bidders is drawn to the provisions of Clause 30 regarding the rejection of bids which are not substantially responsive to the requirements of the bidding documents.

⁹ Delete where domestic preference is not applicable or where domestic preference security is not required.

21. Pre-Bid Meeting

- 21.1 The bidder or its official representative is invited to attend a pre-bid meeting which will take place **at La Prairie Public Beach near Toilet Block on 05 June 2024 at 10:15 hrs.** The Bidders and their representatives are advised to dress in long trousers and long sleeves and to wear sports shoes when attending the pre-bid meeting.
- 21.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 21.3 The bidder is requested to submit any questions in writing or by fax, to reach the Employer not later than one week before the meeting.
- 21.4 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any response prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document from the sources indicated in the Invitation for Bids. Any modification of the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 12.2 and not through the minutes of the pre-bid meeting.
- 21.5 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

22. Format and Signing of Bid

- 22.1 The bidder shall prepare **ONE** original and **TWO** copies of the bid documents comprising the bid as described in Clause 13 of these Instructions to Bidders, bound with the volume containing the Form of Bid, and clearly marked "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between them, the original shall prevail.
- 22.2 The original and all copies of the bid shall be typed or written in indelible ink (in the case of copies, photocopies are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of the bidder, pursuant to Sub-Clauses 6.1 (a) or 6.2 (b), as the case may be. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.
- 22.3 The bid shall contain no alterations, omissions or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.
- 22.4 The bidder shall furnish information as described in the Form of Bid on commission or gratuities, if any, paid or to be paid relating to this Bid, and to contract execution if the bidder is

awarded the contract.

D. Submission of Bids

23. Sealing and Marking of Bids

23.1 The bidder shall seal the original and each copy of the bid in an inner and an outer envelope, duly marking the envelopes as "ORIGINAL" and "COPY".

23.2 The inner and outer envelopes shall

(a) be addressed to the **General Manager** at the following address: **Beach Authority, 7th Floor, Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène**; and

(b) bear the following identification:

- **Bid for The Design and Build of a Panoramic Viewpoint at La Prairie Public Beach**

- Bid Reference Number:
BA/ONB/04/2023-24

- **DO NOT OPEN BEFORE 24 May 2024 at 10:30 hrs.**

23.3 In addition to the identification required in Sub-Clause 22.2, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause 25.

23.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

24. Deadline of Submission of Bid

24.1 Bids must be received by the Employer at the address specified above no later than **24 May 2024 at 10:30 hrs**

24.2 The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause 11, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the extended new deadline.

25. Late Bids

25.1 Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 24 will be rejected

26. Modification and Withdrawal of Bid

and returned unopened to the bidder.

- 26.1 The bidder may modify or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.
- 26.2 The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause 23, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.
- 26.3 No bid may be modified by the bidder after the deadline for submission of bids, except in accordance with Sub-Clauses 26.2 and 31.2.
- 26.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified In Sub-Clause 18.1 may result in the forfeiture of the bid security or in the execution of the bid securing declaration pursuant to Sub-Clause 19.6 or 19.1 respectively whichever is applicable.

E. Bid Opening and Evaluation

27. Bid Opening

- 27.1 The Employer will open the bids, including modifications made pursuant to Clause 26, in the presence of bidders representatives who choose to attend, at **24 May 2024 at 10:30 hrs** ¹⁰ at the following location: **The Conference Room, Beach Authority, 7th Floor, Ebene Heights Building, Plot 34, Ebene Cybercity, Ebene** The bidders' representatives who are present shall sign a register evidencing their attendance.
- 27.2 Envelopes marked "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 26 shall not be opened.
- 27.3 The bidders' names, the Bid Prices, including any alternative Bid Price, any discounts, bid modifications and withdrawals, the presence or absence of bid security or bid securing declaration, and such other details as the Employer may consider appropriate, will be announced and recorded by the Employer at the opening. The bidders' representatives will be required to sign this record.
- 27.4 The Employer shall prepare minutes of the bid opening, including the information disclosed to those present in

¹⁰ Time and date should be as close as possible to those given for the deadline of submission of bids (Sub-Clause 23.1).

	accordance with Sub-Clause 27.3.
28. Process to Be Confidential	28.1 Information relating to the examination, clarification, evaluation and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of the bidder's bid.
29. Clarification of Bids and contacting the Employer	<p>29.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at its discretion, ask any bidder for clarification of its bid. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in, accordance with Clause 31.</p> <p>29.2 Subject to Sub-clause 29.1, no bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the contract is awarded. If the bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.</p> <p>29.3 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.</p>
30. Preliminary Examination of Bids and Determination of Responsiveness	<p>30.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid (i) meets the eligibility criteria of the Public Body; (ii) has been properly signed; (iii) is accompanied by the required securities; (iv) is substantially responsive to the requirements of the bidding documents; and (v) provides any clarification and/or substantiation that the Employer may require pursuant to Clause 29.</p> <p>30.2 A substantially responsive bid is one which conforms to all the terms, conditions and requirements of the bidding documents, without material deviation or reservation.</p> <p>A material deviation or reservation is one:</p> <p>(i) which affects in any substantial way the scope, quality or performance of the Works;</p> <p>(ii) which is inconsistent with the bidding documents and limits in any substantial way, the Employer's rights or the bidder's obligations under the Contract; or</p> <p>(iii) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.</p> <p>30.3 If a bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made</p>

31. Correction of Errors

responsive by correction or withdrawal of the nonconforming deviation or reservation.

31.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetical error.

Arithmetical errors will be rectified on the following basis:

- (a) If there is a discrepancy between the unit rate and the total cost that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total cost will be corrected unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit rate, in which case the total cost as quoted will govern and the unit rate corrected.
- (b) If there is a discrepancy between the total bid amount and the sum of total costs, the sum of the total costs shall prevail and the total bid amount will be corrected.

31.2 The amount stated In the Form of Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, its bid will be rejected, and the bid security or bid securing declaration may be forfeited or executed respectively in accordance with Sub-Clause 19.6 (b) or 19.1 whichever is applicable.

32. Conversion to Single Currency

32.1 The Employer will convert the amounts in various currencies in which the Bid Price is payable to the currency of the Employer's country at the selling exchange rates officially prescribed for similar transactions as established by Bank of Mauritius on the date of opening of bids.

33. Evaluation and Comparison of Bid

33.1 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 30.

33.2 For plant and equipment, the comparison shall be of the ex-factory price of plant and equipment offered from within the Employer's country, (such price to include all costs as well as duties and taxes paid or payable on components .and raw material or to be incorporated in the plant and equipment) and the CIF-named port of destination price offered from outside the Employer's country; plus duties and taxes payable, the cost of local transportation, civil works, installation and other services required under the contract. The Employer's comparison will also include the costs resulting from application of the evaluation procedures described in Sub-Clause 33.4.

33.3 The employer will carry out a detailed evaluation of the bids in order to determine whether the bidders confirm to meet the prequalification requirements and whether the bids are

substantially responsive to the requirements set forth in the bidding documents. In order to reach such a determination, the Employer will examine the information supplied by the Bidders and other requirements in the bidding documents, taking into account the following factors:

- (a) Qualification
 - (i) the determination will take into account the Bidder's updated financial technical and production capabilities and past performance; it will be based upon an examination of the documentary evidence submitted by the Bidder, pursuant to Sub-Clause 6.1(b), as well as such other information as the Employer deems necessary and appropriate; and
 - (ii) an affirmative determination will be a prerequisite for the Employer to continue with the evaluation of the bid; a negative determination will result in rejection of the Bidder's bid.
- (b) Technical
 - (i) overall completeness and compliance with the Employer's Requirements; the technical merits of plant and equipment offered and deviations from the Employer's Requirements; suitability of the facilities offered in relation to the environmental and climatic conditions prevailing at the site; quality, function and operation of any process control concept included in the bid;
 - (ii) achievement of specified performance criteria by the facilities;
 - (iii) type, quantity and long-term availability of spare parts and maintenance services;
 - (iv) compliance to the basic technical requirement of the Employer
 - (v) proposals of sustainable products and methods of construction
 - (vi) compliance to the core personnel and equipment required

Include any other specific additional criteria that the Employer deems necessary or prudent to be taken into consideration. Note that the method of

application must be included in Sub-Clause 33.4(f).

- (c) Commercial
 - (i) the cost of all quantifiable deviation and omissions from the contractual and commercial conditions and the Employer's Requirements as identified in the bid, and other deviations and omissions not so identified;
 - (ii) compliance with the time schedule called for in Appendix to Bid and evidenced as needed milestone schedule provided in the bid;
 - (iii) the projected operating costs during the life of the facilities;
 - (iv) the functional guarantees of the facilities offered; and
 - (v) the extra cost of work, services, facilities etc., required to be provided by the Employer or their parties.

33.4 Pursuant to Sub-Clause 33.3, the following evaluation methods will be followed:

- (a) **Contractual and commercial deviations:** The evaluation shall be based on the evaluated cost for fulfilling the contract in compliance with all commercial, contractual and technical obligations under this bidding document. The Employer will make its own assessment of the cost of any deviation for the purpose of ensuring fair comparison of bids.
- (b) **Time Schedule:** The plant and equipment covered by this bidding are required to be shipped, installed and the facilities completed within the period specified in Sub-Clause 1.2 and the Appendix to the Bid.

Bidders submitting bids which deviate from the time schedule specified will be rejected.

No credit will be given to earlier completion. However, the bids offering a completion date beyond the period specified shall be adjusted In the

evaluation by adding (*indicate factor*)¹¹ to the bid price. Bids offering a completion date beyond (*indicate maximum period*)¹² shall be rejected.

- (c) **Operating costs:** Since the operating costs of the facilities being procured form a major part of the life cycle cost of the facilities, these costs will be evaluated and based on prices furnished by the Bidder in Schedules of Prices: II and III as well as on past experience of the Employer or other employers similarly placed, Such costs shall be added to the bid price for evaluation.

The methodology of calculation is specified in - Not Applicable.

The price of recommended spare parts quoted in Schedule of Prices: VI shall not be considered for evaluation.

- (d) **Functional Guarantee of the facilities:**

- (i) Bidders shall state the functional guarantees (e.g. performance, efficiency, consumption) of the proposed facilities in response to the Employer's Requirements. Plant and equipment offered shall have a minimum (or a maximum, as the case may be) level of functional guarantees specified in the Employer's Requirements to be considered responsive. Bids offering plant and equipment with functional guarantees less (or more) than the minimum (or maximum) specified shall be rejected.
- (ii) For the purposes of evaluation, an adjustment of (*indicate factor*)¹³ will be added to the bid price for each drop (or excess) in the responsive functional guarantees offered by the Bidder below (or above) the value specified in the Employer's Requirements.

- (e) **Work, services, facilities etc., to be provided by**

¹¹ The rate may be a fixed amount per month or prorata per week of delay related to the loss of benefits to the Employer.

¹² The accepted period between the minimum and maximum time 'for completion should be such that the percentage or amount corresponding to the maximum period for completion should be less than or equal to the percentage or amount of liquidated damages stated in The Appendix to Bid.

¹³ Adjustment factors used for bid evaluation will be [*amount in the currency of bid evaluation*] for each one percent (1%)- or prorata for less than one percent - (*drop or excess*) of the rate specified in the Employer's Requirements [*reference*]
or
the value committed in the responsive bid with the most performing functional guarantees. [*Delete the inapplicable option.*]

the Employer: Where bids include the undertaking of work or the provision of services or facilities by the Employer in excess of the provisions allowed for in the bidding documents, the Employer shall assess the costs of such additional work, services and/or facilities during the contract period. Such costs shall be added to the bid price for evaluation; and

- 33.5 (a) Any adjustment in price which results from the above procedures shall be added, for purposes of comparative evaluation only, to arrive at an "Evaluated Bid Price": Bid prices quoted by Bidders shall remain unaltered.
- (b) The Employer reserves the right to accept or reject any variation, deviation or alternative offer. Variations, deviations, and other factors which are in excess of the requirements of the bidding documents or otherwise result in the accrual of unsolicited benefits to the Employer shall not be taken into account in bid evaluation.
- (c) The estimated effect of the price adjustment provisions of the Conditions of Particular Application, applied over the period or execution of the Contract, shall not be taken in bid evaluation.
- (d) If the bid of the successful bidder is substantially below the Employer's estimate for the contract, the Employer may require the bidder to produce detailed price analysis to demonstrate the internal consistency of those prices. After evaluation of the price analysis, the Employer may require that the amount of the performance security set forth in Clause 38 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

34. Margin of Preference

- 34.1 1.A Margin of Preference for employment of local manpower shall be applicable as follows:

(a) For International Bidding

A bidder, incorporated in the Republic of Mauritius and employing a minimum of 80% or more of local manpower of the total man-days deployed for the execution of a Works contract, shall be eligible for a preference of 15 %.

(b) For National Bidding

(i) A local Small and Medium Enterprise, having an annual turnover not exceeding Rs 100M or a joint venture consisting of local Small and Medium Enterprises having an aggregate annual turnover not exceeding Rs 100M and employing a minimum of 80% or more of local manpower of the total man-

days deployed for the execution of a Works contract, shall be eligible for a Margin of Preference of 20 %.

(ii) Any bidder incorporated in the Republic of Mauritius not satisfying the conditions mentioned in (i) above but employing a minimum of 80% or more of local manpower of the total man-days deployed for the execution of a Works contract, shall be eligible for a Margin of Preference of 10 %.

Note: Local manpower shall mean Mauritian nationals, who are on the payroll of the contractor as well as those of subcontractors executing works on the site.

35. Award

35.1 Subject to Clause 36, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest Evaluated Bid Price, provided that such bidder has been determined to be (i) eligible in accordance with the provisions of Clause 4; and (ii) qualified in accordance with the provisions of Clause 6.

36. Employer's Right to Accept any Bid and to Reject any or all Bids

36.1 Notwithstanding Clause 35, 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 award of Contract, without thereby incurring any liability to the affected bidder or bidders.

37. Notification of Award

37.1 Following the identification of the selected bidder and subject to the notification and the time period referred to in accordance with section 40 of the Act for major contracts, the Public Body shall, prior to the expiration of the bid validity period, issue award to the successful Bidder. The Employer will:

(a) notify the successful bidder by fax, confirmed by registered letter, that its bid has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall name the sum which the Employer will pay the Contractor in consideration of the execution, completion and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Contract Price").

(b) within seven days from the issue of Letter of Acceptance, 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

	<p style="text-align: center;">of the contract awarded; and</p> <p style="text-align: center;">(ii) an executive summary of the Bid Evaluation Report.</p> <p>37.2 The notification of award will constitute the formation of the Contract.</p> <p>37.3 Upon the furnishing by the successful bidder of a performance security and preference security (where applicable) the Employer will promptly notify the other bidders that their bids have been unsuccessful.</p>
<p>38. Signing of Contract Agreement</p>	<p>38.1 At the same time that he notifies the successful bidder that its bid has been accepted, the Employer will send the bidder the Form of Contract Agreement provided in the bidding documents, incorporating all agreements between the parties.</p> <p>38.2 Within 28 days of receipt of the Form of Agreement, the successful bidder shall sign the Form and return it to the Employer.</p>
<p>39. Performance Security – Not Applicable</p> <p>Preference Security</p>	<p>39.1 Within 28 days of receipt of the notification of award from the Employer, the successful bidder shall furnish to the Employer a performance security in an amount of ten percent of the Contract Price in accordance with the Conditions of Contract. The form of performance security provided in Section 6 of the bidding documents may be used or some other form acceptable to the Employer – NOT APPLICABLE</p> <p>39.2 Failure of the successful bidder to comply with the requirements of Clauses 38 or 39 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security or execution of the bid securing declaration which ever is applicable.</p> <p>39.3 (a) For contracts above Rs 100M, the selected bidder having benefitted from the application of the Margin of Preference for employment of local manpower shall submit a preference security in the form of a bank guarantee from a local bank. (b) For contracts up to Rs 100M, the public body shall, at the selected bidder's option, either retain money from progressive payments to constitute the preference security or request a security in the form of a bank guarantee. (c) The preference security shall serve as a guarantee for the contractor to fulfill its obligation to employ a minimum of 80% or more of local manpower of the total man-days deployed for the execution of the works. (d) 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. (e) The preference security shall be forfeited by the public body in case of failure on the part of the Contractor to employ</p>

40 Debriefing

at least 80 % of the local manpower in the execution of the works. The defaulting contractor may also be liable to debarment or disqualification under the Public Procurement Act 2006.

- 40.1 The Employer shall promptly attend to all 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.

**Design and Build of a Panoramic Viewpoint at
*La Prairie Public Beach***

Procurement Reference No: BA/ONB/04/2023-24

Section 2. Part I – General Conditions of Contract

Section 2. Part I – General Conditions

Notes on the Conditions of Contract

The Conditions of Contract comprise two parts: Part I – General Conditions (Section 2 of this document), and Part II – Conditions of Particular Application (Section 3 of this document) as per FIDIC Plant and Design Build First Edition 1999..

The standard text of the FIDIC General Conditions of contract should be retained intact to facilitate its reading and interpretation by bidders. Any amendments and additions to the General Conditions, specific to the contract in hand, should be introduced in the "Particular Conditions of Contract". Sample Particular Conditions, applicable to the above FIDIC Conditions of Contract some of which have been adopted from the Standard Bidding Document of Millennium Challenge Corporation of United States of America, are included under Section 3, for ease of bidding documents preparation. The Public Body should not consider these sample Particular Conditions as exhaustive as it is its responsibility to amend these conditions to best suit the particular project.

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

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

Design and Build of a Panoramic Viewpoint at *La Prairie Public Beach*

Procurement Reference No: BA/ONB/04/2023-24

Section 3. Part II –Conditions of Particular Application

1. General Provisions

Sub-Clause 1.1.1
The Contract

Amend Subpara. 1.1.1.1 (“Contract”) by adding the following at the end:

“The words ‘Agreement’ and ‘Contract’ are used interchangeably.”

Amend Subpara. 1.1.1.8 (“Tender”) by adding the following at the end:

“The word ‘tender’ is synonymous with ‘Bid,’ and the words ‘Letter of Tender’ with ‘Letter of Bid’, and the words ‘Appendix to Tender’ with ‘Appendix to Bid,’ and the words ‘tender documents’ with ‘Bidding Documents.’”

Sub-Clause 1.1.3
Dates, Tests, Periods and
Completion

Amend Sub-Para. 1.1.3.7 by inserting the following after the reference to Sub-Clause 11.1:

“which extends over twelve months except if otherwise stated in the Appendix to Bid”.

Sub-Clause 1.4

Replace the text of Sub-Clause 1.4 and add the following:

"The law of the Contract is the law of Mauritius.

"The language is the English language"

Sub-Clause 1.5
Priority of Documents

Delete the list of documents listed under (a) to (h) and add the following:

- "(a) the Contract Agreement;
- (b) the Letter of Acceptance;
- (c) the Employer’s Requirements;
- (d) the Bid;
- (e) the Conditions of Contract, Part II;
- (f) the Conditions of Contract, Part I;
- (g) the Schedules;
- (h) the Drawings; and
- (i) the Contractor’s Proposal."

Sub-Clause 1.12
Confidential Details

Replace the text of Sub-Clause 1.12 with the following:

“The Contractor’s and the Employer’s Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify the Contractor’s compliance with the Contract and allow its

proper implementation; provided that the requirements of this Sub-Clause 1.12 shall not apply to authorized Representatives of the Employer and the Employer's Audit.

"Each of the Parties shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the design and of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or, with the prior consent of the Employer, information otherwise reasonably required to establish its qualifications to compete for other projects. If any dispute arises as to the necessity of any publication or disclosure of the details of the Contract, the same shall be referred to the Employer whose determination shall be final. The Contractor shall ensure that the requirements imposed on the Contractor by this Sub-Clause apply equally to each Subcontractor."

Sub-Clause 1.13
Compliance with Laws

Amend Sub-Clause 1.13(b) by adding the following at the end:

"unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence."

3. The Engineer

Sub-Clause 3.1
Engineer's Duties
and Authority

Amend Sub-Clause 3.1 by replacing the word "may" in the first sentence of the third paragraph with the word "shall".

Amend Subpara. (b) of Sub-Clause 3.1 by deleting the word "and" at the end.

Amend Subpara. (c) of Sub-Clause 3.1 by replacing the period at the end with "; and".

Amend Sub-Clause 3.1 by adding the following at the end:

"(d) any act by the Engineer in response to a Contractor's request except otherwise expressly specified shall be notified in writing to the Contractor within 28 days of receipt.

"The following provisions also shall apply:

"The Engineer shall obtain the specific approval of the Employer before taking action under the following Sub-Clauses of these Conditions:

- (i) Sub-Clause 4.12 [*Unforeseeable Physical Conditions*]: Agreeing to or determining an extension of time and/or additional cost.
- (ii) Sub-Clause 10.1 [*Taking-over of the Works and Sections*]: Prior to issuing Taking-Over Certificate.
- (iii) Sub-Clause 11.9 [*Performance Certificate*]: Prior to issuing

Performance Certificate.

- (iv) Sub-Clause 13.1 [*Right to Vary*]: Instructing a Variation, except if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Appendix to Bid.
- (v) Sub-Clause 13.3 [*Variation Procedure*]: Approving a proposal for Variation submitted by the Contractor in accordance with Sub-Clause 13.1 [*Right to Vary*] or 13.2 [*Value Engineering*], except if such a Variation would increase the Accepted Contract Amount by less than the percentage specified in the Appendix to Bid.
- (vi) Sub-Clause 13.4 [*Payment in Applicable Currencies*]: Specifying the amount payable in each of the applicable currencies.

“Notwithstanding the obligation, as set out above, to obtain approval, if, in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibility under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. Within 7 days of having issued such emergency instructions, the Engineer shall submit written documentation of such instructions to the Employer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 13 [*Variations and Adjustments*] and shall notify the Contractor accordingly, with a copy to the Employer.”

4. The Contractor

Sub-Clause 4.1
Contractor’s General
Obligations

(a) Add the following sentence to precede the existing text under Sub-Clause 4.1:

"The Contractor is required to check the design criteria and calculations (if any) included in the Employer’s Requirements, to confirm their correctness, in its bid and to assume full responsibility for them."

‘Amend sub-clause **4.1** by adding the following at the end’.

“The Contractor and its Subcontractors, including their respective personnel and affiliates, shall at all times during the term of this Contract have the nationality of a country or territory eligible, in accordance with the contract., The Contractor or a Subcontractor and their respective personnel and affiliates shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.

Sub-Clause 4.2
Performance Security
(NOT applicable)

“All Equipment, Materials, Plant and any services to be incorporate in or required for the Works shall have their origin in Eligible Countries.

“For the purpose of this Sub-Clause 4.1, “origin” means the place where the Equipment, Materials or Plant have been mined, grown, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics, purposes or utility from its underlying components. With respect to any services, the term “origin” means the place from which the services are supplied.”

“The contractor shall permit, and shall cause its subcontractors and consultants to permit, the employer and/or persons authorized by the employer to inspect the contractor’s offices and all accounts and records relating to the performance of the contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the employer if requested by the employer.”

~~❖ Name the existing text as Sub-Clause 4.2 (i)~~

~~❖ Amend Sub-Clause 4.2 (i) by adding the following at the end:~~

~~“Without limitation to the other provisions of this Sub-Clause 4.2, whenever the Engineer determines an addition to the Contract Price as a result of a change in cost and/or legislation or as a result of a Variation amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor, at the Engineer’s written request, shall promptly increase the value of the Performance Security in the applicable currency by an equal percentage.~~

~~“The Performance Security of a joint venture or other consortium shall be issued so as to commit fully all members of the joint venture or other consortium.~~

~~The performance security shall be in the form of a bank/insurance guarantee, issued either (a) by a bank/insurance company located in the country of the Employer or a foreign bank through a correspondent bank located in the country of the Employer, or (b) directly by a foreign bank acceptable to the Employer. The performance security shall be denominated in the types and proportions of currencies in which the Contract Price is payable~~

~~The cost of complying with the requirements of this clause shall be borne by the contractor~~

❖ Add Sub- Clause 4.2 (ii)

Where the Contractor has benefitted from the application of the Margin of Preference for employment of local manpower, it shall:

- (a) in the execution of the contract, fulfill its obligation of maintaining local manpower for 80 % or more of the man-days deployed in the execution of the Works with which it satisfied the criteria of eligibility for being awarded the contract in application of the Margin of Preference; and
- (b) concurrently with the above performance security, provide a preference security to guarantee it will fulfill its obligation in that respect.
- (c) For contracts above Rs 100M, the selected bidder having benefitted from the application of the Margin of Preference for employment of local manpower shall submit a preference security in the form of a bank guarantee from a local bank.
- (d) For contracts up to 100M, the public body shall either retain money from progressive payments to constitute the preference security or request a security in the form of a bank guarantee at the selected bidder's option.
- (e) The preference security shall serve as a guarantee for the contractor to fulfill its obligation to employ local manpower for 80 % or more of the total man-days deployed for the execution of the works.
- (f) 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.
- (g) The preference security shall be valid until the Contractor has completed the Works and a Taking-over Certificate has been issued by the Employer's Representative as per Clause 10.
- (h) The cost of providing the security shall be borne by the Contractor.

❖ Add Sub-Clause 4.2 (iii)

Where a preference security is applicable:

- (a) the Employer's Representative shall monitor the employment of local manpower throughout the execution of the contract and shall from time to time request a report from the contractor on the percentage of total men-days deployed using local manpower.
- (b) the Contractor shall submit the local manpower employment reports as often as it is reasonably requested by the Employer's Representative.
- (c) the Employer's and Contractor's representatives shall consult each other to ensure that the Contractor's obligation

towards local manpower employment is met during the works execution.

- (d) At the time of works completion, the Contractor shall submit a certified audit report to the Employer to substantiate the actual percentage of local manpower employed throughout the execution of the works.
- (e) The preference security shall be forfeited by the Employer in case of failure on the part of the Contractor to employ at least 80 % of the local manpower in the execution of the works and the contractor may be subject to disqualification.

Sub-Clause 4.3
Contractor's
Representative

Amend Sub-Clause 4.3 by adding the following at the end:

"If the Engineer determines that the Contractor's Representative or any of these persons are not fluent in the said language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer."

Sub-Clause 4.8
Safety Procedures

Amend Sub-Clause 4.8 by adding the following at the end:

"The Contractor shall notify the Engineer and Employer within 48 hours or as soon as reasonably possible after the occurrence of any accident which has resulted in damage or loss of property, disability or loss of human life, or which has or which could reasonably be foreseen to have a material impact on the environment and shall submit to the Engineer and Employer no later than 28 days after the occurrence of such an event, a summary report thereof."

Sub-Clause 4.18
Protection of the
Environment

Amend Sub-Clause 4.18 by adding the following at the end:

"The Contractor shall be responsible for ensuring that all Subcontractor's and Contractor's Personnel understand and operate in accordance with the principles and requirements of the environmental and social impacts provisions of this Sub-Clause.

"The Contractor's program shall demonstrate clearly the procedures and methods of working that the Contractor and its Subcontractors will adopt to comply with the environmental and social impacts requirements of this Sub-Clause.

"The Contractor shall ensure the adequate disposal of construction and excavation wastes.

"The Contractor shall restore the Site to original conditions or to a state as set out in the Employer's Requirements after the completion of the Works."

Sub-Clause 4.21
Progress Reports

Amend Sub-Clause 4.21 by adding the following at the end:

"Within 7 days of the submission by the Contractor of each monthly progress report, the Engineer and the Employer shall meet with the Contractor to discuss the progress of the Works."

5. Design

Sub-Clause 5.4 Technical Standards and Regulations

Add the following sentence to the end of the Sub-Clause 5.4:

"In respect of technical specifications and standards, any national or international standards which promise to confer equal or better quality than the standards specified will also be acceptable."

6. Staff and Labor

Sub-Clause 6.4 **[Labour Laws]**

To add at the end of this sub-clause:

Notwithstanding the above provisions and any other provisions under Part I, the employer and the contractor shall comply with the following:

1.1 (a) The rates of remuneration and other conditions of work of the employees of the Contractor shall not be less favourable than those established for work of the same character in the trade concerned-

(i) by collective agreement applying to a substantial proportion of the workers and employers in the trade concerned;

(ii) by arbitration awards; or

(iii) by Remuneration Regulations made under the Employment Relation Act 2008.

(b) Where remuneration and conditions of work are not regulated in a manner referred to at (a) above, the rates of the remuneration and other conditions of work which are not less favourable than the general level observed in the trade in which the contractor is engaged by employers whose general circumstances are similar.

1.2 No contractor shall be entitled to any payment in respect of work performed in the execution of the contract unless he has, together with his claim for payment, filed a certificate:

(a) stating the rates of remuneration and hours of work of the various categories of employees employed in the execution of the contracts;

(b) stating whether any remuneration payable in respect of work done is due;

(c) containing such other information as the authorized officer administering the contract may require to satisfy himself that the provisions under this clause have been complied with.

1.3 Where the where the authorized officer is satisfied that remuneration is still due to an employee employed under this contract at the time the claim for payment is filed, he may, unless the remuneration is sooner paid by the Contractor,

	<p>arrange for the payment of the remuneration out of the money payable under this contract.</p>
	<p>1.4 Every contractor shall display a copy of this clause of the contract at the place at which the work required by the contract is performed.</p>
<p>Sub-Clause 6.8 Contractor's Superintendence</p>	<p>Amend Sub-Clause 6.8 by adding the following at the end:</p> <p>"If the Engineer determines that the Contractor's Personnel providing superintendence have inadequate knowledge of such language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Engineer."</p>
<p>Sub-Clause 6.12 Foreign Personnel</p>	<p>Add the following Sub-Clause 6.12:</p> <p>"The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.</p> <p>"The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial."</p>
<p>Sub-Clause 6.13 Prohibition of Harmful Child Labor</p>	<p>Add the following Sub-Clause 6.13:</p> <p>"The Contractor shall not employ any child to perform any work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development."</p>
<p>Sub-Clause 6.14 Employment Records of Workers</p>	<p>Add the following Sub-Clause 6.14:</p> <p>"The Contractor shall keep complete and accurate records of the employment of labor at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer, and these records shall be available for inspection by auditors during normal working hours. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [<i>Records of Contractor's Personnel and Equipment</i>]."</p>
<p>Sub-Clause 6.____ Measures against Insect & Pest Nuisance</p>	<p>The Contractor shall at all times take the necessary precautions to protect all staff and labour employed on the Site from insect and pest nuisance, and to reduce the dangers to health and the general</p>

<p>Sub-Clause 6.____ Epidemics</p>	<p>nuisance occasioned by the same. The Contractor shall provide its staff and labour with suitable prophylactics for the prevention of malaria and take steps to prevent the formation of stagnant pools of water. The Contractor shall comply with all the regulations of the local health authorities and shall arrange to spray thoroughly with approved insecticide all buildings erected on the Site. Such treatment shall be carried out at least once a year or as instructed by such authorities."</p>
<p>Sub-Clause 6.____ Alcoholic Liquors or Drug</p>	<p>In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders and requirements as may be made by the Government or the local medical or sanitary authorities, for the purpose of dealing and overcoming the same."</p>
<p>Sub-Clause 6.____ Arms and Ammunition</p>	<p>"The Contractor shall not, otherwise than in accordance with the statutes, ordinances and government regulations or orders for the time being in force, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter or disposal by his Subcontractors, agents staff or labour."</p>
<p>Sub-Clause 6.____ Festivals and Religious Customs</p>	<p>"The contractor shall not give, barter or otherwise dispose of to any person or persons, any arms or ammunition of any kind or permit or suffer to the same as aforesaid."</p>
<p>Sub-Clause 6.____ Festivals and Religious Customs</p>	<p>The Contractor shall in all dealings with his staff and labour have due regard to all recognized festivals, days of rest and religious or other customs."</p>

7. Plant, Materials and Workmanship

<p>Sub-Clause 7.7 Ownership of Plant and Materials</p>	<p>Add the following sub-clause after sub-clause 7.8</p> <ul style="list-style-type: none"> (a) Any materials, equipment, services or design services which will be incorporated in or required for the Contract, as well as the Contractor's Equipment and other supplies, shall have their origin in eligible source countries. (b) For the purpose of this clause, "services" means the works and all project-related services including design services. (c) For the purposes of this clause, "origin" means the place where the materials and equipment were mined, grown, produced, or manufactured, or from which the services are provided. (d) The origin of Goods and Services is distinct from the nationality of the Supplier."
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8. Commencement, Delays and Suspension

<p>Sub-clause 8.4 Extension of Time for completion</p>	<p>Replace paragraph (c) as follows – (c) exceptionally adverse climatic conditions, defined as any one of the following events</p> <ol style="list-style-type: none"> (1) Minimum of 100mm rainfall recorded in one day at the nearest rain station, (2) An official declaration of “Torrential rain” by the Meteorological Department of Mauritius, and (3) Cyclone warning class III or Class IV
<p>Sub-Clause 8.6 Rate of Progress</p>	<p>Amend Sub-Clause 8.6 by inserting the following at the end:</p> <p>“Additional costs of revised methods, including acceleration measures, instructed by the Engineer to reduce delays resulting from causes listed under Sub-Clause 8.4 [<i>Extension of Time for Completion</i>] shall be paid by the Employer, without generating, however, any other additional payment benefit to the Contractor.”</p>
<p>Sub-Clause 8.12 Resumption of Work</p>	<p>Amend Sub-Clause 8.12 by inserting the following at the end:</p> <p>“after receiving from the Engineer an instruction to this effect under Clause 13 [<i>Variations and Adjustments</i>].”</p>

11. Defects Liability

<p>Sub-Clause 11.3 Extension of Defects Notification Period</p>	<p>Amend Sub-Clause 11.3 by inserting the following at the end of the first sentence of the first paragraph:</p> <p>“attributable to the Contractor.”</p>
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13. Variations and Adjustments

<p>Sub-Clause 13.1 Right to Vary</p>	<p>Amend Sub-Clause 13.1 by deleting the word “or” at the end of clause (ii) in the second paragraph and by inserting the following at the end of the first sentence of the second paragraph:</p> <p>“or (iv) such Variation triggers a substantial change in the sequence or progress of the Works.”</p>
<p>Sub-Clause 13.7 Adjustments for Changes in Legislation</p>	<p>Amend Sub-Clause 13.7 by adding the following at the end:</p> <p>“Notwithstanding the foregoing, the Contractor shall not be entitled to such an extension of time if the same shall already have been taken into account in determining an extension and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the table of adjustment data in accordance with the provisions of Sub-Clause 13.8 [<i>Adjustments for Changes in Cost</i>].”</p>
<p>Sub-Clause 13.8 Adjustments for Changes</p>	<p>Amend Sub-Clause 13.8 by inserting the following after the first sentence of the second paragraph:</p>

in Cost

“Adjustment shall be made for the first time during the term of the Contract at the end of month **[insert number of months into the Contract]**, and **[insert frequency]** thereafter.”

14. Contract Price and Adjustment

Sub-Clause 14.1
The Contract Price

Amend Subpara. (b) of Sub-Clause 14.1 by deleting the phrase “except as stated in Sub-Clause 13.7 [*Adjustments for Changes in Legislation*]”.

[If payment for any part of the Works is to be made on the basis of measurement, that part of the Works must be defined in the Contract and the following wording added.]

Amend Sub-Clause 14.1 by adding the following at the end:

“The Engineer shall agree or determine the value of those parts of the Works which are to be measured, in accordance with Sub-Clause 3.5 [*Determinations*]. Measurement shall be made of the net actual quantities of those parts.

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

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

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

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

“If the Contractor examines and disagrees with the records, and/or does not sign them as agreed, then the Contractor shall notify the Engineer of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Engineer shall review the records and either confirm or vary them. If the Contractor does not so notify the Engineer within 14 days after being requested to examine the records, they shall be accepted as accurate.”

Sub-Clause 14.2
Advance Payment

Amend Sub-Clause 14.2 by deleting the phrase “, as an interest-free loan” from the first sentence of the first paragraph.

Amend Sub-Clause 14.2 by replacing the fifth paragraph with the

following:

“Unless stated otherwise in the Appendix to Bid, the advance payment shall be repaid through percentage deductions from the interim payments certified by the Engineer in accordance with Sub-Clause 14.6 [*Issue of Interim Payment Certificates*], as follows:

- (a) deductions shall commence in the next Interim Payment Certificate following that in which the total of all interim payments (excluding the advance payment and deductions and repayments of retention) certified to the Contractor has reached the percentage of the Accepted Contract Amount stipulated in the Appendix to Bid less Provisional Sums; and
- (b) deductions shall be made at the amortization rate stated in the Appendix to Bid of the amount of each Interim Payment Certificate (excluding the advance payment and deductions for its repayments as well as deductions for retention money) in the currencies and proportions of the advance payment until such time as the advance payment has been repaid; always provided that the advance payment shall be completely repaid prior to the time when the percentage of the Accepted Contract Amount less Provisional Sums stipulated in the Appendix to Bid has been certified for payment.”

Amend Sub-Clause 14.2 by inserting the following after “become due” in the final sentence:

“and in the case of termination under Clause 15 [*Termination by Employer*] or Sub-Clause 19.6 [*Optional Termination, Payment and Release*],”

Sub-Clause 14.6

Amend Sub-Clause 14.6 by replacing 28 days by 21 days.

Sub-Clause 14.7
Payment

Amend Sub-Clause 14.7 by replacing the first line with the following:

“The Employer shall pay or cause to be paid to the Contractor:”

Amend Sub-Clause 14.7(b) by replacing 56 days by 42 days for projects above MUR 300m or by 28 days for projects below MUR 300m

Sub-Clause 14.8
Delayed Payment

Amend Sub-Clause 14.8 by replacing the second paragraph with the following:

“These financing charges shall be calculated at the annual rates of interest and shall be paid in the currencies indicated in the Appendix to Bid.”

Sub-Clause 14.9
Payment of Retention Money

Amend Sub-Clause 14.9 by adding the following at the end:

“When the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified by the Engineer for payment, the Contractor shall be entitled to substitute a guarantee, in the form annexed to the Particular Conditions or in

another form approved by the Employer and provided by an entity approved by the Employer, for the second half of the Retention Money. The Contractor shall ensure that the guarantee is in the amounts and currencies of the second half of the Retention Money and is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects, as specified for the Performance Security in Sub-Clause 4.2 [*Performance Security*]. On receipt by the Employer of such guarantee, the Engineer shall certify and the Employer shall pay, or cause to be paid, the second half of the Retention Money. The release of the second half of the Retention Money against such guarantee shall then be in lieu of the release under the second paragraph of this Sub-Clause. The Employer shall return the guarantee to the Contractor within 21 days after receiving a copy of the Performance Certificate.

“If the Performance Security required under Sub-Clause 4.2 [*Performance Security*] is in the form of a demand guarantee, and the amount guaranteed under it when the Taking-Over Certificate is issued is more than half of the Retention Money, then the Retention Money guarantee will not be required. If the amount guaranteed under the Performance Security when the Taking-Over Certificate is issued is less than half of the Retention Money, the Retention Money guarantee will only be required for the difference between half of the Retention Money and the amount guaranteed under the Performance Security.”

Sub-Clause 14.11
Application for Final
Payment Certificate

Amend Sub-Clause 14.11 by inserting the following in the first sentence of the second paragraph after “may reasonably require”:

“within 28 days from request of the Engineer”

15. Termination by Employer

Sub-Clause 15.2
Termination by
Employer

Replace the first line by the following:
The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. Fundamental breaches of Contract shall include, but shall not be limited to, the following:

Sub-Clause 15.5
Employers Entitlement
to Termination

Replace this sub-clause by the following:
The employer may terminate the contract for its convenience at any time upon a determination that because of changed circumstances the continuation of the contract is not in the public interest by giving notice of such termination to the contract. The termination shall take effect 28 days after the later of the dates on which the contractor receives this notice or the employer return the performance security. The employer shall not terminate the contract under this sub-clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor.
After this termination, the contractor shall proceed in accordance with sub-clause 16.3(Cessation of Works and Removal of Contractor Equipment) and shall be paid in accordance with sub-clause 19.6 (Optional Termination, Payment and Release) except that the contractor will not be entitled to recover anticipated profits on the

Sub-Clause 15.6
Corrupt or Fraudulent Practices

completion of the contract.

Add the following Sub-Clause 15.6:

It is the policy of the Government of the Republic of Mauritius to require Public Bodies, as well as bidders, suppliers, and contractors and their agents (whether declared or not), personnel, subcontractors, sub-consultants, service providers and suppliers, observe the highest standard of ethics during the procurement and execution of contracts. ¹⁴ In pursuance of this policy, the Government of the Republic of Mauritius:

- (d) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party¹⁵;
 - (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; ¹⁶
 - (iii) “collusive practice” is an arrangement between two or more parties¹⁷ 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 party¹⁸ or the property of the party to influence improperly the actions of a party;
 - (v) “obstructive practice” is
 - (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede the Employer’s investigation into allegations of a

¹⁴ In this context, any action taken by a bidder, supplier, contractor, or any of its personnel, agents, sub-consultants, sub-contractors, service providers, suppliers and/or their employees to influence the procurement process or contract execution for undue advantage is improper.

¹⁵ “Another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes employer’s staff and employees of other organizations taking or reviewing procurement decisions.

¹⁶ “Party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

¹⁷ “Parties” refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, noncompetitive levels.

¹⁸ “Party” refers to a participant in the procurement process or contract execution.



corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or

- (bb) acts intended to materially impede the exercise of the employer’s inspection and audit rights provided for under sub-clause 4.1 Part II of the contract.
- (e) 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; and
- (f) will sanction a firm or an individual, at any time, in accordance with prevailing legislations, including by publicly declaring such firm or individual ineligible, for a stated period of time: (i) to be awarded a public contract; and (ii) to be a nominated^b sub-contractor, consultant, manufacturer or supplier, or service provider of an otherwise eligible firm being awarded a public contract.
- (g)The Contractor shall take steps to ensure that no person acting for it or on its behalf will engage in any type of fraud and corruption during the contract execution.

Transgression of the above is a serious offence and appropriate actions will be taken against such contractor

16. Suspension and Termination by Contractor

Sub-Clause 16.2
Termination by Contractor

Amend Subpara. (d) of Sub-Clause 16.2 by adding the following at the end:

“in such manner as to materially and adversely affect the economic balance of the Contract and/or the ability of the Contractor to perform the Contract,”

Amend Subpara. (f) of Sub-Clause 16.2 by deleting the word “or” at the end.

Amend Subpara, (g) of Sub-Clause 16.2 by replacing the period at the end with “; or”.

Amend Sub-Clause 16.2 by adding the following at the end of the

^b A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which either has been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that are accounted for in the evaluation of the bidder’s pre-qualification application or the bid; or (ii) appointed by the Employer.

first paragraph:

”(h) the Contractor does not receive the Engineer’s instruction recording the agreement of both Parties on the fulfillment of the conditions for the commencement of Works under Sub-Clause 8.1 [*Commencement of Works*].”

17. Risk and Responsibility

Sub-Clause 17.3
Employer’s Risks

Amend Sub-Clause 17.3 by replacing the first line with the following:

“The Employer’s risks, insofar as they directly affect the design and execution of the Works,”

Sub-Clause 17.6
Limitation of Liability

Amend Sub-Clause 17.6 by replacing the first paragraph with the following:

“Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract, other than as specifically provided in Sub-Clause 8.7 [*Delay Damages*]; Sub-Clause 11.2 [*Cost of Remedying Defects*]; Sub-Clause 15.4 [*Payment after Termination*]; Sub-Clause 16.4 [*Payment on Termination*]; Sub-Clause 17.1 [*Indemnities*]; Sub-Clause 17.4 (b) [*Consequences of Employer’s Risks*] and Sub-Clause 17.5 [*Intellectual and Industrial Property Rights*].”

18. Insurance

Sub-Clause 18.1
General Requirements for Insurance

Amend Sub-Clause 18.1 by adding the following at the end:

“The insuring Party shall be entitled to place all insurance relating to the Contract (including, but not limited to the insurance referred to in Clause 18 [*Insurance*]) with insurers from any eligible source country unless otherwise stated in the Appendix to Bid.”

Sub-Clause 18.5
Insurance for Design

Add the following Sub-Clause 18.5:

“The Contractor shall effect professional indemnity insurance which shall cover the risk of professional negligence in the design of the Works. This insurance shall be for a limit of not less than the amount stated in the Appendix to Bid, with no limit on the number of occurrences. The Contractor shall maintain the professional indemnity insurance in full force and effect until 5 years after the Time for Completion. The Contractor undertakes to notify the Employer promptly of any difficulty in extending, renewing or reinstating this insurance.”

19. Force Majeure

Sub-Clause 19.4

Amend Sub-Clause 19.4 by inserting the following at the end of

Consequences of Force Majeure

Subpara. (b):

“, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Sub-Clause 18.2 [*Insurance for Works and Contractor’s Equipment*].”

20. Claims, Disputes and Arbitration

Sub-Clause 20.1
Contractor’s Claims

Amend Sub-Clause 20.1 by inserting the following as a new paragraph between subparagraphs 6 and 7:

“Within the above defined period of 42 days, the Engineer shall proceed in accordance with Sub-Clause 3.5 [*Determinations*] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 [*Extension of Time for Completion*], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.”

Amend Sub-Clause 20.1 by deleting paragraph 8 (in the order of paragraphs prior to the amendment made above) and replacing it with the following new paragraph:

“If the Engineer does not respond within the timeframe defined in this Sub-Clause, either Party may consider that the claim is rejected by the Engineer and either Party may refer such claim to the DAB in accordance with Sub-Clause 20.4 [*Obtaining Dispute Adjudication Board’s Decision*].”

Sub-Clause 20.2
Appointment of the Dispute Adjudication Board

Amend Sub-Clause 20.2 by inserting the following at the end of the first sentence of the second paragraph:

“, each of whom shall be fluent in the language for communication defined in the Contract and shall be a professional experienced in the type of construction involved in the Works and with the interpretation of contractual documents.”

Sub-Clause 20.6
Arbitration

Amend Sub-Clause 20.6 by replacing the first paragraph with the following:

“Any dispute not settled amicably and in respect of which the DAB’s decision (if any) has not become final and binding shall be finally settled by arbitration. Unless otherwise agreed by both Parties, the dispute shall be referred to the competent court of Mauritius or for Arbitration under Mauritian Laws.

Section 4. Employer's Requirements

Design and Build of a Panoramic Viewpoint at La Prairie Public Beach

Procurement Reference No: BA/ONB/04/2023-24

Section 4. Employer's Requirements and Specifications

Employer's Basic Requirements

The Beach Authority intends to build a new and undiscovered viewpoint at La Prairie public beach to explore the charismatic perspective of the south west coast of Mauritius.

The Beach Authority has under its jurisdiction more than 6Ha of virgin land which is found at about 55m above mean sea level. The Authority wishes to convert this unused portion of land into a viewpoint which shall comprise of two levels (1st level and peak) and which shall warrant the following scope of works:

1. The primary access to the entrance of the viewpoint is through B9 road at La Prairie. From the road level, there is already a concrete access of about 100m long from the road level which leads up to the trail of the proposed viewpoint. The starting point of the trail is about 30m above mean sea level. The proposed trail and viewpoint are dense with trees, vegetations and shrubs. To democratize access to the peak of the site, the whole length of the trail needs to be cleared of trees, branches and shrubs
 - a. Approximate length of trail from starting point to first level checkpoint: 330m. Width of trail to clear: 6m
 - b. Elevation at first level: 48m AMSL
 - c. Approximate area of platform at first checkpoint to clear at first level: 30m x 20m
 - d. Approximate length of trail from 1st level checkpoint to peak of viewpoint: 150m. width of trail to clear: 6m
 - e. Elevation at peak: 55m AMSL
 - f. Approximate area to clear at peak: 15m x 10m
2. A footbridge of suitable and sustainable structural elements of approximate dimensions of 2m wide x 750mm long shall be constructed from the concrete access to the start of the trail
3. Determine and design the most appropriate way to access the viewpoint. Appropriate natural steps of 2m wide with convenient and uniform riser supported by wooden logs or appropriate and approved elements and topped with 25mm thick wood chips shall be constructed from the start of the trail to the peak of the viewpoint. Where slopes are too steep, terracing of land may be necessary
4. At elevation 55m AMSL, an open roof octagonal (in shape) mirador of dimensions not less than 5m x 5m x 3m high made of appropriate and approved material shall be constructed. The mirador shall be capable of withstanding gusts up to 280km/hr. Appropriate aesthetic handrails shall be provided on the mirador

5. Wooden handrails should be fixed all along the length of the trail, on both sides, from its entrance unto the peak of the viewpoint
6. A security barrier of 0.9m high shall be fixed with appropriate warning signs at the first level and at the peak over an approximate length of 100m and 50m respectively
7. All wooden handrails shall be treated as appropriate and as approved
8. Two arched decorative wooden pergolas approximately 2m long x 750mm wide x 2m high shall be constructed at starting point of trail, that is, at elevation 30m, as well as on the first checkpoint at elevation 48m AMSL:
 - a. At elevation 30m AMSL: serve as a welcome gate at the entrance of the trail
 - b. At elevation 48m AMSL: serve as a selfie point for visitors to capture the turquoise lagoon of the south west coast
9. The successful bidder shall also be required to design and implement a selfie point at the first level of approved and sustainable material with a geographical signature of La Prairie to capture the picturesque scenery from another angle
10. An appropriate directional signage made of sustainable materials with wordings in white shall be erected at the first level platform to guide visitors towards the directions to the mirador or the selfie points
11. Landscaping, such as planting of palm trees and other appropriate endemic plants shall be carried out around the mirador. Pollarding, as may be necessary, shall be done on existing trees that obstruct the view to the lagoon and mountain
12. Design and provision of a 3D signboard shall be made at elevation 30m AMSL to depict the trail and amenities, highlighting the path of the trail and pinned entrance
13. A concrete stele clad with natural stone rock face tiles finish shall be constructed at ground level with an integrated, vandal-proof and non-corrosive inauguration plate of approximately 750mm x 600mm. The wordings shall be communicated to the bidder by the end of the contractual period
14. The Authority has opted for a design and build contract and the selected bidder shall comprise of a team including a registered landscaper (Landscape Architect), a Sworn Land Surveyor, Civil/Structural Engineer and a Quantity Surveyor. The bidder's team shall be required to plan the above and submit proposals for the materials to be used for the amenities and trail and to submit design calculations for the mirador.

Architectural Services/Landscape Architect Services

- 1) Prepare a preliminary design plan of the project for client's approval after collection of brief and carrying out detailed survey of the existing site and facilities
- 2) Prepare detailed planning and design of the project with due consideration to client's time scale
- 3) Consult the relevant authorities concerned to ensure that the proposed design comply with all statutory regulations prevailing as well as obtaining guidelines

- susceptible to improve the overall planning and to obtain other clearances as may be required
- 4) Be responsible for the submission of a complete set of as-built drawings to the client at the completion of the project
 - 5) To attend consultative meetings with the Employer and stakeholders as and when required
 - 6) Supervision of the execution of the Works
 - 7) To ensure timely submission of samples, specifications, etc. for approval

Civil/Structural Engineering Services

- 1) Prepare detailed design and drawings for the entire civil/structural works associated with this project
- 2) Carry out such site investigations as may be necessary and indicate to the Authority, the architect and the quantity surveyor the likely problems to be expected with the foundation works and allowance to be made for excavation in rock and coral rocks and other anticipated contingencies and to propose appropriate construction techniques and methods
- 3) Provide assistance to the architect for the design of such site services that may require his engineering expertise
- 4) Perform such work as may be necessary in order to ensure that the budgetary limit is not exceeded
- 5) Responsible for the supervision of all the civil/structural works during construction, prior to final vetting by Engineers of the Authority
- 6) Assist the architect on all civil/structural engineering matters relevant to this project
- 7) Attend site meetings regularly
- 8) Submit at the completion of the project a complete set of as built drawings.

Quantity Surveying Services

- 1) Advise the client and the architect on any aspect that can influence the project's cost and measures that can be taken in order to ensure that the budget for the project is not exceeded
- 2) Prepare and submit to the Authority interim valuation certificates
- 3) Assist the Authority in valuing any extra works and preparing rates for any new item of works under this contract

- 4) Assist the Authority in ensuring a sound financial management of the contract
- 5) Arrange for submission of final account
- 6) Carry out Quantity take-off and certification of same

Land Surveying Services

- 1) Setting up of a temporary benchmark on La Prairie public beach
- 2) Carrying out appropriate topographical survey to establish the most convenient path to the peak of the viewpoint. The topographical survey shall include the following:
 - a) Pegging of the boundaries of the public beach
 - b) Preparation of a plan showing all physical features being implemented under the project and existing features at La Prairie public beach with GPS coordinates
- 3) Submit topographical plans with all the above-mentioned physical features in one hard copy on A1 with contour plan and GPS coordinates
- 4) Submit topographical plans the above-mentioned physical features in three hard copies on A3
- 5) Submit topographical plans of the above-mentioned physical features in Autocad and PDF formats

Qualification Criteria

Criteria, sub-criteria, and point system for the evaluation of Full Technical Proposals is detailed within the bid document. The minimum technical score required to pass is: 50 Points

Qualification and experience of the consultants shall be considered as the paramount requirement.

The weightage given to the Technical and Financial Proposals would be 50% and 50% respectively.

The technical proposal shall be evaluated as per the Marking System and evaluated on the basis of a maximum of 100 marks.

The financial proposal shall be evaluated on the basis where the lowest substantially responsive bidder will score a total of 40 marks and higher bids will be allocated marks on a relative proportion.

The minimum passing mark for technical criteria shall be 50, as per Technical Proposal Marking Criteria.

PROPOSED MARKING SCHEME FOR EVALUATION OF PROPOSAL							
Project: THE DESIGN AND BUILD OF A PANORAMIC VIEWPOINT AT LA PRAIRIE PUBLIC BEACH							
Procurement Reference No: BA/ONB/04/2023-24							
The weightage given to the technical and financial proposals would be 50% and 50% respectively. Technical proposals scoring less than 50 marks will be considered non responsive and will not be considered further. The technical proposals shall be evaluated using the following criteria:							
SN	CRITERIA TO BE ASSESSED	MARKS	MAXIMUM MARKS TO BE SCORED	MARKING CRITERIA (MARKS)			
1	General Experience of the Contractor: To show Specific Work Experience (coastal/beach landscape, beach fronts etc.) in atleast ONE similar project over the past Five years		10	> 5 Projects	3-4 projects	2-3 projects	1 project
				10	8	6	4
2	Specific Experience (Projects of similar nature & complexity): Contractor to show proof of at least ONE project undertaken whose project value (PV) exceeds 5M over the past Five Years		16	> 4 projects	3 projects	2 projects	1 project
				16	10	6	3
3	Qualification and experience of personnel/team to be deployed for the project		24				
	<i>(a) Qualification of REGISTERED PROFESSIONAL personnel</i>						

	(i) Landscape Architect	2					
	(ii) Civil/Structural Engineer	2					
	(iii) Land Surveyor	2					
	(iv) QS	2					
	<i>(b) Experience in works of similar nature & complexity</i>			5 years or more	3-4 years	2-3 years	1 year
	(i) Architect with at least 5 years of post-registration experience	4		4	3	2	1
	(ii) Civil/Structural Engineer with at least 5 years of post-registration experience	4		4	3	2	1
	(iii) Landscaper (Landscape Architect) with at least 5 years of post registration experience	4		4	3	2	1
	(iv) QS with at least 5 years of post registration experience	4		4	3	2	1
4	Proposed work plan, method statement and layout		50	Unsatisfactory	Satisfactory	Good	Excellent
	(a) Work plan	10					
	(b) Aesthetics	10					

	(c)Functionality	10					
	(d) Method statement	10					
	(e)Overall design proposal	10					
	TOTAL		100				

Notes on Preparing Employer's Requirements

These Notes for preparing Employer's Requirements are intended as a guide for the Employer or the person drafting the bidding documents and should not be included in the final document.

In the traditional approach the Employer employs an Architect/Engineer to design the Works. From this design, a detailed technical specification is drawn up for bidders to bid on.

In a Design-Build or Turnkey approach, the design is to be done by the Contractor. No detailed technical specification as is normally recognized is developed at the pre-bid stage. However, the Employer does and must know what it wants and must communicate its needs to the bidders. Hence, this section on Employer's Requirements replaces the usual Technical Specifications of a more traditional approach.

To enable bidders to submit responsive bids and, subsequently, for the bids received to be evaluated in a fair and equitable manner, the Employer must state its requirements as clearly and as precisely as possible. The Employer's requirements must therefore, specify exactly the particular requirements of the completed Works including scope and quality. Where the performance of the completed Works could be measured in quantitative terms (e.g. production output of a manufacturing plant or maximum generating capacity of a power station) the Employer's Requirements should not only clearly specify the desired output/capacity but also the upper and lower acceptable limits of deviation from the desired capacity and how such deviations (if any) will be evaluated. It will also be necessary to specify the tests that will be carried out on completion of the Works to verify compliance with the requirements specified. The Employer's Requirements should also clearly specify what associated or incidental services and goods must be supplied by the Contractor. For example, the Contractor may be required to train the Employer's personnel and to supply consumable or spare parts as listed in a Schedule.

While this section of the bidding documents should endeavour to define the Employer's Requirements as precisely as possible care must be taken to avoid over specifying details to the extent that the flexibility and potential benefits associated with a Design-Build or Turnkey contract are seriously eroded or threatened. This section on Employer's Requirements should, therefore, be carefully prepared on behalf of the Employer by suitably-qualified professionals who are familiar with the requirements and with the technical aspect of the required Works.

For major and complex projects, the Design-Build or Turnkey Contract will have to be subject to international competitive bidding and the Employer's Requirements must be drawn up to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials and performance of the Works. Only if this is done will the objectives of economy and efficiency and equality in procurement be realized, responsiveness of bids be ensured and the subsequent task of bid evaluation facilitated. The Employer's Requirements should stipulate that all goods and materials to be incorporated in the Works are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials.

Notes on Preparing Employer's Requirements (continued)

As for the drafting of Technical Specifications, care must be taken when drafting the Employer's Requirements to ensure that the requirements are not restrictive. In the specification of standards of goods, materials and workmanship recognized international standards should be used as much as possible. Where other particular standards are specified, whether national standards or other standards, it should be stated that goods, materials and workmanship meeting other authoritative standards and which promise to ensure equal or higher quality than the standards specified, will also be acceptable. Where a brand name of a product is specified it should always be qualified with the terms or "equivalent".

In addition to stating the requirements of the completed Works clearly, the Employer Requirements Section should also include matters related to the execution of the Works to enable the bidders to gauge the extent of responsibility and to price the bid accordingly. The matters referred to in some of the following Sub-Clause (FIDIC Part I) may be included:

- 1.9 Number of copies (and required extent) of Construction Documents.**
- 4.1 Design criteria and calculations (if any) to be checked by the Contractor and confirmed to be correct with the bid.**
- 4.4 Other contractors and organization (and others) on site to whom the Contractor should afford reasonable opportunities for them to carry out their work.**
- 4.7 Setting-out points, lines and levels of reference to be used.**
- 4.8 Quality Assurance system details.**
- 4.12 Access routes particularly if such routes are within existing facilities.**
- 4.13 Periods for preconstruction reviews and for any submission, approvals and consents.**
- 4.20 Employer's machinery and materials.**
- 5.1 Qualification criteria of design personnel.**
- 5.2 Extend and procedures for submission and preconstruction reviews of Construction documents.**
- 5.5 List of samples and procedure for submission for preconstruction testing and review of data.**
- 5.6 Form and number of As-built drawings and records of the works to be submitted and approval process.**
- 5.7 Timing and number of copies of Operation and Maintenance Manuals to be submitted and approval process.**

Notes on Preparing Employer's Requirements *(continued)*

- 6.6** *Facilities to be provided on site by the Contractor for the Employer and the Employer's Representative and its personnel.*
- 7.4** *Tests to be carried out during manufacture and/or construction.*
- 9.1** *Tests to be carried out in Completion before Taking-Over to demonstrate completion. If the works are to be tested and taken over in stages, the test requirements and special arrangements must be detailed.*
- 11.1** *Test to be carried out after Taking-Over to verify that the Works fulfill the performance requirements.*
- 11.4** *Minimum performance criteria acceptable below which works failing to pass tests after completion will be rejected.*

Implementation of Beach Management Plan (Phase II)
Design and Build of a Panoramic Viewpoint at
La Prairie Public Beach
Procurement Reference No: BA/ONB/04/2023-24

Specifications

1.0 GENERAL

1.1 Location of the Works

The location of the works is on the site drawing, which is located at La Prairie public beach.

1.2 Scope of Works

The Works to be carried out under the Contract shall include the construction of a viewpoint with numerous amenities comprising all the civil, structural and associated ancillary works. The Works shall comprise:

- Clearing of site
 - Construction of a mirador
 - Fixing of handrails as safety barriers
 - Construction of pergolas, stele and miscellaneous amenities.
-

1.3 Datum

The levels of the Works are related to Ministry of Housing, Lands and Town and Country Planning Datum. A suitable benchmark must be established by the Contractor, which will form the sole point of reference for the execution of the Works.

All other temporary benchmarks required by the Contractor shall be provided by him at his own expense.

1.4 Joint surveys

Prior to the start of construction works, the Contractor shall carry out a joint survey with the Engineer of the existing services such as water pipes for connection purposes around the site. The Contractor shall also confirm the invert levels of some specific features.

1.5 Standard Specification

For convenience, and in order to establish the necessary standards of quality, reference has been made to specifications issued by national or other widely recognised bodies. Such specifications shall be referred to as "Standard Specifications" and shall be the latest editions

of such standard specifications issued prior to the issue of the Tender Documents, together with such additions and amendments as may have been issued prior to the same date.

Subject to the written approval of the Engineer any other internationally accepted standard that requires and equal quality of work may be used. In referring to Standard Specifications, the following abbreviations are used:

BS	British Standard
ISO	International Organisation for Standardisation

If the Contractor proposes to use a Standard Specification other than that specified, three copies of the proposed Standard Specification shall be submitted to the Engineer not less than 28 days before approval of the Standard Specification is required. Copies, in English language, of all Standards used in connection with the Works shall be supplied to the Engineer.

1.6 Units

In this Specification, the Drawings, and in the Bills of Quantities, the metric system of dimensioning has been adopted except where it is understood that suppliers and manufacturers are not yet able to provide material in metric sizes. Where dimensions are given in metric units for materials which are only available in Imperial dimensions, and vice versa, the Contractor may, subject to his obtaining the prior approval of the Engineer, substitute the nearest equivalent available standard size in the other system.

1.7 Contractor's Working Area

The Contractor shall make his own arrangements with the Employer for land which he wishes to use as access for the storage of his plant, materials and for the use of his own labour and all costs in this connection shall be borne by the Contractor.

1.8 Survey Instruments and Chainmen

The Contractor shall provide as whenever required by the Engineer modern and accurate survey equipment for the use on site as listed below:

- 1 no. modern automatic level and tripod
- 1 no. staff 4 metres long graduated at 0.005m intervals
- 1 no. 50 metres fibron tape
- 1 no. 5 metres steel tape

The Contractor shall also supply all other requisites for the sole use of the Engineer including chainmen necessary for checking the setting out and for measurement of the Works.

1.9 Contractor's Superintendence

The Agent who shall have full authority in respect of the Works shall be able to speak English fluently. Correspondence between the Contractor or the Agent and the Engineer shall be in English.

1.10 Temporary Works and Access

After the Contract is placed and before the Works on Site commence, the Contractor shall submit to the Engineer drawings showing the proposed location and general arrangement of his offices, workshops, stores, quarters, access roads and other temporary works required for the proper and expeditious execution of the permanent works. It will be the Contractor's responsibility to acquire sites for his offices, etc.

The Contractor shall obtain his own information with regard to access to all parts of the Site of the Works and if he wishes to make use of routes through private property then he must make all arrangements with the owners.

The condition of the surfaces of the private roads, paths or yards used or crossed by him for the purpose of the Contract shall be kept in reasonable repair during its progress, and on completion he shall put the roads, paths or yards in proper repair at least equal to the original condition of the roads, paths or yards used or crossed by him and to the satisfaction of the Engineer, all at his own cost.

In general, the Contractor is to regulate the character of his transport to ensure that no undue damage is caused to any roads, tracks or properties within the area of the Works, public or otherwise.

The whole of the temporary works, plant, equipment and appliances used on the Works will be the liability of the Contractor in regard to construction, sufficiency, safety, maintenance and removal on completion of the Contract and approval by the Engineer shall in no way relieve the Contractor of this liability.

The Contractor shall provide and allow in his rates and prices for all temporary works, bridges, or other work required in the construction of the Works.

1.11 Obstruction of Streets and Footpaths

All work affecting traffic on public roads shall be in a manner acceptable to the traffic authorities, the police and the Engineer. Before commencing work the Contractor shall produce an agreed phased programme for such work.

The Contractor shall not occupy or obstruct by his operations more than half of the width of any main road in which Works are being executed, and he will include in his rates for removing excavated spoil to an approved tip and return when required for backfilling. Permission to close any street or road to vehicular through traffic must be requested from the Engineer in writing.

When roads are closed to traffic or traffic is otherwise restricted the Contractor shall supply, erect and maintain, for the duration of the Works, adequate warning and diversion signs and any other signs or control light signals that may be considered necessary.

The cost of providing all diversions, lights, signs, signal operators, flagmen and the like will be at the Contractor's expense and shall be deemed to be included in the rates entered in the Bill of Quantities.

1.12 Protection from Water and Sewage

The Contractor shall keep the whole of the Works free from water and sewage and accept all risks of flooding from any cause whatsoever. The Contractor shall provide and maintain the necessary pumping plant to deal with all water and sewage which may flow into trenches or excavations and shall allow in his prices for such plant and all dams, pumping, shoring, temporary drains, sumps, etc. Any damage caused shall be cleared away and made good at his own cost and to the satisfaction of the Engineer.

1.13 Existing Services

The position of all existing services which may be affected by the Works shall be ascertained by the Contractor before work commences. Trial holes shall be excavated in advance of excavation works to locate services as required by the Engineer.

The Contractor shall make such provisions as may be required by the authorities concerned for the support and protection of any water main, sewer, telephone cable, power cable or other services met with on the site, making good at his own expenses any damage to services.

Any new work or alterations as necessary which the Engineer may order to be carried out by the Contractor shall be paid for at daywork rates, but should the authorities concerned prefer to carry out the work with their own workmen the Contractor shall be paid net amounts plus five per cent on such work. The Contractor shall pay such amounts and recover the costs through payment certificates.

Where existing fences, walls or other boundary features have to be temporarily opened to provide access, they shall be reinstated as found and to the satisfaction of the Engineer and the cost of this work shall be paid at Dayworks rates or any other approved rates, except where otherwise provided in the Bills of Quantities.

Where it is necessary for the Contractor to divert a waterway or interrupt the flow he shall make all the necessary arrangements with any users and other interested parties and further seek the approval of the Engineer to the arrangements made. The Contractor shall, however, be responsible for all claims or charges arising from interference with or diversion of waterways or irrigation by the temporary works.

1.14 Damage to Essential Public Services

In the event of the Contractor damaging water, sewerage, electricity or telephone services, whether these have been marked or not, the Contractor shall immediately inform the authority concerned. The Authority concerned will carry out the repairs, and shall inform the Contractor through the Engineer in writing of the damage and repairs carried out.

In some cases where water supply pipelines are damaged the Contractor may be instructed to effect the necessary repairs under the supervision of the Operations Section of the Central Water Authority and consequently, close liaison will be required on the part of the Contractor.

The Contractor shall pay for the cost of repairs within one month of receiving the account. In the event of the Contractor failing to pay the account within one month, the Engineer's Representative will, if required to do so, inspect the accounts to ensure that they are reasonable

and shall then request the Employer to deduct the sum which is assessed as reasonable from any monies due to the Contractor.

1.15 Water and Power Supplies for Use on the Works

The Contractor shall be solely responsible for the location, procurement and maintenance of a water supply adequate in quality and quantity to meet his obligations under the Contract.

The Contractor shall also make his own arrangements for power supplies and shall be solely responsible for the location, procurement and maintenance of a power supply, adequate to meet his obligations under the Contract.

The rates entered in the Bill of Quantities shall be deemed to include for all obligations for the location, procurement and maintenance of adequate water and power supplies and shall be deemed to include for all costs in association therewith.

1.16 Protection against Fires

The Contractor is advised that at all times, it is necessary to guard against fires starting within the site or in the environs thereof, particularly as the result of the Works or from the actions of his employees. The Contractor shall have available at all times, fire-fighting equipment and shall deal with all fires howsoever caused.

1.17 Liaison with Police and Other Officials

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

The Contractor shall liaise with the Municipalities, the District Councils, the Police, the Ministry of Public Infrastructure, Land Transport and Shipping, the National Transport Authority, the Telecommunication Department, the Central Electricity Board and other interested Authorities shall comply with their requirements.

1.18 Overhead Power Line

Where work is being carried out in the vicinity of overhead power lines, the Contractor shall be 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 of power lines; the Contractor's attention is drawn to BS 162 which gives safe clearance for the various voltages.

1.19 Materials for the Works

All materials supplied by the Contractor shall comply with the appropriate Standard Specification unless otherwise required hereinafter.

The Contractor shall, before placing any order for materials, manufactured articles or machinery for incorporation in the Works, submit for the approval of the Engineer the names of the firms from whom he proposes to obtain such materials, etc. together with a list of materials, manufactured articles and machinery, giving the origin, quality, weight, strength, description, etc. which he proposes that the firms should supply.

No materials, manufactured articles or machinery shall be ordered or obtained from any firm, which the Engineer has not previously approved in writing. All materials shall be delivered to the site in a sufficient period of time before they are required for use in the Works to enable the Engineer to take such samples as he may wish for testing and approval. Any materials condemned as unsuitable for the Works shall be removed from the site at the Contractor's expense.

The Contractor may propose alternative materials to those specified, provided that they are of equivalent quality and, subject to the Engineer's approval, such materials may be used in the Works.

1.20 Contractor's Orders to be approved

Before ordering any materials for incorporation in the Works, the Contractor shall inform the Engineer of the names of the persons or firms from whom he desires to obtain such materials, and except as regards minor and unimportant matters, no order of such materials shall be given except with the sanction of the Engineer.

The Contractor shall keep the Engineer fully advised of all orders and delivery dates of all materials.

Notwithstanding the fact that sanction shall have been given in accordance with the above paragraph, the Engineer may forbid the use of any such materials if upon delivery, they are found to be defective, or he considers them unsuitable for incorporation in the Works. Such rejected materials shall be removed from the site forthwith.

1.21 Alternatives

The Contractor is at liberty to put forward alternatives for items of plant or methods of construction for which he claims advantages to that indicated in the Specification and Drawings, providing the mode of operation and method of construction is fully detailed and is at least equal to that shown on the Drawings or implied in this Specification. The Contractor shall fully state his reasons for submitting any alternatives and the Contractor shall price separately any reduction in his rates if and where applicable.

1.22 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 landowners 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 landowners concerned for access to the site of the 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 fulfil the above obligations and against all other claims arising from failures of a similar nature.

1.23 Construction and Checking of Work

The Contractor shall be solely responsible for and shall provide all labour, tools, plant, lifting tackle and other equipment required for the construction of the Works.

No operative shall be allowed to execute any type of work that is normally carried out by a skilled tradesman unless he is thoroughly experienced and proficient in the trade concerned. Supervisors and operatives may be required to demonstrate their proficiency or produce a certificate of competence to the satisfaction of the Engineer. As each part of the Works is erected, it shall be subject to the approval of the Engineer.

1.24 First Aid, Welfare and Safety Precautions

The Contractor shall use his best endeavours to ensure the health, safety and welfare at work of his employees including those of his subcontractors, of the public and of all other persons on the Site. His responsibilities shall include:

- (i) To ensure that all employees of the Contractor and any subcontractor are trained in site working practices and systems of work.
- (ii) The presentation to the Engineer of copies of his employer's liability and public liability insurance which should provide cover for the duration of the project.
- (iii) To forward a copy of his safety policy or equivalent Mauritian Requirement to the Engineer.
- (iv) Provision and maintenance of safe and properly illuminated equipment.
- (v) Establishment of safe and well illuminated systems of working.
- (vi) Provision and maintenance in operative conditions of all equipment necessary to render first-aid in case of accidents or other emergencies. This equipment shall be kept in readiness at all sites of the works. The Contractor shall ensure that there are persons available at all such places with a knowledge of simple first-aid procedures and able to administer help in the event of injury.
- (vii) To abide by the safety requirements of the Engineer.
- (viii) Promptly report accidents arising out of or in connection with the performance of the work that caused death, personal injury or damage to property, giving full details and statements of witnesses. Reports shall be made to the Engineer both verbally and in writing.

If anyone claims against the Contractor or any subcontractor as a result of any accident, the Contractor shall promptly report the facts in writing to the Engineer giving full details of the claim.

1.25 Alterations to and Preservation of Services

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 the 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.

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. He 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 caused.

1.26 Setting Out

The Contractor shall be responsible for the setting out of the Works where required. Throughout the Contract, both 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, gangers and key men working on the Site are made aware both of the positions of important line and level pegs and of the importance of reporting any damage or disturbance to the same. In the event of any reference marks being damaged or misplaced during construction, then the Contractor shall reinstate such pegs 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 on 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 of any part of the Works before and after the completion of wearing course, in order 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 method of the complete setting out of the works shall be submitted to the Engineer for prior approval.

1.27 Temporary Works

All land to be permanently used or occupied by the Works will be provided by the Employer, prior to the commencement of the Works wherever possible. When no longer required for the Contract, all such provision 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 the same condition as that obtained immediately prior to occupation.

1.28 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. Provisions 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.

1.29 Rejected Materials and Defective Work

Materials of work, which in the opinion of the Engineer, do not comply with the Specification, shall be classified as rejected materials or defective work and shall be cut out and removed from the Works and replaced as directed by the Engineer.

1.30 Protection of Works

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

1.31 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.

1.32 Joint Measurement of Extras

In such cases as the Contractor deems it necessary to execute any work, or provide any materials which he feels entitled to claim as extras, he shall obtain written permission from the Engineer before commencing such work.

He shall make arrangements for the works or materials to be measured jointly with the Engineer, and the quantities agreed. Failure to obtain authority to commence any such work shall entitle the Engineer not to approve such claims.

The Engineer shall at all times have full access to the Contractor's timekeeper or otherwise although this shall in no way bind the Engineer to value the work other than by remeasurement.

1.33 Inspection by Engineer during Defects Liability Period

The Engineer will give the Contractor due notice of his intention to carry out any inspections during the Defects Liability Period and the Contractor shall upon receipt of such notice arrange for a responsible representative to be present at the time and dates named by the Engineer.

The Contractor shall render all necessary assistance and take note of all matters and things to which his attention is directed by the Engineer. Any remedial or other work instructed by the Engineer shall be executed forthwith.

1.34 Signboards

The Contractor shall erect signboards at locations given as per drawings prior to the start of construction works.

1.35 Clearance of Site on Completion

The Contractor is required to ensure that all debris, Contractor's offices, store rooms, plant, excess material, spoil etc. caused as a result of the Works are to be removed from the site on completion. Removal and clearance are to be at the approval of the Engineer. The cost of such removal and cleaning works is deemed to be covered in the appropriate BQ item in Section 1.

1.36 Backfill of Excavations and Trenches

The Contractor immediately upon completion and approval of work shall backfill in layers all excavations and trenches which may have arisen to the approval of the Engineer. He shall clear and level any mounds or heaps of earth, and cart away all rubbish which may have become superfluous.

The Contractor shall bear and pay all costs, charges, damages and expenses which may have been incurred or sustained on account or in consequence of any accident which may happen by reason of excavations and trenches connected with the Works.

1.37 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 temporary warning signs 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 arrangements shall receive the approval of the Engineer.

Provision 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.

2.0 MATERIALS

2.1 Materials - General

All materials used in the works shall be to the relevant British Standards specified or as described and shall be clearly marked with the standard mark, where appropriate, manufacturer's name or mark and date of manufacture.

Wherever in the Specification tests on materials and tests on completed items are called for or implied, they shall be carried out according to, and the materials shall comply with the requirements of the Specification issued by the British Standard Institution. Other equivalent national standard specifications may be substituted for the above at the sole discretion of the Engineer if requested by the Contractor.

2.2 Storage of Materials

Materials and components shall be stored in such a manner as to preserve their quality and condition to the standards required by the Contract. The quantity of materials and components stored on the Site shall be consistent with that necessary for efficient working.

2.3 Handling and Use of Materials

Materials and components shall be handled in such a manner as to avoid any damage or contamination, and in accordance with all applicable recommendations of the manufacturers.

Unless otherwise described in the Contract, the use, installation, application or fixing of materials and components shall be in accordance with all applicable recommendations of the manufacturers. Where appropriate, the Contractor shall make use of any technical advisory services offered by manufacturers.

2.4 Water

Water for making concrete, mortar grout, and for curing shall be clean, fresh and free from matter in solution or suspension in such amounts that may impair the strength or appearance of the concrete, mortar, rendering or grout. The Contractor shall make all arrangements for obtaining water from sources approved by the Engineer. Water shall comply with the requirements of the Appendix to BS 3148.

If required by the Engineer, the Contractor shall take samples of mixing water and send them for testing to a nominated laboratory. If the results of the test show that the water is unsuitable, then the Contractor will be responsible for the cost of the tests, otherwise the costs will be recoverable by the Contractor from the Employer.

2.5 Aggregates for Concrete

The stone for use in the Works shall be obtained from approved quarries and consist of hard, tough, heavy, compact basalt, or other approved rock quarried, broken, screened and graded as specified hereafter to the satisfaction of the Engineer and free from flat, flaky, elongated, soft or decomposed pieces, excess dust and any dirt or acids or other deleterious substances.

Aggregates for different purposes are classified hereafter. Prior to commencing the Works and as required during the progress thereof grading, crushing, specific gravity, abrasive, voids and other tests will be carried out by the Engineer. Sampling and testing shall be carried out in accordance with BS 812.

The grading curves of all aggregates shall have even lines without discontinuities. All aggregates shall be stored in bins or in stockpiles with concrete or timber floors and walls so as to avoid contamination and the mixing of different classes of aggregates.

The aggregate for use in concrete work shall comply with the requirements of the BS 882 with a flakiness index not exceeding 35 and shall consist of cubical broken stone. Coarse aggregate shall be uniformly graded from the maximum size required down to 4.8mm.

2.6 Sands

Fine aggregate for use in the concrete work and cement mortar shall consist of approved crushed rock sand, clean and free from mica, clay, organic matter and other impurities and shall be in accordance with BS 882 for Fine Aggregate, table 2 - Zone 2 or 3. Sand shall be washed before use, if required by the Engineer's Representative.

2.7 Cement

Ordinary Portland cement and rapid-hardening Portland cement shall comply with the requirements of BS 12 - Portland Cement (Ordinary and Rapid-Hardening). Sulphate-resisting Portland cement shall comply with BS 4027.

Each consignment of cement shall be accompanied by the manufacturer's certificate giving results of tests. If such certificate is not made 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 BS 12 to an approved laboratory or where directed by the Engineer, all at the Contractor's expense.

All 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 damp 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 other cause, shall not normally be accepted but may be in special cases and certain parts of the Works if the approval of the Engineer in writing is first obtained.

2.8 Admixtures for Concrete or Grout

Accelerating, retarding and water-reducing admixtures for concrete or grout shall comply with the relevant provisions in BS 5075: Part 1. Air-entrained admixtures shall comply with the relevant provisions of BS 5072: Part 2. Superplasticizing admixtures shall comply with the relevant provisions of BS 5075: Part 3.

Calcium chloride shall not be used in concrete which is to be reinforced, contain embedded metal, or has been designed to retain an aqueous liquid. Where used with sulphate-resisting cement, or in concrete which is to be reinforced or contain embedded metal, the chloride ion content of admixtures shall not exceed 2% by mass of the admixture or 0.03% by mass of the cement. Admixtures containing chlorides shall not be used in reinforced concrete designed to retain an aqueous liquid.

2.9 Cement Grout

Grout shall consist of cement and clean fresh water mixed in the proportion of two parts by weight of cement to one part by weight of water. Any grout which has been mixed for a period longer than one hour shall not be used in the Works.

2.10 Mortar

Mortar shall be mixed only as and when required in the relevant proportions indicated in the following table, until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand.

Nominal mix by volume				
Class	Cement:lime Putty:sand	Cement: sand with plasticizer	Class	Masonry cement: sand
M1	1:0 to ¼:3	1:2½ to 3	M5	1:2 to 2½
M2	1:½:4 to 4½	1:3 to 4	M6	1:2½ to 3½
M3	1:1:5 to 6	1:5 to 6	M7	1:4 to 5
M4	1:2:8 to 9	1:7 to 8	M8	1:5½ to 6½

Ready-mixed lime: sand for mortar and ready-to-use retarded mortar shall comply with the relevant provisions of BS 4721.

All mortar shall be conveyed fresh to the Works as required for use. Mortar which has begun to set or which has been Site-mixed for a period of more than one hour in the case of classes M1, M2, M5 and M6, and two hours in the case of M3, M4, M7 and M8 shall not be used. Plasticizing and set retarding mortar admixtures shall comply with BS 4887: Parts 1 and 2 respectively and shall be supplied with instructions for use.

2.11 Steel Reinforcement

The steel reinforcement for concrete shall comply with the requirements of BS 4449 with Type 2 bond classification.

All hard drawn steel wire mesh fabric shall conform to BS 4483. The main wires shall be held rigidly at the correct spacing by cross-wires electrically welded to them. Epoxy coated steel reinforcement shall comply with the requirements of BS ISO 14654 : 1999.

2.12 Tying wire

Tying wire for steel reinforcement shall be 1.6 mm diameter finally annealed mild steel wire, complying with BS 1052.

2.13 Cover blocks and spacers for reinforcement

Cover blocks and spacers shall be of the grey-coloured plastic type or of fibre-reinforced concrete and shall be designed to maintain the correct clear cover of concrete over steel reinforcement. They shall be as small as possible consistent with their purpose, and of a shape acceptable to the Engineer. Samples shall be submitted to the Engineer for approval.

Fibre-reinforced concrete cover blocks shall be manufactured with a 10 mm maximum aggregate size and otherwise produced to the same specification as the surrounding concrete. Wire cast in the block for the purpose of tying it to the reinforcement shall comply with Clause 2.12.

Spacers shall be rust-proof material and shall not produce staining, or otherwise be detrimental to the concrete or steel.

2.14 Precast Concrete Products

2.14.1 General

Precast concrete units shall be provided by an approved specialist supplier or may be manufactured by the Contractor if the Contractor's samples and workmanship are approved.

2.14.2 Non-Structural Precast Concrete

Non-Structural Precast Concrete units shall be made to the form, surface finish and dimensions specified or shown on the Drawings. Any units damaged during manufacture, hoisting or fixing will be rejected.

The Contractor must allow for any moulds, for any light reinforcement which may be necessary to prevent breakage or damage in handling, for casting in specified lengths, for hoisting and, unless otherwise described, for bedding and jointing where necessary in 1:3 cement:sand mortar.

2.14.3 Structural Precast Concrete

Structural Precast Concrete materials and workmanship shall be in accordance with BS 8110.

The precast units shall be cast under cover and shall so remain for at least 7 days during which period they shall be kept damp or otherwise efficiently cured. No units shall be erected until 21 days after casting except with the written approval of the Engineer.

No unit shall be erected until it has been approved by the Engineer as being free from defects and all surfaces are to the required standard. All precast units shall be marked with an individual identification. Lifting hooks are to be attached only to those positions shown on the detail drawings or as specified by the Engineer.

2.15 Plastic sheeting and Sleeving

Plastic sheeting for waterproof underlay shall be free from tears and voids and be substantially free from pinholes and other discontinuities. It shall have a composition in accordance with Clause 3 of BS 6076 and a nominal film thickness of 125µm, unless otherwise stated.

Tubular polyethylene film for use as a loose protective sleeving for buried iron pipes and fittings shall comply with the relevant provisions of BS 6076, except that the nominal layflat width shall be 280 mm for use with 80 mm and 100 mm nominal internal diameter pipelines incorporating push-in flexible joints, and 400 mm for 150 mm nominal internal diameter pipelines. Sleeving for pipes for below ground use for potable water shall be coloured blue and all other sleeving black.

2.17 Polyethylene pipes and fittings

Polyethylene pipes shall conform to MS ISO 4427 with fusion welded joints unless agreed otherwise.

2.21 Joint seals and Lubricants

Elastomeric joint seals for water mains and drainage purposes shall be Types W and D respectively, complying with the relevant provisions of BS 2494, and shall be obtained from the pipe manufacturer.

Joint lubricants for sliding joints shall have no deleterious effects on either the joint rings or pipes, and be affected by the liquid to be conveyed. Lubricants to be used for jointing water mains shall not impart to waste taste, colour, or any effect known to be injurious to health, and shall be resistant to bacterial growth.

2.24 Materials for Pavements

2.24.1 Granular Sub-Base

Granular sub base material shall be crushed rock (crusher run) complying with the requirements stated in **Schedule 2.24.1** and complying with BS 594.

Schedule 2.24.1

	<i>Property</i>	<i>Test Standard</i>	<i>Unit</i>	<i>Requirement</i>	<i>Frequency of Control Testing</i>
1	<i>Max percentage of soft particles by wt.</i>	<i>ASTM C 142</i>	<i>%</i>	<i>3 max</i>	<i>Weekly*</i>
2	<i>Organic matter content (fine fraction)</i>	<i>BS 1377 Part 3 Test 3</i>	<i>%</i>	<i>2% Max</i>	<i>Weekly*</i>
3	<i>Los Angeles abrasion test</i>	<i>ASTM C 131</i>	<i>%</i>	<i>32 max</i>	<i>Weekly*</i>
4	<i>Los Angeles abrasion test after soaking for 7 days</i>	<i>ASTM C 131</i>	<i>%</i>	<i>32 max</i>	<i>Weekly*</i>

5	Soundness in magnesium sulphate (coarse fraction)	ASTM C 88	% loss	18 max	Weekly*
6	Fraction below 0.425mm: Liquid limit Plasticity Index	BS 1377 Part 2 Tests 4 and 5	% Index	35 max 6 max	Weekly*
7a	Mixed material: Max dry density/optimum moisture content	BS 1377 Part 4 Test 3 (4.5kg Rammer)			Weekly*
7b	Lab CBR after compaction to 95% max density and soaking for 4 days	BS 1377 Part 4 Test 7	%	30 min	Weekly*
8	Aggregate Impact Value	BS812 Part 112	%	30 max	Weekly*
9	Sand Equivalent Value	AASHTO T76	Index	50 min	Weekly or one test for each 500m ³ *

* or as directed by the Engineer.

GRADING LIMITS : BS 812, Part 103, Washing and Sieving Method, within and approximately parallel to the following:

BS Sieve (mm)	Percentage Weight Passing
50	100
31.5	92-100
20	78-91
10	56-76
6	42-64
4	36-55
2	25-42
1	17-30
0.5	10-21
0.08	3-8

2.24.2 Granular Base

Granular base material shall be crushed rock (crusher run) complying with the requirements stated in **Schedule 2.24.2** and complying with BS 594.

Schedule 2.24.2

Property	Test Standard	Unit	Requirement	Frequency of Control Testing
1 Max percentage of soft particles by wt.	ASTM C 142	%	2 max	Weekly*
2 Organic matter content (fine fraction)	BS 1377 Part 3 Test 3	%	2 max	Weekly*
3 Los Angeles abrasion test	ASTM C 131	%	30 max	Weekly*
4 Los Angeles abrasion test after soaking for 7 days	ASTM C 131	%	30 max	Weekly*
5 Soundness in magnesium sulphate (coarse fraction)	ASTM C 88	% loss	18 max	Weekly*

6	Fraction below 0.425mm: Liquid limit Plasticity Index	BS 1377 Part 2 Tests 4 and 5	% Index	25 max 4 max	Weekly*
7a	Mixed material: Max dry density/optimum moisture content	BS 1377 Part 4 Test 3 (4.5kg rammer)			Weekly*
7b	Lab CBR after compaction to 98% max density and soaking for 4 days	BS 1377 Part 4 Test 7	%	80 min	Weekly*
8	Aggregate Impact Value	BS812 Part 112	%	30 max	Weekly*
9	Sand Equivalent Value	AASHTO T 176	Index	60 min	Weekly or one test for each 500m ³ *

* or as directed by the Engineer

GRADING LIMITS : BS 812, Part 103, Washing and Sieving Method, within and approximately parallel to the following:

BS Sieve (mm)	Percentage Weight Passing
31.5	100
20	90-100
10	60-80
6	45-64
4	36-54
2	25-40
1	17-29
0.5	12-21
0.08	5-8

2.24.3.3 Storage of Materials

Granular materials shall be stored on hard, clean and level self-draining surfaces without any segregation. Different materials shall be stored in separate piles without any intermixing.

2.24.4 Asphaltic Concrete

2.24.4.1 Materials

Aggregates shall comply with the requirements stated in **Schedule 2.24.4** and BS 594.

Coarse aggregate shall consist of sound crushed rock coarser than 5mm and shall not contain pieces coated with deleterious materials, dust, dirt or other objectionable matter. Crushed gravel aggregate shall be the product of crushing gravel retained on a screen with openings at least twice the maximum size of aggregate being produced. All particles retained on the 5 mm sieve shall have at least two fractured faces. Coarse aggregate shall be produced in two or three sizes suitable for combining to provide the gradings specified. Fine aggregate shall consist of material finer than 5mm and coarser than 0.075mm as follows:

- (a) Screenings from the production of the coarse aggregate by secondary crushing, free from soft or non-durable particles but in no case containing more than 1% of such particles for wearing course or 2% for other asphalt layers, or
- (b) A mixture of screenings as specified above and natural sand which is free from clay, loam, organic or other foreign matter, or
- (c) An alternative source. Such material shall be tested to demonstrate its compliance with the requirements as set out in **Schedule 2.24.4**.

At least 60% of the filler shall be added filler. The bulk density in toluene of the filler shall be between 0.5 and 0.9 grams per millilitre when measured as described in BS 812.

The grading of the combined aggregates and filler shall be within the limits stated in **Schedule 2.24.4**.

The binder shall be one of the penetration grade bitumen described in **Sub-Clause 2.24.3.1** having the properties set out in **Schedule 2.24.4**.

2.24.4.2 Acceptance Testing

The test requirements for materials for asphaltic concrete are stated in **Schedule 2.24.4**.

Schedule 2.24.4

Property		Test Standard	Unit	Requirement	Frequency of Control Testing
<i>Aggregates</i>					
1	<i>Max percentage of soft particles by wt.</i>	<i>ASTM C 142</i>	<i>%</i>	<i>1 max</i>	<i>Twice weekly*</i>
2	<i>Los Angeles abrasion test</i>	<i>ASTM C 131</i>	<i>%</i>	<i>35 max</i>	<i>Once weekly*</i>
3	<i>Soundness in Magnesium sulphate (coarse fraction)</i>	<i>ASTM C 88</i>	<i>% loss</i>	<i>18 max</i>	<i>Once weekly*</i>
4	<i>Flakiness Index (coarse fraction)</i>	<i>BS 812</i>	<i>Index</i>	<i>30 max</i>	<i>Twice weekly*</i>
5	<i>Water absorption</i>	<i>BS 812</i>	<i>% of dry mass</i>	<i>2.0 max</i>	<i>Twice weekly*</i>
6	<i>Stripping (bitumen retained)</i>	<i>Spec App A15</i>	<i>%</i>	<i>75-100</i>	<i>Once weekly*</i>
<i>Filler</i>					
7	<i>Density in toluene</i>	<i>BS 812</i>	<i>g/ml</i>	<i>0.5-0.9</i>	<i>Twice weekly*</i>

<i>Bitumen (ASTM Tests)</i>					
8	<i>Penetration</i>	<i>D5</i>	<i>0.1m m</i>	<i>85-100 ASTM D946</i>	<i>For each consignment*</i>
9	<i>Flash, point, minimum</i>	<i>D92</i>	<i>°C</i>	<i>ASTM D946</i>	<i>"</i>
10	<i>Softening point (ring and ball)</i>	<i>D2398</i>	<i>°C</i>	<i>ASTM D946</i>	<i>"</i>
11	<i>Ductility, minimum</i>	<i>D113</i>	<i>cm</i>	<i>ASTM D946</i>	<i>"</i>
12	<i>Solubility (trichloroethylene)</i>	<i>D2042</i>	<i>%</i>	<i>ASTM D946</i>	<i>"</i>
13	<i>Penetration of residue</i>	<i>D5</i>	<i>% of 8 above</i>	<i>ASTM D946</i>	<i>"</i>
14	<i>Ductility of residue</i>	<i>D113</i>	<i>cm</i>	<i>ASTM D946</i>	<i>"</i>
15	<i>Spot test</i>	<i>AASHTO T102</i>		<i>Negative</i>	<i>"</i>

* or as directed by the Engineer

Tests to be in accordance with BS 812

Grading limits to be within and approximately parallel to the following envelope

BS Sieve (mm)		Percentage Passing	
		Base Course 20mm Nominal Aggregate Size	Wearing Course 14mm Nominal Aggregate Size
A.	37.5	-	-
B.	28	100	-
C.	20	76-100	100
D.	14	64-89	86 - 100
E.	10	-	78 - 90
F.	6.3	46-71	66 - 79
G.	3.35	32-58	52 - 65
H.	1.18	20-42	34 - 49
J.	0.425	12-28	19 - 33
K.	0.150	6-16	9 - 17
L.	0.075	4-10	5 - 10
<i>Bitumen Content Range</i>		<i>4.0-5.5</i>	<i>5.0 - 7.0</i>
<i>Nominal Thickness</i>		<i>75 mm</i>	<i>50 mm</i>

Schedule 2.24.4 (continued): Marshall Properties of Mixed Materials

Tests to be carried out in accordance with ASTM Specification D1559

	Property	Unit	Base Course	Wearing Course	Frequency of control testing
1.	<i>No. of blows per face</i>	<i>No</i>	<i>75</i>	<i>75</i>	<i>All tests. One every 3</i>
2.	<i>Marshall Stability (min)</i>	<i>N</i>	<i>8000</i>	<i>10,000</i>	

3.	Marshall Flow	mm	2 - 4	2 - 4	hours during laying. Minimum two per day
4.	Voids in mixed aggregate	%	14 - 18	16 - 19	
5.	Voids in total mix	%	3 - 5	3 - 4	
6.	Percentage of voids in total mix filled with bitumen	%	67 - 77	75 - 82	

NOTES

1. The Relative Density of the mix used in the void calculations shall be determined by one of the following methods:

(a) Determine Relative Density of mix in accordance with ASTM D2041.

(b) Determine Relative Density and water absorption of each aggregate fraction in accordance with BS 812 and calculate relative density of mix.

2. Each mix shall be designed to have a mean Marshall stability which exceeds the minimum figure given above by a margin of 2.33 times the standard deviation of the last 30 stability results. Until 30 results have been obtained the margin shall be assumed to be 3000N.

3. The following Relative Density values should be used for void calculations:

Water AbsorptionRelative Density Value

Less than 1%

Oven Dried value

More than 1%

Mean of Oven Dried value and Apparent value.

4. Aggregate

Particle Size

Coarse

14.0 mm to 5.0 mm

Fine

5.0 mm to 0.075 mm

Filler

0.075 mm max

Schedule 2.24.4 (continued): Control Testing

Property		Test Standard	Unit	Requirement	Sampling Point	Frequency of control testing *
Aggregates						
1	Grading	BS 812	-	As per Sub-Clause 2.24.4.1	Mixing Plant	Twice Weekly
2	Relative Density	BS 812		Sub-Clause 6.5.3		Twice Weekly
3	Moisture content	BS 812	%			Twice Weekly
4	Temperature	-	°C	150-170 ****		Continuous
Combined Filler						
5	Density in toluene	BS 812	g/ml	0.5 - 0.9	Storage bin	Once daily
Bitumen						
6	Temperature	-	°C	170 max ****	On entry to mixer	Continuous
Asphaltic Concrete Mix						
7	Aggregate grading	BS812	-	As per Schedule	From hopper of spreader	Once every 3 hours during laying. Min two per day
8	Bulk density in toluene of recovered filler	BS812	g/ml	0.5 - 0.9		
9	Bitumen content	ASTM D2172 Method A	%	±0.3 of total mix		
10	Laboratory Marshall tests	ASTM D1559		As per Schedule		
11	Temperature	-	°C	135 - 165 *****	At mixer discharge point	Continuous
12	Temperature	-	°C	135 - 165 *****	At laying point in spreader hopper	Continuous
13	Temperature	-	°C	125 min *****	After laying prior to rolling	Continuous
Asphaltic Concrete Bulk Sample**						
14	Aggregate grading	BS812	-	As per Sub-Clause 2.24.4	Finished pavement layer	One of each test per day
15	Bitumen content	ASTM D2172 Method A	%	±0.3% of total mix		
16	Penetration of recovered bitumen	ASTM D1754	0.1mm	-		
Asphaltic Concrete Core***						
17	Density	BS598	Mg/m ³	98% of Job Mix formula	Adjacent to above bulk samples and spaced between	One of each test per 100m ² of laid material Min 2 per day
18	Thickness		mm	As per Schedule 6.1.7		
19	Texture Depth	Appendix A11	mm	1.0 mm		
20	Deflection Measurement	*****	mm	as directed by Engineer	*****	One test on each construction layer or as directed by the Engineer

* or as directed by the Engineer

** Bulk sample volume - 300mm x 300mm layer thickness

*** Core - 150mm diameter

**** or lower to comply with **Sub-Clause 6.5.3**

***** or lower to comply with **Sub-Clause 6.5.8**

***** Deflection measurement under a 10 ton axle load test shall be carried out using the Benkelman beam on the centerline and at offsets of 2.5m from the centre line and at 20m intervals on both sides of each construction layer and/or as directed by the Engineer

2.24.5 Prime Coat

Bituminous material for prime coat shall be a medium grade cutback bitumen complying with ASTM D2027 or similar approved.

The properties and rate of application of bitumen shall be as set out in **Sub-Clause 6.5.1** and **Schedule 2.24.5**. The rate of application may be varied within the limits specified to suit field conditions. The actual rate of application to be used will be confirmed by the Engineer.

Prime coat shall be applied to unbound surfaces which are to receive asphalt surfacing.

Schedule 2.24.5

	Property	Test Standard ASTM	Unit	Requirement	Sampling Point	Frequency of Control Testing*
1	Grade	D2027	-	MC70		For each Consignment
2	Max temp. at distributor		°C	115 max	Distributor	Continuous
3	Rate of Spread		kg/m ²	1.0	Surface of Pavement	1 per 1000m ² of laid material

* or as directed by the Engineer

2.24.6 Tack Coat

Bituminous material for tack coats shall be a medium curing cut back bitumen complying with ASTM 2027 or a bitumen emulsion complying with ASTM D977 or similar approved.

The properties and rate of application of bitumen shall be as set out in **Sub-Clause 10.5.1** and **Schedule 2.24.6**. The rate of application may be varied within the limits specified to suit field conditions. The actual rate of application to be used will be confirmed by the Engineer. Tack coats shall be applied to the full area to receive asphalt surfacing.

Schedule 2.24.6

	Property	Test Standard ASTM	Unit	Requirement	Sampling Point	Frequency of Control Testing*
1	Grade	D2027	-	MC 250	-	For each Consignment
2	Max temp. at distributor	-	°C	130 max	Distributor	Continuous
3	Rate of spread		kg/m ²	0.4 – 0.6	Surface of pavement	1 per 1000m ² of laid material

* or as directed by the Engineer

2.31 Structural steel

Structural steel sections shall comply with the relevant provisions of the appropriate British Standard, as set out below:

Type	BS
Structural steel sections	4: Part 1
Cold rolled steel sections	2994
Weldable structural steels	4360
Hot-rolled structural steel sections	4848: Parts 2 and 4
Steel tubes for general purposes	6323: Parts 2-7

2.32 Electrodes, Filler rods and Wires for Welding

Electrodes, filler rods and wires for welding shall be compatible with the grade of steel to be welded. Electrodes for the manual metal-arc welding of carbon and carbon manganese steel and stainless steel shall comply with the relevant provisions of BS 639 and BS 2926 respectively.

Electrode wires and fluxes for the submerged arc welding of carbon steel and medium tensile steel shall comply with the relevant provisions of BS 4165.

Filler rods and wires of the gas-shielded arc welding of ferric steel, austenitic stainless steel and aluminium and aluminium alloy shall comply with the relevant provisions of BS 2901: Parts 1, 2 and 4 respectively.

Manual welding of stainless steel shall be by the inert-gas tungsten-arc process.

2.33 Nuts, Screws, Washers and Bolts

Mild and high strength nuts, screws, washers and bolts shall comply with the relevant provisions of the appropriate British Standards, as set out below:

Type	BS
Black hexagon bolts, screws and nuts	4190
Metal washers for general purposes	4320
High strength friction grip bolts, nuts and washers	4395: Parts 1 - 3

Bolting for pipes and fittings shall comply with the relevant provisions of BS 4504: Sections 3.1 and 3.2, except that spheroidal graphite iron bolts for use with ductile iron pipes and fittings shall be manufactured from metal complying with the provisions of BS 2789 for Grade 500/7.

Bolt lengths shall be sufficient to ensure that nuts are full-threaded when tightened in their final position.

Stainless steel nuts, screws, washers and bolts shall be manufactured from Grade 316S31 steel complying with BS 970: Part 1 or BS 1449: Part 2.

Where bolting is incompatible with the material being fixed, suitable isolating washers and sleeves shall be used.

2.34 Safety Chains

Mild steel safety chain shall be 8 mm nominal size Grade M(4) non-calibrated chain, Type 1, complying with BS 4942: Part 2. After manufacture, mild steel safety chains shall be hot dip galvanized in accordance with BS 729.

Stainless steel safety chain shall be manufactured from grade 316S31 steel complying with BS 970: Part 1. Chain links shall be welded and have an internal length not exceeding 45 mm and an internal width of between 12 mm and 18 mm. The fins caused by welding shall be removed and the weld shall be smoothly finished all around. When tested in accordance with Clause 7.3 of BS 4942: Part 2, each chain shall withstand a breaking force of 30 kN and a proof force of 15 kN.

2.35 Handrails and Balusters

Handrails and balusters shall be manufactured from material complying with the relevant provisions of the appropriate British Standard, as set out below. Protective barriers shall comply with the provisions of BS 6180 for Buildings - use Category 6.

Material	Handrails				Balusters			
	Solid		Tubular		Solid		Tubular	
	BS	Grade	BS	Grade	BS	Grade	BS	Grade
Mild Steel	4360	43A	1387	-	4360	43A	1387	-

After manufacture, mild steel handrails and balusters, shall be hot dip galvanised in accordance with BS 729. Any section of handrailing and balustrade needing to be cut after galvanising shall be re-galvanised.

Balusters and handrails shall be as per drawings or if not provided, shall be of tubular mild steel 42 mm diameter and 32 mm diameter respectively medium gauge with flush fittings.

The design loading shall be in accordance with BS 6180: Table 2.

Toe-boards 150 mm deep x 6 mm thick shall be manufactured from the same material as the handrail and standards.

2.36 Steel Balustrading and Handrails

Steel balustrading shall be as detailed and described on the Drawings or in the Schedules.

Stainless steel for balustrading shall be in accordance with BS 6323: Part 8 and BS 1449: Part 2. Other steel for balustrading shall be in accordance with BS 1387, BS 6323: Parts 1 to 7 and BS1449: Part 1 as appropriate.

The Contractor shall provide all necessary preformed bends, joints, flanges for standards and rails and incorporate all necessary fittings and fixings. Painting or other decorative and protective finishes shall be as defined in the Finishes Schedule or on the Drawings.

2.38 Fencing

Fencing shall be anti-intruder chain link complying with BS 1722 Part 1 and as per drawings and conform to the following requirements:

1. Post and bracings shall be hot dipped galvanised circular hollow sections (CHS) and shall comply to BS EN 10210
2. Line wire, stirrup wire and tying wire shall be galvanised wire complying with BS 1722, Part 1 and BS 443
3. Chain link mesh shall be woven from galvanised wire complying with BS 1722, Part 1 except that wire with an outside diameter of 3.5mm and a core of 2.5mm shall be acceptable. The bottom 0.3m of the fencing shall be buried vertically and ground surface reinstated.

Use of plastic coated chain link fencing shall be according to manufacturer's specifications subject to the Engineer approval. Details of all fencing shall be submitted to the Engineer for approval before manufacture commences.

2.39 Fixings for metalwork

Mild steel bolts and nuts shall be hot dip galvanised in accordance with BS 729 and stainless steel bolts and nuts shall be manufactured from Grade 316S31 steel complying with BS 970: Part 1 or BS 1449: Part 2.

Stainless steel proprietary fixings shall be manufactured from Grade 316S31 steel complying with BS 970: Part 1 or BS 1449: Part 2. Mild and high tensile steel proprietary fixings shall be protected in accordance with the relevant provisions of the appropriate British Standard, as set out below:

Type of protection	Type of fixing		
	Cast-in, having no machined thread	Cast-in/expanding, basic major diameter of machined thread	
		Not exceeding 19mm	Exceeding 19mm
Hot dip galvanized	BS 729	-	-
Electroplated cadmium	BS 1706, Cd 4	BS 3382: Pt 1	BS 1706, Cd 4
Electroplated zinc	BS 1706, Zn 10	BS 3382: Pt 2	BS 1706, Zn 10

Where described in the Contract, axial and shear loading tests on structural fixings in concrete or masonry shall be carried out in accordance with the provisions of BS 5080: Parts 1 and 2 respectively. The safe working load shall be as described in the Contract.

Where fixings are incompatible with the material being fixed, suitable isolating washers and sleeves shall be used.

2.43 Paints and Painting Materials

Ready mixed paints for buildings shall be external quality. Paint colours for building purposes shall comply with the relevant provisions of BS 4800.

Priming paint for wood shall comply with the relevant provisions of the appropriate British Standard, as set out below:

Type	BS
Ready mixed aluminium	4756, Type II
Water-borne	5082, Type B
Solvent-borne	5358, Type B

Priming paint for metal shall comply with the relevant provisions of the appropriate British Standard, as set out below:

Type	BS
Lead-based	2523, Type B or C
Calcium plumbate	3698, Type A
Metallic zinc-rich (organic media)	4652

Paint remover shall be non-flammable, solvent-based and comply with BS 3761.

2.44 Paints and Painting Materials

Priming paint for metal shall comply with the relevant provisions of the appropriate British Standard, as set out below:

Type	BS
Lead-based	2523, Type B or C
Calcium plumbate	3698, Type A
Metallic zinc-rich (organic media)	4652

Paint remover shall be non-flammable, solvent-based and comply with BS 3761.

2.45 Masonry Blocks

Precast Concrete Blocks shall conform to BS 6073: Part 1: 1981. Blocks shall be solid or cellular, of the sizes required and shall be made in approved moulds of metal construction of sufficient strength to ensure the manufacture of blocks of even size and shape.

Concrete blocks for general walling shall be of an approved size. Cutting where necessary shall be such that clean sharp arises are produced without fracture or cracking of the portion to be used. Voids in cut blocks shall be filled solid with concrete. The face of concrete blocks to be plastered shall have a reasonably dense fair finish from moulds. The face of concrete blocks for finishing fair face shall have a smooth and dense finish from the mould.

2.48 Materials for Stone Masonry

Stone for use in masonry works shall consist of sound undecomposed blue or black basalt obtained from approved sources and shall be of even texture and colour.

2.49 General Filling Materials

Hardcore shall consists of clear, hard, durable material, either broken stone, bricks or concrete, graded from 150 mm to 50 mm, and be free from extraneous matter.

Selected fill whether selected from locally excavated material or imported, shall consist of uniform readily compactible material, free from vegetable matter, building rubbish, or materials susceptible to spontaneous combustion, and excluding clay of liquid limit greater than 80 and/or plastic limit greater than 55 and material of excessively high moisture content. Clay lumps and stones retained on 75 mm and 14 mm sieves respectively shall be excluded from the fill material.

2.50 Granular Sub-Base Material (Crusher Run)

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, clay, topsoil or other deleterious matter, and shall be to the approval of the Engineer.

The rock from which the stone is to be produced shall comply with the following:

		Sub-Base	Base
Aggregate Crushing Value	: Maximum	32%	30%
Los Angeles Abrasion Value	: Maximum	40%	35%
Sodium Sulphate Soundness Test	: Maximum	20%	12%
Flakiness Index	: Maximum	35%	30%

The grading shall conform to the grading requirements given in the table below and the particle size distribution shall be a smooth curve within and approximately parallel to the grading envelope.

B.S. Sieve Size (mm)	Percentage Passing by Weight
75	100
50	95-100
37.5	85-100
10	45-100
5	25-85
0.6	8-45
0.075	0-10

The sampling of materials shall be in accordance with BS 812. The percentage passing No. 0.425 sieve shall be NON-PLASTIC. Stone shall be free of all foreign matter.

Where the crusher run material is deficient in the fine aggregate, and in the opinion of the Engineer the Contractor has made every reasonable effort to produce the required grading, the Engineer will allow admixing of crusher fines. No extra payment will be made for providing and mixing in of such fines. Added fines should be non-plastic and from rock meeting the requirements for crusher run.

2.51 Rolled Asphalt

Hot rolled asphalt shall comply with the provisions of BS 594: Part 1.

2.53 Dowel Bars

Dowel bars for expansion joints in concrete shall consist of mild steel complying with the provisions of BS 4449, Grade 250.

Dowel bars shall be straight, free from burrs or other irregularities and shall have their sliding ends sawn. The sliding half of each dowel bar shall be painted with a thin coat of bond breaking compound, and the end of this half shall be provided with a close fitting plastic or waterproof cardboard cap at least 100 mm long, the end 20 mm of which shall be fitted with a disc of joint filler or a pad of cotton waste.

2.54 Bond Breaking Compound for Dowel Bars

Bond breaking compound for dowel bars shall consist of a bitumen paint containing 66% of 200 pen bitumen, blended hot with 14% light creosote oil with the addition, when cold, of 20% solvent naphtha. It shall in no way retard or otherwise affect the setting of concrete.

2.55 Joint Filler Board

Filler board for joints in concrete shall be Resin Bonded Cork as manufactured by Expandite or similar approved and shall not extrude when compressed.

Holes in preformed joint filler to accommodate dowel bars shall be accurately bored or punched out to produce a sliding fit on the dowel bars. The material comprising the joint filler shall be of such quality that it can be satisfactorily installed in position at the joint.

Adhesives used to retain preformed joint fillers in place during construction shall have no harmful effects on concrete and, except for those used in connection with softwood fillers, shall be obtained from the same manufacturer as the joint filler.

Preformed filler for joints in structures to retain aqueous liquids shall have a maximum water absorption of 0.3% by volume and a non recovered compression set of 20% of the original thickness, both when tested in accordance with ASTM D3595.

2.56 Joint Sealing Compounds and Sealants

Joint sealing compounds shall be impermeable ductile materials of a type suitable for the conditions of exposure in which they are to be placed, and capable of providing a durable, flexible and watertight seal by adhesion to the concrete throughout the range of joint movement.

Hot poured joint sealants shall comply with BS 2499, Ordinary Type A1 sealant. Cold poured polymer-based joint sealant shall comply with BS 5212: Part 1, Normal Type N sealant. Two-part polysulphide-based sealants shall comply with the relevant provisions of BS 4254.

Pouring Grade shall be applied to horizontal upward-facing joints and Gun Grade to joints of any other aspect or inclination. Other two-part polymer-based sealants of Gun or Trowel Grade shall comply with the physical and test requirements of BS 4254.

Silicone based building sealants shall comply with the relevant provisions of BS 5889. Primers for use with joint sealants shall be compatible with, and obtained from the same manufacturers as, the adjacent sealant. Primers shall have no harmful effects on concrete.

Sealants and primers which will be in contact with water to be used for potable supply shall not impart to waste taste, colour, or any effect known to be harmful to health, and shall be resistant to bacterial growth.

2.58 Geotextile filter fabric

The filter fabric shall be a nonwoven fabric consisting only of continuous chain or short staple polymeric filaments or yarns of polyester, formed into a stable network by needle punching.

The fabric shall be inert to commonly encountered chemicals, hydrocarbons, mildew and rot resistant, resistant to ultraviolet light exposure, insect and rodent resistant, and shall have the following properties: -

Fabric Property	Test Method	Minimum Average Roll Value
Fabric Weight	ASTM D-3776	340 g/m ²
Thickness	ASTM D-1777	3.5 mm
Grab Strength	ASTM D-4632	130 kg
Grab Elongation	ASTM D-4632	65%
Trapezoid Tear Strength	ASTM D-4533	45 kg
Puncture Resistance	ASTM D-4833	55 kg
Mullen Burst Strength	ASTM D-3786	3.5 MPa
Permittivity	ASTM D-4491	70 l/s/m ²
Apparent Opening Size	ASTM D-4751	100 US sieve size

The filter fabric shall be provided in rolls wrapped with protective covering to shield the fabric from mud, dirt dust, and debris. The fabric shall be free of defects or flaws which significantly affect its physical properties.

Fabric shall be installed in conformity with all requirements of the manufacturer.

2.59 Fibre reinforcement for concrete

Fibres for control of plastic shrinkage and crazing in concrete where specified shall be 12 mm monofilament polypropylene fibres complying with BS 5075 : Part 2 : 1982 and shall show a reduction of plastic shrinkage crack area of not less than 95 % and shall be subject to the approval of the Engineer.

Fibres shall be manufactured from pure polypropylene complying with BS 5139, classification code AH-3.0-FL-1329. Dosing and mixing rates shall be as recommended by the manufacturer, but not less than 0.9 kg/m³. Fibres shall comply with BS 6920-1988: suitability of non-metallic substances for contact with water for human consumption.

3.0 EXCAVATION AND EARTHWORKS

3.1 Definitions

Required excavation is the excavation required solely for the Permanent Works and does not include excavation for Temporary Works, working spaces, access and the like.

A foundation is that part of the ground on which Permanent Works will be constructed.

A formation is a surface on which earthworks operations, or a stage of operations, have been completed.

Topsoil is material from the surface layers of the ground which is capable of supporting plant life.

Spoil is excavated material which is unsuitable for use in the Permanent Works or is material which is surplus to the requirements of the Permanent Works.

Suitable filling material is material which is not unsuitable as defined hereunder and which is approved by the Engineer for use in the Permanent Works.

Unsuitable material is material which in the opinion of the Engineer falls into one or more of the following classifications:-

- (a) material from swamps, marshes and bogs;
- (b) peat, timber, tree roots and stumps, refuse and material containing degradable matter;
- (c) material susceptible to spontaneous combustion;
- (d) material in a frozen condition;
- (e) material with an organic content exceeding two per cent as determined by Test No.8 of BS 1377 - Determination of organic matter content;
- (f) material which is too wet for compaction in accordance with the Specification;
- (g) material containing chlorides, sulphates or other chemicals in quantities which will be injurious to the Permanent Works;
- (h) any other material which is not approved by the Engineer.

3.2 Site Clearance

The clearance areas indicated on the Drawings shall be cleared of all trees, shrubs and other vegetation, buildings and other obstructions, hard surfaces and rubbish. Other parts of the Site shall be cleared to the extent indicated on the Drawings or instructed by the Engineer.

Where underground structures, manholes, drawpits, earthpits and similar items are discovered, their presence shall be reported immediately to the Engineer and they shall not be further disturbed until the Engineer has given his instructions for their disposal.

Where such underground structures, manholes, drawpits, earthpits and similar items are demolished and removed from areas which are to be occupied by buildings, roads, hard standings and other Permanent Works, any holes or depressions resulting from such removal shall be filled with material similar to that in the surrounding ground and compacted to a density equal to that of the surrounding ground unless other treatment is shown on the Drawings or instructed by the Engineer.

All removable items which are to be preserved in accordance with the Drawings, the Specification or the instructions of the Engineer shall be stored on Site in a place of safety and in a manner appropriate to their nature. All such items shall remain the property of the Employer.

3.3 General Requirements for Excavation and Earthworks

(a) Constructional Plant

Before any Constructional Plant for excavation and earthworks is ordered or delivered to Site, the Contractor shall submit to the Engineer full details of the Plant he proposes to use and the arrangements he proposes to make.

(b) Ground Levels

Before any excavation or earthworks is commenced, the site of the excavation or earthworks shall be surveyed by the Contractor in a manner and to the extent required by the Engineer. Drawings recording the survey shall be signed by the Contractor and the Engineer as a true record and the Contractor shall then supply two prints and one transparency of the drawings to the Engineer.

Such records shall not be altered in any way unless such alterations are agreed and signed by both the Contractor and the Engineer.

(c) Excavated Surfaces

All excavated surfaces shall be finished neatly to the lines and levels shown on the Drawings unless such lines and levels are shown as nominal.

When such lines and levels are stated to be nominal, the final lines and levels will be instructed by the Engineer to take into account the conditions of the ground exposed as the excavation nears the nominal lines and levels shown on the Drawings and the Contractor may be required to carry out the excavation in more than one stage in order to arrive at the final lines and levels.

In material other than rock the surface shall be left not less than 150 mm above its final level until immediately before commencing Permanent Works construction.

Excavated surfaces which will remain permanently exposed on completion of the Permanent Works shall be cleared of all loose material, pieces of rock, debris, rubbish and the like and left neat and tidy.

(d) Supports to Excavations

The responsibility of the Contractor for the safety and care of the Works under the Contract shall include taking the following measures:

- (i) The Contractor shall excavate the sides of excavations which are not positively supported to slopes which will remain stable.
- (ii) The sides of excavations which are not cut to a stable slope shall be properly and adequately supported to the extent necessary to ensure stability during the period of construction of the Permanent Works and the excavation shall then be backfilled unless otherwise indicated on the Drawings.
- (iii) No materials, plant or other load shall be placed so close to any excavation that the stability of the sides of the excavation is endangered.
- (iv) The Contractor shall remove or otherwise secure by barriers, net or other means any material which might fall and thereby cause damage to the Permanent Works or injury to any person.

The Contractor shall be responsible for the installation and subsequent removal of all necessary sheeting, timbering, strutting, shoring and the like to secure the excavations, to prevent any movement of adjacent ground and to ensure the safety of

workmen and freedom from damage to structures, buildings, streets, sewers, drains, walls, services or any other thing.

Where temporary underpinning is required, the Contractor shall submit to the Engineer full details of the design, materials to be used and method of working proposed.

(e) Slips and Over-excavation

The Contractor shall avoid excavating beyond the lines and levels shown on the Drawings, disturbing ground adjacent to excavations, or damaging material beyond the limits of the required excavation except to provide the minimum adequate working space.

Slippages, excavation for working space, over-excavation and damaged areas shall be made good to the satisfaction of the Engineer. In the case of surfaces on which or against which Permanent Works are to be constructed, this remedial work shall comprise replacing the slipped, over-excavated or damaged material with suitable filling material or with concrete as instructed by the Engineer.

Slips, falls, subsidence and other damage which have the effect of removing or reducing support to existing or proposed structures, services and the like shall be made good in concrete or otherwise in a manner acceptable to the Engineer.

In the case of permanently exposed surfaces, remedial work shall comprise replacing and compacting material similar to that, which has been removed in order to provide a surface not less satisfactory than adjacent correctly excavated surfaces. If this is not possible, remedial works shall be as instructed by the Engineer.

(f) Records of Excavation

After completion of each section of Permanent Works excavation, the Contractor shall provide the Engineer with a record of the excavation.

The record shall comprise all relevant information including the following:

- (i) the location of the excavation
- (ii) the elevation of the original ground and of any groundwater which is encountered during the excavation
- (iii) the measures taken to deal with groundwater
- (iv) the elevation, thickness and classification of all strata encountered
- (v) the instructed and actual profiles of the excavation.

3.4 Excavation in Rock

Rock shall be defined as a material which, in the opinion of the Engineer, must be removed by impacts methods (blasting, wedging or pneumatic or hydraulic hammer). This will include boulders having dimensions of greater than 300mm on two perpendicular axes.

Measurement of 'rock' excavation in trenches shall be unless otherwise stated made extra over standard excavation and shall be measured as the net volume of voids formed by the excavation measured from the top of the rock to the underside of the rock or formation level, whichever is the less depth. No payment shall be made for overbreak.

The classification of materials shall be agreed by the Engineer and the Contractor as the work proceeds and materials shall only be classified as 'rock' when the Engineer has given his agreement prior to its removal. In the event of a dispute over the classification of materials, the ruling of the Engineer shall be final and binding.

3.5 Preparation and Inspection of Foundations

(a) Foundations on Rock

Rock surfaces shall be free of all dust, mud, loose or fractured material and other debris. Fissures shall be cleaned out to the extent instructed by the Engineer and filled with concrete, mortar or grout of the class instructed by the Engineer.

In addition, where shown on the Drawings, the surfaces shall be washed completely clean using water or air and water jets immediately prior to placing the concrete. If instructed by the Engineer, the Contractor shall clean part of the foundation in advance of the remainder for the purpose of inspection.

(b) Foundations on Materials other than Rock

Surfaces other than rock shall be trimmed to the correct line and level immediately before commencing Permanent Works construction and any loose or disturbed material shall be removed.

(c) Inspection Pits and Boreholes

Where shown on the Drawings or instructed by the Engineer inspection pits shall be dug and boreholes drilled in foundations for the purpose of establishing the nature of the underlying ground. Tests shall be carried out in situ and on samples recovered from the pits and boreholes as instructed by the Engineer.

(d) Inspection of Foundations

When the Contractor considers that a foundation is ready for Permanent Works construction to commence, he shall inform the Engineer in writing, who will either approve the foundation in writing or instruct any further work which he may consider to be necessary.

Where shown on the Drawings or instructed by the Engineer, blinding concrete of the thickness and class shown or instructed, shall be laid on the foundation after inspection and approval by the Engineer.

3.6 Disposal of Excavated Material

Unless areas within the Site have been designated in the Contract or agreed by the Engineer as spoil areas, all spoil shall be disposed of in areas to be found by the Contractor outside the Site.

All spoil tips shall be formed with side slopes which will remain stable under all conditions to which they will be subject and the tops shall be graded to prevent the ponding of water. When tipping of spoil has been completed, spoil tips shall be trimmed and graded to present a neat and tidy appearance.

Temporary stockpiles of material for later use in the Works shall be formed with side slopes which will remain stable under all conditions to which they will be subject and the tops shall be graded to prevent the ponding of water.

Different materials shall be placed in separate spoil tips or stockpiles unless otherwise agreed by the Engineer. Spoil tips and stockpiles shall be placed so that there is no risk of material obstructing or polluting watercourses.

3.7 Backfilling

Excavations which are to be backfilled and any other fill areas shown on the Drawings shall be filled with suitable material from the excavations unless the Contract requires otherwise. If insufficient material is available from this source, the Contractor shall supply suitable material from another source.

All vegetation, topsoil, rubbish and unsuitable material shall be removed from any area on which fill is to be placed unless the Engineer agrees otherwise.

Except where special placing and compacting requirements are laid down in the Specification, the material shall be placed in layers not exceeding 300 mm after compaction, and compacted to not less than 90% of its maximum dry density measured as in Test No. 12 of BS 1377 - Determination of the dry density/moisture content relationship (2.5 kg rammer).

When placing fill, the Contractor shall make due allowance for settlement and shall ensure that the final lines and levels are as shown on the Drawings. Any areas which subside shall be made good without delay, up to the end of the Defects Liability period.

4.0 FILL

4.1 General Requirements for Fill

Fill shall be any suitable material that can be compacted to the degree specified.

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

'Unsuitable material' shall mean other than suitable material and shall comprise:

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

'Rock' shall mean those geological strata or deposits so designated in the Drawings and any hard natural or artificial material requiring the use of blasting or approved pneumatic tools for its removal but excluding individual masses less than 0.03m³.

'Rock fill' shall consist of hard durable inert material of suitable size for compaction as in Clause 4.3(d).

Any fill material shall have a soluble sulphate content, if any, not exceeding 2.5g per litre when tested in accordance with Test 10 of BS 1377.

The Contractor shall submit to the Engineer details and such samples as the Engineer may require of fill which he proposes to use in the Permanent Works together with the results of such tests as may be required to show that the fill complies with the Specification.

Fill material which fails to comply with the Specification, even though it might have been placed in excavations or in fill areas, shall be removed by the Contractor at his own expense. The material removed shall be carted away or disposed of to spoil as may be agreed with the Engineer.

Suitable material from excavations shall be used for fill to formation level and for the subsequent layers. The Contractor will be responsible to ensure the suitability of the material from his own resources. His rates for fill to formation and other subsequent layers will include the provisions as above including transport, handling, etc.

Wherever, in the opinion of the Engineer, the natural ground is unsuitable in quality, the Contractor will be instructed to excavate to whatever depth is required, remove such material, refill with approved material and compact in successive layers of thickness as specified under Clause 4.3.

Should materials from excavations prove to be unsatisfactory or insufficient, then selected fill shall be used.

4.2 Placing Fill

All vegetation, topsoil and any other unsuitable overburden shall be removed from areas on which fill is to be placed.

When fill is placed on sloping ground and against existing fill, the slopes shall be benched unless the Engineer agrees that benching is not required.

Fill shall be placed in uniform layers across the full width and length of the area to be filled so that the area is built up evenly and shall be compacted as soon as practicable after deposition. Materials of differing characteristics shall not be mixed in any one layer and each layer shall be free from lumps and pockets of such material.

Fill shall be placed so that the surface is sufficiently even and has sufficient camber to shed surface water and to avoid ponding.

The Contractor shall direct constructional traffic over the fill in such a manner that damage to compacted layers is minimised and shall remedy any such damage as instructed by the Engineer. If the Contractor wishes to route traffic across completed fill areas, he shall take such measures as may be necessary including the placing of further temporary fill to prevent damage to the Permanent Works fill by such traffic.

Where it is necessary to place fill around Permanent Works structures, it shall be placed and compacted evenly on all sides to minimise unbalanced loads on the structures. Such fill shall not contain boulders or any other hard material of a size that in the opinion of the Engineer may result in damage to the structures or incomplete compaction of the fill.

If filled areas contain material which is susceptible to deterioration due to the absorption or loss of water, such areas shall be protected by covering with further Permanent Works construction or with a temporary layer of fill of sufficient thickness to prevent penetration of water to or loss from the permanent fill. Alternatively a suitable impermeable membrane may be used to protect the permanent fill.

Where fill is to be placed in trenches, pits and other places the sides of which are supported, those supports which are to be removed shall as far as practicable be withdrawn ahead of the

layer of fill to be compacted and all voids left by the supports shall be filled with fully compacted material.

Fill material shall be deposited in such a manner that does not cause segregation.

If fill material which has been deposited but not fully compacted reaches a moisture content by wetting or by drying at which it cannot be compacted in accordance with the Specification, the Contractor shall take action subject to the agreement of the Engineer to render the material suitable. Such action may include:

- (a) removing the material and replacing it with suitable material
- (b) adjusting the moisture content by appropriate mechanical or chemical methods including the addition of water in the case of material which is too dry
- (c) ceasing work on the material until it again becomes suitable

4.3 Compaction of Fill

(a) Definitions

The specified thickness of a layer of fill is the thickness after compaction has been completed.

The maximum dry density and the optimum moisture content at which this density is achieved are the values obtained by BS 1377, Test No. 12 - Determination of the dry density/ moisture content relationship (2.5kg rammer method) or Test No. 13 - Determination of the dry density/ moisture content relationship (4.5kg rammer method) as may be instructed by the Engineer.

The field density tests called for in the Specification are those described under BS 1377, Test No.15 - Determination of the dry density of soil on the Site.

(b) General Requirements

Fill shall be compacted in layers of optimum thickness for the compaction plant in use. In large open areas, the thickness of each layer of fill shall, in no case, be more than 300mm.

The Contractor shall carry out tests on the material used for backfilling and determine the maximum dry density and optimum moisture content. The results of these tests shall be reported to the Engineer. Before and during compaction of a layer the moisture content of the material shall be adjusted to within plus or minus 2% of the optimum moisture content. The material shall then be compacted to 95% BS Heavy compaction for its full depth, or as indicated on the drawings.

If fill has a moisture content too low to permit the specified dry density to be achieved, the Contractor shall incorporate sufficient water by a method acceptable to the Engineer to permit compliance with the Specification.

If fill becomes sufficiently wet to cause serious rutting by construction traffic or heaving under compaction plant and to an extent that the required dry density cannot be obtained, placing and compaction shall forthwith cease, and shall not be resumed until the Contractor has taken whatever action may be necessary in accordance with Clause 4.2 to restore the fill to a proper condition for compaction.

(c) Compactive Effort

Fill shall be compacted using the type of equipment, the depth of layer and the number of passes determined in accordance with Table 4.1 and the notes appended thereto, provided that the expected dry density is obtained as previously determined from compaction trials. If the dry density is not obtained, the depth of layer shall be decreased or the number of passes shall be increased, or the type of equipment shall be changed until the required dry density is achieved.

Compaction trials with the main types of material likely to be encountered and type of equipment to be used shall be completed before Permanent Works with the corresponding materials will be allowed to commence. Compaction work shall be continued until a state of compaction is reached in the layer being compacted such that 9 out of every 10 consecutive samples taken of the compacted material have a dry density at least equal to that specified.

If the Contractor proposes to use compaction equipment which is not covered by Table 4.1, he shall place fill in a trial area to a total depth of at least 600mm using the plant, layer thickness and number of layers which he proposes, in order to demonstrate the adequacy of his proposals. The trial area may form part of the Permanent Works provided it complies with the Specification.

(d) Compaction of Rockfill

Rockfill shall be spread in layers not exceeding 0.45 metre in depth before compaction. Each layer shall be compacted by at least four passes of towed vibrating roller with an overall weight of at least eight tonnes. The roll shall provide a static load of at least four tonnes per metre width and shall be operated at not more than 4.0km/ hour. During compaction the rockfill shall be freely sluiced with water unless the Engineer agrees otherwise.

If the rockfill contains sufficient fine material for compaction in accordance with the requirements of Table 4.1 for well graded granular material it shall be compacted to these requirements.

(e) Field Control of Compaction

The Contractor shall regularly check the dry density which is being achieved in fill compacted in accordance with Table 4.1 or agreed modifications thereof by testing as set out in BS 1377 Test No. 15, using the method appropriate to the soil being compacted. Tests shall be made in each layer compacted on the basis of one test for every 500m² with a minimum of three tests per layer.

Tests for the maximum dry density and optimum moisture content, the Atterberg limits and particle size analysis shall be made when the placing of fill commences and subsequently on the basis of one set of tests for every 500m³ of fill placed until such time as the Engineer agrees that the frequency of testing may be reduced. In addition, such tests shall be made on samples taken adjacent to the site of any in situ density determination which fails to reach the specified compaction requirement or which indicates more than 100 per cent compaction.

TABLE 4.1 : Compaction Requirements

Type of Plant	Size of Plant	Cohesive Materials		Well Graded Granular and Dry Cohesive Materials		Uniformly Graded Materials	
		Depth of Layer(mm)	Min. number of passes	Depth of Layer(mm)	Min. number of passes	Depth of Layer(mm)	Min. number of passes
Vibratory Roller	Static load per metre width of roll						
	0.3 - 0.45 tonne	-	Unsuitable	75	16	150	16
	0.45 - 0.7 tonne	-	Unsuitable	75	12	150	12
	0.7 - 1.25 tonne	100	12	130	12	150	6
	1.25 - 1.8 tonne	130	8	150	8	200	10*
	1.8 - 2.3 tonne	150	4	150	4	225	12*
	2.3 - 2.9 tonne	180	4	180	4	250	10*
	2.9 - 3.6 tonne	200	4	200	4	275	8*
3.6 - 4.3 tonne	225	4	225	4	300	8*	
4.3 - 5.0 tonne	250	4	250	4	300	6*	
Vibrating Plate Compactor	Static pressure under Baseplate per m ²						
	0.8 - 1.0 tonne	-	Unsuitable	-	Unsuitable	75	6
	1.0 - 1.2 tonne	-	Unsuitable	75	10	100	6
	1.2 - 1.4 tonne	-	Unsuitable	75	6	150	6
	1.4 - 1.8 tonne	100	6	130	6	150	4
	1.8 - 2.1 tonne	150	6	150	5	200	4
over 2.1 tonne	200	6	200	5	250	4	

Vibro-tamper	Wt in Kgs						
	50 – 65	100	3	100	3	150	3
	65 – 75	130	3	130	3	200	3
	Over 75	200	3	150	3	225	3
Power Rammer	Wt in Kgs						
	100 – 500	150	4	150	6	-	Unsuitable
	Over 500	275	8	275	12	-	Unsuitable

- See Note 2

TABLE 4.1 : Compaction Requirements (continued)

Type of Plant	Size of Plant	Cohesive Materials		Well Graded Granular and Dry Cohesive Materials		Uniformly Graded Materials	
		Depth of Layer	Min. number of passes	Depth of Layer	Min. number of passes	Depth of Layer	Min. number of passes
Smooth Wheeled Roller	Load per metre width of roll						
	2.2 - 2.7 tonne	130	8	130	10	130	10*
	2.7 - 5.5 tonne	130	6	130	8	130	8*
	Over 5.5 tonne	150	4	150	8	-	Unsuitable
Grid Roller	Load per metre width						
	2.7 - 5.5 tonne	150	10	-	Unsuitable	150	10
	5.5 - 8.0 tonne	150	8	130	12	-	Unsuitable
	Over 8.0 tonne	150	4	150	12	-	Unsuitable
Pneumatic Tyred Roller	Load per wheel						
	1.0 - 1.5 tonne	130	6	-	Unsuitable	150	10*
	1.5 - 2.0 tonne	150	5	-	Unsuitable	-	Unsuitable
	2.0 - 2.5 tonne	180	4	130	12	-	Unsuitable
	2.5 - 4.0 tonne	225	4	130	10	-	Unsuitable
	4.0 - 6.0 tonne	300	4	130	10	-	Unsuitable
	6.0 - 8.0 tonne	300	4	150	8	-	Unsuitable
	8.0 - 12.0 tonne	300	4	150	8	-	Unsuitable
Over 12.0 tonne	300	4	180	6	-	Unsuitable	
Tamping Roller	Load per roll Over 4.0 tonne	225	4	150	12	250	4

- See Note 2

Design and Build of a Panoramic Viewpoint at La Prairie Public Beach

Procurement Reference No: BA/ONB/04/2023-24

NOTES ON TABLE 4.1

1 Definitions

The depth of a layer is the amount by which an area of fill is raised by each successive compacted layer.

The number of passes is the number of times that each point on the surface of the layer being compacted has been traversed by the item of compaction plant.

The load per metre width of roll is the total load on the roll divided by the width in metres.

Cohesive soils include clays and marls containing up to 20% gravel or rock and having a moisture content not less than the value of the plastic limit less 4. They also include chalk with a saturation moisture content of 20% or more.

Well graded granular and dry cohesive soils include clays and marls with more than 20% of gravel or rock and with a moisture content less than the value of the plastic limit less 4. They also include well-graded sands and gravels with uniformity co-efficient exceeding 10, chalk with a saturation moisture content between 15% and 20% and all shales.

A uniformly graded material includes sands and gravels with uniformity co-efficient of 10 or less and all silts. Any soil containing 80 per cent or more of material in the particle size range 0.06 to 0.002mm will be regarded as silt for this purpose.

2 An asterisk indicates that a roller towed by a tracklaying vehicle is necessary. A self propelled roller would be unsuitable.

3 Where combinations of different types or sizes of plant are used, the compaction requirements shall be determined in accordance with the following rules:

- (a) The depth of layer shall be that for the type of plant requiring the least depth of layer.
- (b) The number of passes shall be that for the type of plant requiring the greatest number of passes.

However, where the Contractor uses a lighter type of plant to provide some preliminary compaction only to assist the use of heavier plant, this shall be disregarded in assessing the above requirements.

4 Vibratory Rollers

Vibratory rollers are self-propelled or towed rollers having means of applying mechanical vibration to one or more rolls.

The requirements for vibratory rollers are based on the use of the lowest gear on a self-propelled machine and a towing speed of 1.5 - 2.5km/ hr for a towed machine. If higher gears or speeds are used an increased number of passes shall be provided in proportion to the increase in speed of travel.

Vibratory rollers operating without their vibration mechanism in use will be classified as smooth-wheeled rollers.

Vibratory rollers shall be operated with their vibration mechanism operating only at the frequency of vibration recommended by the manufacturers. All such rollers shall be equipped with a device automatically indicating the frequency at which the mechanism is operating.

5 Vibrating-Plate Compactors

Vibrating-plate compactors are machines having a base-plate to which is attached a source of vibration consisting of one or two eccentrically weighted rotating shafts.

The static pressure under the plate of a vibrating-plate compactor is calculated by dividing the total weight of the machine in working order by the area in square metres in contact with the fill.

Vibrating-plate compactors shall be operated at the frequency of vibration recommended by the manufacturer. They shall normally be operated at travelling speeds of less than 15 metres/min but if higher speeds are necessary the number of passes shall be increased in proportion to the increase in speed of travel.

6 Vibro-tampers

Vibro-tampers are machines in which an engine-driven reciprocating mechanism acts on a spring system, through which oscillation are set up in a base-plate.

7 Power Rammers

Power rammers are machines that are actuated by explosive combustion in an internal combustion cylinder, each explosion being controlled manually by the operator.

In the case of power rammers one pass will be considered as made when the compacting shoe has made one strike on the area in question.

8 Smooth Wheeled Rollers

Where a smooth-wheeled roller has more than one axle the machine will be assessed on the basis of the axle giving the highest value of load per metre width.

9 Grid Rollers

Grid rollers, whether self-propelled or towed, will be assessed on the same basis as smooth wheeled rollers.

10 Pneumatic Tyred Rollers

For pneumatic tyred rollers, wheel load is the total weight of the roller divided by the number of wheels.

In assessing the compactive effect of pneumatic tyred rollers to meet the requirements of Table 4.1 the effective width shall be the sum of the widths of the individual wheel tracks together with the sum of spacing between the wheel tracks provided each spacing does not exceed 225mm. Where the spacings exceed 225mm the effective width shall be the sum of the widths of the individual wheel tracks.

11 Tamping Rollers

Tamping rollers are machines that have rolls from which 'feet' project. The requirements shown in Table 4.1 are for machines which have two rolls in tandem. If the machine has only one roll, the number of passes shown must be doubled.

5.0 REINFORCEMENT FOR CONCRETE

5.1 Materials

This section covers plain and deformed bar reinforcement and steel fabric to be cast into concrete in any part of the Works but does not include prestressing tendons or any other embedded steel. Reinforcement shall comply with the British Standards indicated on the drawings. The Standards include the following:-

BS 4449	Carbon steel bars for the reinforcement of concrete
BS 4482	Cold reduced steel wire for the reinforcement of concrete
BS 4483	Steel fabric for the reinforcement of concrete

All reinforcement for use in the Permanent Works shall be tested for compliance with the appropriate British Standard in a laboratory acceptable to the Employer's Representative and two copies of each test certificate shall be supplied to the Employer's Representative. The frequency of testing shall be as set out in the British Standard.

In addition to the testing requirements described above, the Contractor shall carry out additional tests as instructed by the Employer's Representative. Any reinforcement which does not comply with the Specification shall be removed from Site.

5.2 Storage of Reinforcement

Reinforcement shall be stored on Site either in racks or on a hard impermeable base so that it remains straight and free from contamination.

Any reinforcement which is likely to remain in storage for a long period shall be protected from the weather so as to avoid corrosion and pitting. All reinforcement which has become corroded or pitted to an extent which, in the opinion of the Employer's Representative, will affect its properties shall be removed from Site.

5.3 Bending Reinforcement

5.3.1 Bar Schedules

The Contractor shall prepare and submit in duplicate to the Employer's Representative bar schedules showing cutting and bending details of the reinforcement shown on the Drawings. The schedules shall be prepared in accordance with BS 8666: 2000 – Specification for Scheduling, Dimensioning, Bending and Cutting of steel reinforcement for concrete.

5.3.2 Cutting and Bending Reinforcement

The Contractor shall cut reinforcement to length and bend it to the shape shown on the schedules within the dimensional tolerances given in BS 8666. Bars shall be bent cold by the application of slow steady pressure. Hooks or right-angle bends shall be formed where

called for by the schedules and to the dimensions and tolerances specified in BS 8666. At temperatures below 5°C the rate of bending shall be reduced if necessary to prevent fracture of the steel.

After bending, bars shall be securely tied together in bundles or groups and legibly labelled as set out in BS 8666. Reinforcement shall be thoroughly cleaned and all dirt, scale, loose rust, oil and other contaminants removed before it is placed in the Permanent Works.

5.4 Fixing Reinforcement

Reinforcement shall be securely fixed in position within a dimensional tolerance of 20 mm in any direction parallel to a concrete face and within a tolerance of 5 mm at right-angles to a face, provided that the cover is not thereby decreased below the minimum shown on the Drawings.

Unless otherwise agreed by the Employer's Representative, all intersecting bars shall either be tied together with 1.6 mm diameter soft annealed iron wire and the ends of the wire turned into the body of the concrete, or shall be secured with a wire clip of a type agreed by the Employer's Representative.

Spacer blocks shall be used for ensuring that the correct cover is maintained on the reinforcement. Blocks shall be as small as practicable and of a shape agreed by the Employer's Representative.

They shall be made of mortar mixed in the proportions of one part of cement to two parts of sand. Wires cast into the block for tying in to the reinforcement shall be 1.6 mm diameter soft annealed iron.

Alternatively another type of spacer block may be used subject to the Employer's Representative's agreement. Reinforcement shall be rigidly fixed so that no movement can occur during concrete placing. Any fixings made to the formwork shall not be within the space to be occupied by the concrete being currently placed.

No splices shall be made in the reinforcement except where shown on the Drawings or agreed by the Employer's Representative. Splice lengths shall be as shown on the Drawings.

Reinforcement shall not be welded except where required by the Contract or agreed by the Employer's Representative.

If welding is employed, the procedures shall be as set out in BS 2640 for gas welding or BS 5135 for metal arc welding.

Full strength butt welds shall only be used for steel complying with BS 4449, and if used on high yield deformed bars complying with BS 4449 the permissible stresses in the vicinity of the weld shall be reduced to those applicable to plain bars complying with that specification.

Mechanical splices shall not be used unless the Employer's Representative agrees otherwise.

The Contractor shall ensure that reinforcement left exposed in the Permanent Works shall not suffer distortion, displacement or other damage.

When it is necessary to bend protruding mild steel reinforcement aside temporarily, the radius of the bend shall not be less than four times the bar diameter for plain bars or six times the bar diameter for high yield bars. Such bends shall be carefully straightened before concrete placing continues, without leaving residual kinks or damaging the concrete round them.

Bars complying with BS 4461 or other high tensile bars shall not be bent after placing in the Works.

Before concrete is placed in any section of the Permanent Works which includes reinforcement, the reinforcement shall be completely clean and free from all contamination including concrete which may have been deposited on it from previous operations.

6.0 FORMWORK FOR CONCRETE

6.1 Definitions

Formwork means the surface against which concrete is placed to form a face, together with all the immediate supports to retain it in position while concrete is placed.

Falsework means the structural elements supporting both the formwork and the concrete until the concrete becomes self supporting.

A formed face is one which has been cast against formwork.

An exposed face is one which will remain visible when construction has been completed.

6.2 Construction of Formwork and Falsework

Before construction begins, the Contractor shall submit to the Engineer drawings showing details of the proposed formwork and falsework.

Formwork and falsework shall be so constructed that they will support the loads imposed on them by the fresh concrete together with additional stresses imposed by vibrating equipment and by construction traffic, so that after the concrete has hardened the formed faces shall be in the positions shown on the Drawings within the tolerances set out in Clause 5.6.

Ground supports shall be properly founded on footings designed to prevent settlement.

Joints in formwork for exposed faces shall, unless otherwise specified, be evenly spaced and horizontal or vertical and shall be continuous or form a regular pattern.

All joints in formwork including formwork for construction joints shall be tight against the escape of cement and fines. Where reinforcement projects through formwork, the form shall fit closely round the bars.

Formwork shall be so designed that it may be easily removed from the work without damage to the faces of the concrete. It shall also incorporate provisions for making minor adjustments in position, if required, to ensure the correct location of concrete faces. Due allowance shall be made in the position of all formwork for movement and settlement under the weight of fresh concrete.

Where overhangs in formwork occur, means shall be provided to permit the escape of air and to ensure that the space is filled completely with fully compacted concrete.

Formwork shall be provided for concrete surfaces at slopes of 30° to the horizontal or steeper. Surfaces at slopes less than 20° may be formed by screeding. Surfaces at slopes between 20° and 30° shall generally be formed unless the Contractor can demonstrate to the satisfaction of the Engineer that such slopes can be screeded with the use of special screed boards to hold the concrete in place during vibration.

Horizontal or inclined formwork to the upper surface of concrete shall be adequately secured against uplift due to the pressure of fresh concrete. Formwork to voids within the body of the concrete shall also be tied down or otherwise secured against floating.

The external angles on concrete surfaces shall be formed with 25 mm chamfers unless otherwise instructed by the Engineer.

Supports for formwork may be bolted to previously placed concrete provided the type of bolt used is acceptable to the Engineer. If metal ties through the concrete are used in conjunction with bolts, the metal left in shall not be closer than 50 mm to the face of the concrete.

Formwork shall not be re-used after it has suffered damage which is sufficient to impair the finished surfaces of the concrete.

Where circumstances prevent easy access within the form for cleaning and inspection, temporary openings for this purpose shall be provided through the formwork.

Shear keys shall be provided in all construction joints of the size and shape indicated on the Drawings.

6.3 Preparation of Formwork

Before any reinforcement is placed into position within formwork, the latter shall be thoroughly cleaned and then dressed with a release agent. The agent shall be either a suitable oil incorporating a wetting agent, an emulsion of water suspended in oil or a low viscosity oil containing chemical agents. The Contractor shall not use an emulsion of oil suspended in water nor any release agent which causes staining or discolouration of the concrete, air holes on the concrete surface, or retards the set of the concrete.

In order to avoid colour differences on adjacent concrete surfaces, only one type of release agent shall be used in any one section of the Works.

In cases where it is necessary to fix reinforcement before placing formwork, all surface preparation of formwork shall be carried out before it is placed into position. The Contractor shall not allow reinforcement or prestressing tendons to be contaminated with formwork release agent.

Before placing concrete all dirt, construction debris and other foreign matter shall be removed completely from within the placing area. Before concrete placing commences, all wedges and other adjusting devices shall be secured against movement during concrete placing and the Contractor shall maintain a watch on the formwork during placing to ensure that no movement occurs.

6.4 Removal of Formwork

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand safely any stresses to which it may thereby be subjected.

The minimum periods which shall elapse between completion of placing concrete and removal of forms are given in Table 5.1 and apply to ambient temperatures higher than 10°C. At lower temperatures or if cements other than ordinary Portland are involved, the Engineer may instruct longer periods.

Alternatively, formwork may be removed when the concrete has attained the strength set out in Table 5.1, provided that the attained strength is determined by making test cubes and curing them under the same conditions as the concrete to which they refer.

Compliance with these requirements shall not relieve the Contractor of his obligation to delay removal of formwork until the removal can be completed without damage to the concrete.

TABLE 6.1 Minimum Periods for Formwork Removal

Position of Formwork	Minimum Period for Temps. over 10°C	Strength to be Attained
Vertical or near vertical faces of mass concrete	24 hours	0.2 C
Vertical or near vertical faces of reinforced walls, beams and columns	48 hours	0.3 C
Underside of arches beams and slabs (formwork only)	4 days	0.5 C
Supports to underside of arches, beams and slabs	14 days	C

NOTE: C is the nominal strength for the class of concrete used.

If the Contractor wishes to strip formwork from the underside of arches beams and slabs before the expiry of the period for supports set out above, it shall be designed so that it can be removed without disturbing the supports. The Contractor shall not remove supports temporarily for the purpose of stripping formwork and subsequently replace them.

As soon as the formwork has been removed, bolt holes in concrete faces other than construction joints which are not required for subsequent operations shall be completely filled with mortar sufficiently dry to prevent any slumping at the face. The mortar shall be mixed in the same proportions as the fine aggregate and cement in the surrounding concrete and with the same materials and shall be finished flush with the face of the concrete.

6.5 Surface Finishes

6.5.1 Classes of Finish

The surface finish to be achieved on formed concrete surfaces shall be as Class F1 or F2 finish as appropriate, unless otherwise shown on the Drawings.

Class F1 Finish

This finish is for surfaces against which backfill or further concrete will be placed. Formwork may be sawn boards, sheet metal or any other suitable material which will prevent the loss of fine material from the concrete being placed.

Class F2 Finish

This finish is for surfaces which are permanently exposed to view but where the highest standard of finish is not required. Forms to provide a Class F2 finish shall be faced with wrought thickened tongued and grooved boards with square edges arranged in a uniform pattern and close jointed or with suitable sheet material. The thickness of boards or sheets shall be such that there shall be no visible deflection under the pressure exerted by the concrete placed against them. Joints between boards or panels shall be horizontal and vertical unless otherwise directed. This finish shall be such as to require no general filling of surface pitting, but fins, surface discolouration and other minor defects shall be remedied by methods agreed by the Engineer.

Class F3 Finish

This finish is for surfaces which will be in contact with water flowing at high velocity, and for surfaces prominently exposed to view where good appearance is of special importance. To achieve this finish, which shall be free of board marks, the formwork shall be faced with plywood complying with BS 1088 or equivalent material in large sheets. The sheets shall be arranged in an approved uniform pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features or changes in direction of the surface. All joints between panels shall be vertical and horizontal unless otherwise directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets. Unfaced wrought boarding or standard steel panels will not be permitted for Class F3 finish. The Contractor shall ensure that the surface is protected from rust marks, spillages and stains of all kinds.

6.6 Tolerances

All parts of formed concrete surfaces shall be in the positions shown on the Drawings within the tolerances set out in Table 5.2.

In cases where the Drawings call for tolerances other than those given in Table 5.2 the Drawings shall rule.

Where precast units have been set to a specified tolerance, further adjustments shall be made as necessary to produce a satisfactory straight or curved line. When the Engineer has approved the alignment, the Contractor shall fix the units so that there is no possibility of further movement.

TABLE 6.2 Tolerances

Class of Finish	Tolerances in mm (See Note 1)		
	A	B	C
F1	10	10	+25 to -10

F2	5	10	+ or -15
F3	2	5	+ or -10

Note 1: The tolerances A, B and C given in the table are defined as follows:

A is an abrupt irregularity in the surface due to misaligned formwork or defects in the face of the formwork.

B is a gradual deviation from a plane surface as indicated by a straightedge 3 m long. In the case of curved surfaces the straightedge shall be replaced by a correctly shaped template.

C is the amount by which the whole or part of a concrete face is displaced from the correct position shown on the Drawings.

6.7 Remedial Work to Defective Surfaces

If on stripping any formwork the concrete surface is found to be defective in any way, the Contractor shall make no attempt to remedy such defects prior to the Engineer's inspection and the receipt of any instructions which the Engineer may give.

Defective surfaces shall not be made good by plastering.

Areas of honeycombing which the Engineer agrees may be repaired shall be cut back to sound concrete or to 75 mm whichever is the greater distance. In the case of reinforced concrete the area shall be cut back to at least 25 mm clear distance behind the reinforcement or to 75 mm, whichever is the greater distance. The cavity shall have sides at right-angles to the face of the concrete. After cleaning out with water and compressed air, a thin layer of cement grout shall be brushed on to the concrete surfaces in the cavity and it shall then be filled immediately with concrete of the same class as the main body but with aggregate larger than 20 mm nominal size removed. A form shall be used against the cavity, provided with a lip to enable concrete to be placed. The form shall be filled to a point above the top edge of the cavity.

After seven days the lip of concrete shall be broken off and the surface ground smooth.

Surface irregularities which are outside the limits of tolerance set out in Clause 5.6 shall be ground down in the manner and to the extent instructed by the Engineer.

Defects other than those mentioned above shall be dealt with as instructed by the Engineer.

7.0 CONCRETE

7.1 Scope of Section

This section covers concrete and mortar required in the Permanent Works other than the special concrete and mortars specified in other sections of the Specification.

7.2 Definitions

Structural concrete is any class of concrete which is used in reinforced, prestressed or unreinforced concrete construction, which is subject to stress and which is required to comply with Clause 6.4.

Non-structural concrete is composed of materials complying with the Specification but for which no strength requirements are specified and which is used only for filling voids and similar purposes where it is not subjected to significant stress.

A formed surface is a face which has been cast against formwork. A free surface is a horizontal or nearly horizontal surface produced by screeding or trowelling to the level and finish required. A pour refers to the operation of placing concrete into any mould, bay or formwork, etc., and also to the volume which has to be filled. Pours in vertical succession are also referred to as lifts.

Water/cement ratio is the ratio by weight of the free water in the mix divided by the weight of cement in the mix. Free water is the water in the mix excluding water absorbed by the aggregate.

7.3 Materials for Concrete

7.3.1 General

The Contractor shall submit to the Engineer full details of all materials which he proposes to use for making concrete. No concrete shall be placed in the Permanent Works until the Engineer has approved the materials of which it is composed. Approved materials shall not thereafter be altered or replaced by other materials without the consent of the Engineer.

7.3.2 Cement

- (a) Cement shall comply with the appropriate Standards, which include the following:-
- | | |
|---------|-------------------------------------|
| BS 12 | Portland Cement. |
| BS 4027 | Sulphate resisting Portland Cement. |
| BS 5075 | Concrete Admixtures: |

- Part 1: Accelerating admixtures, retarding admixtures and water reducing admixtures.
- Part 2: Air entraining admixtures.
- Part 3: Super plasticising admixtures.

Cement shall be free flowing and free of lumps. It shall be supplied in the manufacturer's sealed unbroken bags or in bulk. Bagged cement shall be transported in vehicles provided with effective means of ensuring that it is protected from the weather. Bulk cement shall be transported in vehicles or in containers built and equipped for the purpose.

Cement in bags shall be stored in a suitable weatherproof structure of which the interior shall be dry and well ventilated at all times. The floor shall be raised above the surrounding ground level and shall be so constructed that no moisture rises through it.

Each delivery of cement in bags shall be stacked together in one place. The bags shall be closely stacked but shall not be stacked against an outside wall. If pallets are used, they shall be constructed so that bags are not damaged during handling and stacking. No stack of cement bags shall exceed 3 m in height. Different types of cement in bags shall be clearly distinguished by visible markings and shall be stored in separate stacks.

Cement from broken bags shall not be used in the Permanent Works. Cement in bags shall be used in the order in which it is delivered. Bulk cement shall be stored in weatherproof silos which shall bear a clear indication of the type of cement contained in them. Different types of cement shall not be mixed in the same silo.

The Contractor shall provide sufficient storage capacity on Site to ensure that his anticipated programme of work is not interrupted due to lack of cement having due regard to factors outside the Contractor's control such as transport, weather conditions, holidays and breakdowns.

Cement that has become hardened or lumpy or fails to comply with the Specification in any way shall be removed from the Site. All cement used in the Permanent Works shall be tested by the manufacturer or the Contractor in a laboratory acceptable to the Engineer. The tests shall be in accordance with Test A1 in Appendix A, and the Contractor shall supply two copies of each test certificate to the Engineer.

Each set of tests carried out by the manufacturer or Contractor shall relate to not more than one day's output of each cement plant, and shall be made on samples taken from cement which is subsequently delivered to the Site. Alternatively, subject to the agreement of the Engineer, the frequency of testing shall be one set of tests for every 200 tonnes of cement delivered to Site from each cement plant.

Cement which is stored on Site for longer than one month shall be retested in a laboratory acceptable to the Engineer at the rate of one set of tests for every 200 tonnes, and at monthly intervals thereafter. Cement which does not comply with the Specification shall not be used in the Permanent Works.

The Contractor shall keep full records of all data relevant to the manufacture, delivery, testing and use of all cement used in the Permanent Works and shall provide the Engineer with two copies thereof.

7.3.3 Aggregates for Concrete

Aggregates for concrete shall conform to the requirements for fine and coarse aggregates in BS 882.

Fine and coarse aggregates shall separately conform to the requirements set out below:-

(a) General Requirements

Aggregate shall be clean, hard, durable and frost resistant and shall not contain iron pyrites, iron oxides (other than magnetite), mica, shale, coal or other laminar, soft or porous materials.

(b) Grading

Fine aggregate shall conform to BS 882 Table 5, Zones C or M. In order to achieve an acceptable grading it may be necessary to blend materials from more than one source. Coarse aggregates shall be supplied in the nominal sizes specified and shall be graded in accordance with BS 882 for single sized aggregates. A coarse aggregate shall be predominantly angular, rounded or irregular as defined in BS 812, part 1.

(c) Chlorides

The chloride content shall not exceed 0.03 per cent by weight expressed as chloride ion when tested in accordance with BS 812 subject to the further restriction on total chloride content hereunder.

(d) Sulphates

The sulphate content shall not exceed 0.4 per cent by weight expressed as SO_3 when tested.

(e) Total Chloride and Sulphate Content

The total chloride content arising from all ingredients in a mix including cement, water and admixtures shall not exceed the following limits, expressed as chloride ion and as a percentage of the weight of cement in the mix:-

For prestressed concrete, steam cured concrete or concrete containing sulphate resisting or supersulphated cement: 0.05 per cent.

For any other reinforced concrete 0.3 per cent in 95 per cent of all test results providing no result is more than 0.5 per cent.

The total sulphate content expressed as SO_3 of all the ingredients in a mix including cement, water and admixtures shall not exceed 4.0 per cent of the weight of cement in the mix.

(f) Soundness

As may be required, aggregates shall not show a weight loss of more than 18 per cent using magnesium sulphate.

(g) Alkali Reactive Minerals

No part of the aggregates shall contain any mineral known to have a potential to cause alkali silica, alkali silicate, alkali carbonate or any other damaging chemical reaction between alkalis and aggregates.

The minerals present should be determined, as required, on a range of samples selected to include every mineral type present in the aggregate as a whole irrespective of the proportion of the mineral.

If during the course of the test it is concluded that an unequivocal identification of a potentially reactive mineral is not possible, alternative tests shall be carried out such as to provide the required identification.

(h) Flakiness

Flakiness Index of coarse aggregates when tested in accordance with BS 812 shall be as set out hereunder and not as given in BS 882 Table 1.
For nominal 40 mm aggregate and above, not more than 40.
For nominal 20 mm aggregate and below, not more than 35.

Shell Content

In addition to the requirements of BS 882, the content of hollow and flat shells shall not be such as will reduce the 28 day strength below the minimum average strength required or reduce the average 28 day strength by more than 5 percent when tested in accordance with BS 1881 when 10 cubes made of concrete with shells are compared with 10 cubes made of concrete with shells removed.

(j) Water Absorption

The coarse aggregate shall not have a water absorption of more than 2.5 per cent when tested as set out in BS 812.

(k) Organic Impurities

Fine aggregate shall be tested as set out in BS 1377 Test 8 and rejected if the percentage of organic matter exceeds 1 percent.

7.3.4 Aggregates for Mortar

Aggregates for mortar shall conform to BS 1200.

7.3.5 Testing Aggregates

(a) Acceptance testing

The Contractor shall deliver to the Engineer samples containing not less than 50 kg of any aggregate which he proposes to use in the Permanent Works and shall supply such further samples as the Engineer may require. Each sample shall be clearly labelled to show its origin and shall be accompanied by all the information called for in BS 882.

Tests to determine compliance of the aggregates with all the requirements of Clauses 7.3.3 or 7.3.4 shall be carried out by the Contractor in a laboratory acceptable to the Engineer. If the tested materials fail to comply with the Specification, further tests shall be made in the presence of the Contractor and the Engineer and acceptance of the material shall be based on such tests.

The acceptance tests carried out by the Contractor shall generally be on three representative samples of fine and coarse aggregates taken in the presence of the Engineer.

Total numbers of tests required for acceptance are as follows:-

Test	Fine Aggregates	Coarse Aggregates
Water absorption	-	3*
Flakiness index	-	3*
Shell content determination	-	3*
Test for shell content (where required)	-	1
10% Fines test or aggregate impact value	-	3*
Grading	3*	3 on each nominal size
Chloride content	3*	3*
Sulphate content	3*	3*
Soundness	-	3*
Petrographic examination	As required, minimum 3	As required, minimum 3
Clay, silt and dust determination	3	3
Organic impurities	3	3

* One test on each sample

If at any time a significant physical or chemical change in the nature of the coarse or fine aggregate occurs, or a new source of aggregate is used, the Engineer may direct that some or all of the acceptance testing is repeated.

(b) Routine Testing

The Contractor shall carry out routine testing of aggregates for compliance with the Specification during the period in which concrete is being produced for the Permanent Works.

The tests set out below shall be performed on aggregates from each separate source on the basis of one set of tests for each day on which aggregates are delivered to Site provided that no set of tests shall represent more than 250 tonnes of fine aggregate nor more than 500 tonnes of coarse aggregate, and provided also that the aggregates are of uniform quality.

If the aggregate from any source is variable, the frequency of testing shall be as instructed by the Engineer.

Grading

	BS 812
Silt and clay content	BS 812
Moisture content	BS 812

In addition to the above routine tests, the Contractor shall carry out the following tests at the frequencies stated:

Moisture content: As frequently as may be required in order to control the water content of the concrete as required by the Specification.

Chloride content: As frequently as may be required to ensure that the proportion of chlorides in the aggregates does not exceed the limit stated in the Specification.

The Contractor shall take account of the fact that when the chloride content is variable it may be necessary to test every load in order to prevent excessive amounts of chloride contaminating the concrete. For this purpose the Contractor shall use the rapid field test (the Quantab test). In the event of disagreement regarding the results of the field test, the chloride content of the aggregate shall be determined in the laboratory as described in BS 812 (the Volhard test).

7.3.6 Delivery and Storage of Aggregates

Aggregates shall be delivered to Site in clean and suitable vehicles. Different types or sizes of aggregate shall not be delivered in one vehicle.

Each type or size of aggregate shall be stored in a separate bin or compartment having a base such that contamination of the aggregate is prevented. Dividing walls between bins shall be substantial and continuous so that no mixing of types or sizes occurs.

The storage of aggregates shall be arranged so that as far as possible rapid drying out in hot weather is prevented in order to avoid sudden fluctuations in water content. Storage of fine aggregates shall be arranged so that they can drain sufficiently before use in order to prevent fluctuations in water content of the concrete.

7.3.7 Water for Concrete and Mortar

Water for mixing or curing concrete or mortar shall not contain more than the following concentrations of impurities:-

	Max ppm
The sum of sulphates, alkali carbonates and bicarbonates	1000
Chlorides	500
Suspended solids	2000
Other dissolved solids	2000
Seawater or brackish water shall not be used	

At the commencement of the Works the Contractor shall send a sample of the water proposed for concrete and mortar to an accredited laboratory capable of carrying out the full analysis of potable water in accordance with either the "Analysis of Raw, Potable and Waste Waters" published by Her Majesty's Stationery Office (HMSO) or "The Standard Method of Examination of Water and Waste Waters" published by the American Water Works Association (AWWA).

The results of the analysis shall be submitted to the Engineer. The sample of water sent for analysis shall be taken in the presence of the Engineer. If the water selected comes from a reliable potable water source the Contractor shall obtain a copy of a recent analysis from the chemist of the Water Authority. If the Engineer considers this satisfactory the tests required above need not be carried out.

If the source of water is changed it shall be tested as above. If water contains 80 percent of the maximum concentration of impurities properties given above it shall be retested at two monthly intervals.

7.3.8 Admixtures

(a) General

The use of admixtures in concrete may be required under the Contract to promote special properties to the concrete or may be proposed by the Contractor to assist compliance with the Specification.

In all cases the Contractor shall submit to the Engineer full details of the admixture he proposes to use and the manner in which he proposes to add it to the mix. The information provided shall include:

- (i) The typical dosage and the detrimental effects of an excess or deficiency in the dosage.
- (ii) The chemical names of the main active ingredients in the admixture.
- (iii) Whether or not the admixture contains chlorides, and if so the chloride ion content expressed as a percentage by weight of admixture.
- (iv) Whether the admixture leads to the entrainment of air when used at the manufacturer's recommended dosage, and if so, the extent to which it does so.
- (v) Long and short term effects of the admixture on concrete including the effects on different types of cement and aggregates.
- (vi) Storage life.
- (vii) Safety precautions required in handling.
- (viii) Compatibility with other additives.
- (ix) Compliance with Standards.

The chloride ion content of any admixture shall not exceed 2 per cent by weight of the admixture nor 0.03 per cent by weight of the cement in the mix.

Admixtures shall not be mixed together without the consent of the Engineer.

(b) Super Plasticizing Admixtures

Super plasticizing admixtures shall comply with BS 5075 Part 3.

If the Drawings specify or the use of super plasticizing admixtures is subsequently authorised by the Engineer, the Flow Table test carried out in accordance with BS 1881 Part 105 shall be used to control and record workability.

Test cubes shall be made in accordance with BS 1881 except that the concrete shall be placed in the cubes and compacted to the same degree as the concrete placed in the works.

In addition to the normal trial mix cubes required an additional set of cubes shall be made with 1.5 times the intended super plasticizing admixture addition to assess the effect of overdosage on the concrete.

If the super plasticizing additive is not specified but the Contractor requests permission to use it the Engineer shall not approve its use unless full particulars including chemical constituents of the admixture are submitted and the additional trial mixes mentioned above have been carried out and all are considered satisfactory.

The Engineer reserves the right to refuse the use of super plasticizing admixture for concrete required for particular structures.

(c) Air Entraining Agents

In addition to the general requirements, air entraining agents shall be capable of producing an air content in concrete mixes within the limits stated on the Drawings without any tendency to produce excessive air content in the event of prolonged mixing times.

The effect of a proposed air entraining agent shall be tested by the Contractor in trial mixes produced in the plant which he proposes to use for the Permanent Works. Air entraining agents shall comply with BS 5075.

(d) Workability Agents

Subject to the agreement of the Engineer, admixtures may be used by the Contractor to assist in meeting the requirements of the Specification or to aid the placing of concrete.

Workability agents shall comply with BS 5075 and shall not have any adverse effect on the properties of the concrete. If a reduction in strength of the concrete is caused, the Contractor shall counteract this by a reduction in water cement ratio or by an increase in cement content.

7.3.9 Other Cementitious Components

(a) Pulverised Fuel Ash

Pulverised fuel ash shall comply with the requirements of BS 3892 and shall have a carbon content not exceeding seven per cent by weight.

The maximum sulphate content of PFA expressed as SO_3 shall be 2.5 per cent by weight of PFA but if the weight of PFA in the mix exceeds the weight of cement in the mix, the maximum content of SO_3 shall be 1.5 per cent.

The maximum SO_3 content of the mix shall not exceed the limit given in Clause 6.3.3

The fineness as expressed by the specific surface shall be within the range of Zones B or C in BS 3892, and not more than one test in ten shall show a result falling outside this range.

Pulverised fuel ash shall only be used in conjunction with cement complying with BS 12 and the total sulphate content of the mix from all sources, expressed as SO_3 shall not exceed that stated in Clause 6.3.3 (e).

7.4 Design of Concrete Mixes for Structural Concrete

7.4.1 Classes of Concrete

The classes of structural concrete to be used in the Permanent Works shall be those shown on the Drawings. The classes are designated on Table 6.1.

Table 7.1
CONCRETE CLASSES

Class of Concrete	Minimum Cement Content Kg/m ³	Maximum Water/Cement Ratios		150mm cubes Required Minimum Average 28 day strength (M.A.S) N/mm ²
		A	B	
C20	180	0.61	-	20
C25	200	0.59	-	25
C30	230	0.57	-	30
C35A	325	0.53	0.50	35
C40	350	0.49	0.46	40

M.A.S = Required Minimum Average 28 day Strength

Concrete for water retaining shall have a maximum cement content of 400 kg/m³ and maximum water/cement ratios as column B above or as shown on the Drawings. Concrete for other structures shall have maximum water/cement ratios as column A above or as shown on the Drawings.

The coarse aggregate maximum size shall be 20 mm unless 10 mm or 40 mm are shown on the Drawings.

7.4.2 Design of Proposed Mixes

The Contractor shall design the mixes which he proposes to use in the Permanent Works to achieve acceptable workability and resistance to segregation during handling and placing. Mixes shall be designed in accordance with the requirements of BS 5328 and shall also comply with the following requirements:

- (a) The aggregate portion shall be well graded from the nominal maximum size of stone down to the 150 micron size.
- (b) The cement contents shall be as designated in Table 6.1 unless a higher cement content is required to meet the strength requirement.
- (c) The water/cement ratio shall be the minimum consistent with adequate workability but in any case not greater than that shown in Table 6.1 taking due account of any water contained in the aggregates. The Contractor shall take into

account that this requirement may need the inclusion of a workability agent in the mix.

- (d) The workability shall be consistent with ease of placing and proper compaction having regard to the presence of reinforcement and embedded items.
- (e) The crushing strength at 28 days as determined in accordance with Sub-Clause 6.4.3 shall not be less than the minimum average strength given in Table 6.1 plus 2 N/mm².
- (f) The drying shrinkage determined in accordance with BS 1881 shall not be greater than 0.05 per cent.
- (g) Blinding concrete shall be Class C15 unless otherwise indicated on the drawings.

The Contractor shall submit full details of all the mixes he proposes to use to the Engineer.

7.4.3 Trial Mixes with 150 mm test cubes

For each mix of concrete the Contractor shall in the presence of a representative of the Engineer prepare three separate batches of concrete using the materials which have been approved for use in the Permanent Works and the mixing plant which he proposes to use for the Permanent Works.

Six test cubes shall be cast from each batch. The making, curing and testing of all test cubes shall comply with the requirements of BS 1881. The slump of the concrete carried out in accordance with BS 1881 shall be recorded.

Three cubes from each batch shall be tested for compressive strength at seven days and the remaining three at 28 days. The density of all the cubes shall be determined before the cubes are crushed.

The average value of the crushing strength of the nine cubes tested at 28 days less 2 N/mm² shall be greater than the Minimum Average Strength given in Table 6.1 for the class of concrete tested.

If the 28 day strength determined as above is less than the minimum average strength shown in Table 6.1 plus 2 N/mm² the mix shall be adjusted in order to comply. If adjustment of aggregate proportions does not increase the strength the water cement ratio shall be reduced.

If it is then necessary to increase the workability the use of a plasticity additive will be accepted. An increase in cement content will not normally be acceptable.

The average strength of the final nine trial mix 28 day cubes accepted by the Engineer shall be referred to thereafter as the "final trial mix strength". The Contractor shall carry out tests to determine the drying shrinkage of the concrete.

If the Engineer does not agree to a proposed concrete mix for any reason, the Contractor shall amend his proposals and carry out further trial mixes. No mix shall be used in the Permanent Works without the written consent of the Engineer.

Based on the results of the tests on the trial mixes, the Contractor shall submit full details of his proposals for mix design to the Engineer, including the type and source of each ingredient, the proposed proportions of each mix and the results of the tests on the trial mixes.

7.4.4 Quality Control of Concrete Production (150 mm cubes)

For each class of concrete in production at each plant for use in the Permanent Works, samples of concrete shall be taken at the point of mixing or of deposition as instructed by the Engineer and in the presence of a representative of the Engineer, all in accordance with the sampling procedures described in BS 1881.

The slump of each sample carried out in accordance with BS 1881 shall be determined at the time of sampling. Samples shall be taken on the basis of one for each 20 m³ of concrete placed but in any case not less than one sample per day or one sample for each pour of concrete placed, whichever is the more frequent.

Three 150 mm test cubes shall be cast from each sample, cured and tested as set out in BS 1881. One cube shall be tested at seven days and two at 28 days. The average strength of the two cubes crushed at 28 days shall be referred to as one test result.

Concrete shall be deemed to comply with the strength specified if the average strength of any four consecutive test results (8 cubes) exceeds the final average trial mix strength minus 2 N/mm² for the Class of concrete with no single test result (2 cubes) being less than the final average trial mix strength minus 6 N/mm².

7.4.5 Failure to Comply with Requirements

The Contractor shall take any action instructed by the Engineer to remedy concrete that fails to comply with the Specification. Such action may include but is not necessarily confined to the following:

- (a) Adjusting the mix proportions until the concrete again complies with the Specification.
- (b) Cutting test cores from the failed concrete and testing in accordance with BS 1881.
- (c) Carrying out additional works to overcome the effect of the failed concrete.
- (d) Removing the failed concrete.
- (e) Increasing the frequency of sampling until control is again established.

7.5 Mixing Concrete

Before any plant for batching, mixing, transporting, placing, compacting and finishing concrete is ordered or delivered to Site, the Contractor shall submit to the Engineer full details including drawings of all the plant which he proposes to use and the arrangements he proposes to make.

Concrete for the Permanent Works shall be batched and mixed in one or more central plants unless the Engineer agrees to some other arrangement.

Batching and mixing plants shall be modern efficient equipment complying with the requirements of BS 1305 and capable of producing a uniform distribution of the ingredients throughout the mass. Truck mixers shall not be used unless the Engineer agrees otherwise, in which case they shall comply with the requirements of BS 4251.

If the plant proposed by the Contractor does not fall within the scope of BS 1305, it shall have been tested in accordance with BS 3963 and shall have a mixing performance within the limits of Table 6 of BS 1305. All mixing operations shall be under the control of an experienced supervisor.

The aggregate storage bins shall be provided with drainage facilities arranged so that drainage water is not discharged to the weigh hoppers. Each bin shall be drawn down at least once per week and any accumulations of mud or silt removed.

Cement and aggregates shall be batched by weight. Water may be measured by weight or volume. The weighing and water dispensing mechanisms shall be maintained in good order. Their accuracy shall be maintained within the tolerances described in BS 1305 and checked against accurate weights and volumes when required by the Engineer.

The weights of cement and of each size of aggregate indicated by the mechanisms employed shall be within a tolerance of plus or minus two per cent of the respective weights per batch agreed by the Engineer.

The Contractor shall provide standard test weights at least equivalent to the maximum working load used on the most heavily loaded scale and other auxiliary equipment required for checking the satisfactory operation of each scale or other measuring device. Tests shall be made by the Contractor at intervals to be determined by the Engineer and shall be carried out in his presence.

For the purpose of carrying out these tests, there shall be easy access for personnel to the weigh hoppers. The Contractor shall furnish the Engineer with copies of the complete results of all check tests and shall make any adjustments, repairs or replacements necessary to ensure satisfactory performance.

The nominal drum or pan capacity of the mixer shall not be exceeded. The turning speed and the mixing time shall be as recommended by the manufacturer, but in addition, when water is the last ingredient to be added, mixing shall continue for at least one minute after all the water has been added to the drum or pan.

If the Engineer has reason to doubt the adequacy of the mixing, he may order a variability test as set out in Test A8 in Appendix A and the Contractor shall forthwith carry out such tests, the results of which shall comply with the requirements shown in Appendix A.

The blades of pan mixers shall be maintained within the tolerances specified by the manufacturer of the mixer and the blades shall be replaced when it is no longer possible to maintain the tolerances by adjustment.

Mixers shall be fitted with an automatic recorder registering the number of batches discharged. The water to be added to the mix shall be reduced by the amount of free water contained in the coarse and fine aggregates. This amount shall be determined by the Contractor by a method agreed by the Engineer immediately before mixing begins each day and thereafter as the Engineer directs.

When the correct quantity of water, determined as set out in the Specification, has been added to the mix, no further water shall be added, either during mixing or subsequently. After mixing for the required time, each batch shall be discharged completely from the mixer before any materials for the succeeding batch are introduced.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before any fresh concrete is mixed and thereafter the first batch of concrete through the mixer shall contain only half the normal quantity of coarse aggregate. This batch shall be mixed for one minute longer than the time applicable to a normal batch. Mixers shall be cleaned out before changing to another type of cement.

7.6 Transport of Concrete

7.6.1 Site Batched Concrete

The concrete shall be discharged from the mixer and transported to the Works by means which shall prevent adulteration, segregation or loss of ingredients, and which shall ensure that the concrete is of the required workability at the point and time of placing. The loss of slump between discharge from the mixer and placing shall not exceed 25 mm.

The time elapsing between mixing and placing a batch of concrete shall be as short as practicable and in any case no longer than will permit completion of placing and compaction before the onset of initial set. If the placing of any batch of concrete is delayed beyond this period, the concrete shall not be placed in the Permanent Works.

7.6.2 Transport and Delivery of Ready Mixed Concrete

(a) Quantity of Concrete

The basis of supply shall be by the cubic metre of fresh, fully compacted concrete. The volume of a given batch of concrete shall be calculated from the total mass of the batch divided by the mass per cubic metre of fresh, fully compacted concrete determined in accordance with BS 1881. The total mass of the batch shall either be calculated as the sum of the masses of all materials used including water, or determined from the gross and tare weights of the vehicle on a weighbridge.

(b) Transport of Concrete

Concrete shall be transported in a truck mixer complying with the requirements of BS 4251 unless the Engineer agrees to the use of non-agitating vehicles. When non-agitating vehicles are used, the mixed concrete shall be protected from the gain or loss of water.

(c) Delivery Time

Concrete shall be discharged from the delivery vehicle within 2 hours after the time of loading, when concrete is transported in truck mixers or agitators, or within 1 hour after the time of loading when non-agitating equipment is used.

The time of loading, defined as the time of contact between cement and aggregates or, when these are surface dry, between cement and added water, shall be recorded on the delivery ticket.

NOTE: The delivery times indicated are arbitrary; the requirement is that concrete has the required workability at the time of discharge. A longer time may be appropriate in cool, humid weather or when retarding admixtures have been used, but a shorter time may be essential in hot weather with rich mixes, or where accelerating admixtures have been used.

(d) Additional Water

No additional water, other than any amount required to produce the specified workability, shall be added to the truck mixer drum before discharge unless specifically required and signed for by the Contractor and as agreed by the Engineer.

(e) Delivery Ticket

Before discharging the concrete at the point of delivery, the supplier shall provide the Contractor with a delivery ticket for each batch of concrete on which is printed, stamped or written the following minimum information:

- name and location of ready-mixed concrete depot;
- serial number of ticket;
- date;
- truck number;
- name of purchaser;
- name and location of site;
- grade or mix description of concrete, including minimum cement content if specified;
- specified workability;
- type of cement;
- nominal maximum size of aggregate;
- type of name of admixture, if included;
- quantity of concrete in cubic metres;
- time of loading.

Space shall be provided for any additional items that have been specified and for the following to be completed on site:

- arrival and departure times of the truck;
- time of completion of discharge;
- extra water added under supervision at the request of the Contractor, or his representative, and his signature, and as agreed by the Engineer.

A copy of each delivery ticket shall be given to the Engineer.

7.7 Placing of Concrete

7.7.1 Consent for Placing

Concrete shall not be placed in any part of the Permanent Works until the Engineer's consent has been given in writing, and the Contractor shall give the Engineer at least 18 hours notice of his intention to place concrete.

If concrete placing is not commenced within 24 hours of the Engineer's consent, the Contractor shall again request written consent as specified above.

7.7.2 Preparation of Surfaces to Receive Concrete

Excavated surfaces on which concrete is to be deposited shall be prepared as set out in Section 3 of the Specification.

Existing concrete surfaces shall be prepared as set out in Clause 7.13. Before deposition of further concrete they shall be clean, hard and sound and if required by the Engineer shall be wet but without any freestanding water.

Any flow of water into an excavation shall be diverted through proper side drains to a sump, or be removed by other suitable methods which will avoid washing away the freshly deposited concrete or any of its constituents. Any underdrains constructed for this purpose shall be completely grouted up when they are no longer required by a method agreed by the Engineer.

If so instructed by the Engineer rock surfaces against which concrete is to be placed shall receive a prior coating of mortar mixed in the proportions similar to those of the fines portion in the concrete to be placed. The mortar shall be kept ahead of the concrete. The mortar shall be well worked into all parts of the excavated surfaces and shall be not less than 5 mm thick.

If any fissures have been cleaned out as described in Section 3, they shall be filled with mortar or with concrete as instructed by the Engineer.

The amount of mortar placed at any one time shall be limited so that it does not dry out or set before being covered with concrete.

7.7.3 Placing procedures

The concrete shall be deposited as nearly as possible in its final position. It shall be placed so as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in layers approximately parallel to the construction joint planes and not exceeding 500 mm in compacted thickness unless otherwise permitted or directed by the Engineer, but the layers shall not be less than four times the maximum nominal size of aggregate in thickness.

Layers shall not be placed so that they form feather edges nor shall they be placed on a previous layer which has taken its initial set. In order to comply with this requirement, a layer may be started before completion of the preceding layer.

All the concrete in a single bay or pour shall be placed as a continuous operation. It shall be carefully worked round all obstructions, irregularities in the foundations and the like so that all parts are completely full of compacted concrete with no segregation or honeycombing. It shall also be carefully worked round and between waterstops, reinforcement, embedded steelwork and similar items which protrude above the surface of the completed pour.

All work shall be completed on each batch of concrete before its initial set commences and thereafter the concrete shall not be disturbed before it has set hard. No concrete that has partially hardened during transit shall be used in the Permanent Works and the transport of concrete from the mixer to the point of placing shall be such that this requirement can be complied with.

Concrete shall not be placed during rain which is sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed faces of fresh concrete. Means shall be provided to remove any water accumulating on the surface of the placed concrete. Concrete shall not be deposited into such accumulations of water.

In drying weather, covers shall be provided for all fresh concrete surfaces which are not being worked on. Water shall not be added to concrete for any reason.

When concrete is discharged above its place of final deposition, segregation shall be prevented by the use of chutes, downpipes, trunking, baffles or other appropriate devices.

Forms for walls, columns and other thin sections of significant height shall be provided with openings or other devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulations of hardened concrete on the formwork or reinforcement above the level of the placed concrete.

When it is necessary to place concrete under water the Contractor shall submit to the Engineer his proposals for the method and equipment to be employed. The concrete shall be deposited either by bottom-discharging watertight containers or through funnel-shaped tremies which are kept continuously full with concrete up to a level above the water and which shall have the discharging bottom fitted with a trapdoor and immersed in the concrete in order to reduce to a minimum the contact of the concrete with the water. Special care shall be taken to avoid segregation.

If the concrete in a tremie pipe is allowed to fall to such an extent that water enters the pipe, the latter shall be removed from the pour and filled with concrete before being again lowered into the placing position. During and after concreting under water, pumping or de-watering in the immediate vicinity shall be suspended if there is any danger that such work will disturb the freshly placed concrete.

7.7.4 Interruptions to Placing

If concrete placing is interrupted for any reason and the duration of the interruption cannot be forecast or is likely to be prolonged, the Contractor shall immediately take the necessary action to form a construction joint so as to eliminate as far as possible feather edges and sloping top surfaces and shall thoroughly compact the concrete already placed in accordance with Clause 7.8.

All work on the concrete shall be completed while it is still plastic and it shall not thereafter be disturbed until it is hard enough to resist damage. Plant and materials to comply with this requirement shall be readily available at all times during concrete placing.

Before concreting is resumed after such an interruption the Contractor shall cut out and remove all damaged or uncompacted concrete, feather edges or any other undesirable features and shall leave a clean sound surface against which the fresh concrete may be placed.

If it becomes possible to resume concrete placing without contravening the Specification and the Engineer consents to a resumption, the new concrete shall be thoroughly worked in and compacted against the existing concrete so as to eliminate any cold joints.

7.7.5 Dimensions of Pours

Unless otherwise agreed by the Engineer, pours shall not be more than two metres high and shall as far as possible have a uniform thickness over the plan area of the pour.

Concrete shall be placed to the full planned height of all pours except in the circumstances described in Sub-Clause 7.7.4. The Contractor shall plan the dimensions of pours in such a way that thermal or shrinkage stresses are minimised.

7.7.6 Placing Sequence

The Contractor shall arrange that as far as possible the intervals between placing successive lifts of concrete in one section of the Permanent Works are of equal duration.

This duration shall normally be not less than three nor more than seven days under temperate weather conditions unless otherwise agreed or instructed by the Engineer.

Where required by the Engineer to limit the opening of construction joints due to shrinkage, concrete shall not be placed against adjacent concrete which is less than 21 days old.

If concrete has to be placed against recently cast concrete within a period of less than 21 days, the pour shall be carried out as early as possible after the adjacent pour but precautions shall be taken to minimise shrinkage.

The methods described in Clause 7.9.3 can be used to that effect. However the contractor shall submit for approval his proposed method and programme for placing of concrete.

When the Drawings call for contraction gaps in concrete, these shall be of the widths and in the locations shown on the Drawings and they shall not be filled until the full time interval shown on the Drawings has elapsed.

7.8 Compaction of Concrete

The concrete shall be fully compacted throughout the full extent of the placed layer. It shall be thoroughly worked against the formwork and around any reinforcement and other embedded items, without displacing them. Particular care shall be taken at arrises and other confined spaces. Successive layers of the same pour shall be thoroughly worked together.

Concrete shall be compacted with the assistance of mechanical immersion vibrators, unless the Engineer agrees another method.

Immersion vibrators shall operate at a frequency of between 7000 and 10 000 cycles per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order that the compactive effort is not reduced.

A sufficient number of vibrators shall be operated to enable the entire quantity of concrete being placed to be vibrated for the necessary period and, in addition, stand-by vibrators shall be available for instant use at each place where concrete is being placed.

Where the concrete contains aggregate with a nominal size of 75 mm or more, vibrators with a diameter of 100 mm or more shall be used.

Vibration shall be continued at each point until the concrete ceases to contract, a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids.

Vibration shall not be applied by way of reinforcement nor shall vibrators be allowed to touch reinforcement or other embedded items. The vibrators shall be inserted vertically into the concrete to penetrate the layer underneath at regular spacing which shall not exceed the distance from the vibrator over which vibration is visibly effective.

7.9 Curing of Concrete

7.9.1 General

Concrete shall be protected during the first stage of hardening from loss of moisture and from the development of temperature differentials within the concrete sufficient to cause cracking. The methods used for curing shall not cause damage of any kind to the concrete.

Curing shall be continued for as long as may be necessary to achieve the above objectives but in any case for at least ten days or until the concrete is covered by later construction whichever is the shorter period.

The above objectives are dealt with in sub-clauses 7.9.2 and 7.9.3, but nothing shall prevent both objectives being achieved by a single method where circumstances permit.

The curing process shall commence as soon as the concrete is hard enough to resist damage from the process, and in the case of large areas or continuous pours shall commence on the completed section of the pour before the rest of the pour is finished.

Details of the Contractor's proposals for curing concrete shall be submitted to the Engineer before the placing of concrete commences in the Permanent Works.

7.9.2 Loss of Moisture

Exposed concrete surfaces shall be closely covered with impermeable sheeting, properly secured to prevent its removal by wind and the development of air spaces beneath it. Joints in the sheeting shall be lapped by at least 300 mm.

If for some reason it is not possible to use impermeable sheeting, the Contractor shall keep the exposed surfaces continuously wet by means of a water spray or by covering with a water absorbent material which is kept wet, unless this method conflicts with Clause 7.9.3.

Water used for curing shall be of the same quality as that used for mixing as stated in Clause 7.3.7. Formed surfaces may be cured by retaining the formwork in place for the required curing period.

If the use of the foregoing methods is inappropriate, surfaces which will not have further concrete bonded to them and which are not to receive an application of a finish may be cured by the application of a curing compound having an efficiency index of at least 90 per cent when tested in accordance with Test A9 in Appendix A.

Curing compounds shall contain a fugitive dye to enable the extent of the spread to be seen easily. Curing compound used on surfaces exposed to the sky shall if instructed by the Engineer, contain sufficient finely divided flake aluminium in suspension to produce a complete coverage of the surface with a metallic finish when applied at the rate recommended by the manufacturer.

Curing compounds shall become stable and impervious to the evaporation of water from the concrete surface within 60 minutes of application. The material shall not react chemically with the concrete and shall not crack, peel or disintegrate within three weeks after application.

If instructed by the Engineer, the Contractor shall, in addition to the curing provisions set out above provide a suitable form of shading to prevent the direct rays of the sun reaching the concrete surfaces for at least the first four days of the curing period.

7.9.3 Limitation of Temperature Differentials

The Contractor shall limit the development of temperature differentials in concrete after placing by any means appropriate to the circumstances as accepted by the Engineer which shall include the following:-

- (a) limiting concrete temperatures at placing as set out in Clause 7.11.2;
- (b) use of low heat cement, subject to the agreement of the Engineer;
- (c) insulation of exposed concrete surfaces by insulating blankets. Such blankets shall have a thermal conductance C value less than 1.0 W/m 2°C;
- (d) leaving formwork in place during the curing period. Steel forms shall be suitably insulated on the outside;
- (e) preventing rapid dissipation of heat from surfaces by shielding from wind;
- (f) avoiding the use of water sprays when such use would cause rapid cooling of the surface;

7.10 Protection of Fresh Concrete

Freshly placed concrete shall be protected from rainfall and from water running over the surface until it is sufficiently hard to resist damage from this cause.

No traffic shall be allowed on any concrete surface until such time as it is hard enough to resist damage by such traffic. Concrete placed in the Permanent Works shall not be subjected to any structural loading until it has attained at least its minimum average strength as defined in Clause 7.4.

If the Contractor desires to impose structural loads on newly-placed concrete, he shall make at least three test cubes and cure them in the same conditions as the concrete they represent. These cubes shall be tested singly at suitable intervals in order to estimate the time at which the minimum average strength is reached.

7.11 Concreting in Hot Weather

7.11.1 General

The Contractor shall prevent damage to concrete arising from exposure to extreme temperatures, and shall maintain in good working order all plant and equipment required for this purpose.

In the event that conditions become such that even with the use of the equipment the requirements cannot be met, concrete placing shall immediately cease until such time as the requirements can again be met.

7.11.2 Concrete Placing in Hot Weather

During hot weather the Contractor shall take all measures necessary to ensure that the temperature of concrete at the time of placing in the Permanent Works does not exceed 30°C and that the concrete does not lose any moisture during transporting and placing. Such measures may include but are not necessarily limited to the following:

- (a) Shielding aggregates from direct sunshine.
- (b) Sun shields on mixing plants and transporting equipment.
- (c) Cooling the mixing water. If ice is used for this purpose it shall be in flake form. Lump ice shall not be allowed to enter the tank supplying the mixer drum.
- (d) Covering skips closely with polythene sheet so that the latter is in contact with the concrete.
- (e) Painting all equipment and sunshields white.
- (f) Nightwork, provided that the Engineer has no other reason for refusing permission for nightwork.

Areas in which concrete is to be placed shall be shielded from direct sunshine and rock or concrete surfaces shall be thoroughly wetted if instructed by the Engineer to reduce absorption of water from the concrete placed on or against them.

After concrete in any part of an area has been placed, the specified curing process shall be commenced as soon as possible. If any interval occurs between completion of placing and start of curing, the concrete shall be closely covered during the interval with polythene sheet to prevent loss of moisture.

The Engineer shall have power to order the suspension of concrete production and/or laying when the shade temperature exceeds 30°C if he is not satisfied that the precautions being taken or intended by the Contractor are adequate to prevent the temperature of the concrete rising above 30°C. The possession of this power by the Engineer shall not relieve the Contractor of any of his responsibilities.

7.11.3 No Additional Payment

Under no circumstances will the Contractor be entitled to receive any additional payment for complying with the requirements of this Clause of the Specification.

7.12 Finishes on Free Surfaces

Horizontal or nearly horizontal surfaces which are not cast against formwork shall be finished to the class shown on the Drawings and defined hereunder.

7.12.1 U1 Finish

All surfaces on which no higher class of finish is called for on the Drawings or instructed by the Engineer shall be given a U1 finish.

The concrete shall be levelled and screeded to produce a uniform plain or ridged surface, surplus concrete being struck off by a straightedge immediately after compaction.

7.12.2 U2 Finish

The surface shall first be treated as a Class U1 finish and after the concrete has hardened sufficiently, it shall be floated by hand or machine sufficient only to produce a uniform surface free from screed marks.

7.12.3 U3 Finish

This is a hard trowelled surface for use where weather resistance or appearance is important, or which is subject to high velocity water flow. The surface shall be floated as for a U2 finish but to the tolerance stated below. When the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, it shall be steel-trowelled under firm pressure to produce a dense, smooth uniform surface free from trowel marks.

7.12.4 U4 Finish

The requirement is similar to a U3 finish but the permissible tolerances are smaller.

7.12.5 U5 Finish

The concrete surface shall firstly be prepared as a U2 finish and then lightly brushed with a stiff brush to produce a textured finish. The brush used, once approved, shall be kept for the brushed finish only and not used for any other purpose.

7.12.6 Tolerances

The permissible tolerances on free surfaces shall not exceed the values given in Table 7.2.

Table 7.2
Surface Tolerances

Class of Finish	Tolerance in mm See notes		
	A	B	C
U1	Not applicable	10	+ 20 or - 10

U2	Nil	10	+ 20 or - 10
U3	Nil	5	+12.5 or - 7.5
U4	Nil	2	+ 6 or - 4

Notes:

- (1) Col. A is the maximum allowable value of any sudden change of level in the surface
- (2) Col. B is the maximum allowable value of any gradual irregularity of the surface, as indicated by the gap between the surface and a three metre long straightedge or correctly shaped template placed on the surface.
- (3) Col. C is the maximum allowable value of the difference in level or position between a straightedge or correctly shaped template placed on the surface and the specified level or position of that surface.

Where dimensional tolerances are given on the Drawings or elsewhere in the Specification they shall take precedence over those given in Table 7.2.

7.13 Construction Joints

Whenever concrete is to be bonded to other concrete which has hardened, the surface of contact between the sections shall be deemed a construction joint.

Where construction joints are shown on the Drawings, the Contractor shall form such joints in those positions. The location of joints which the Contractor requires to make for the purpose of construction shall be subject to the agreement of the Engineer and details shall be submitted with the Programme of Works required by the Conditions of Contract.

The exact location of all construction joints shall be submitted to the Engineer at least four weeks prior to the start of construction of the relevant part of the works. Construction joints shall be in vertical or horizontal planes except in sloping slabs where they shall be normal to the exposed surface or elsewhere where the Drawings require a different arrangement.

Construction joints shall be so arranged as to reduce to a minimum the effects of shrinkage in the concrete after placing, and shall be placed in the most advantageous positions with regard to stresses in the structures and the desirability of staggering joints.

Feather edges of concrete at joints shall be avoided and any feather edges which may have formed where reinforcing bars project through a joint shall be cut back until sound concrete has been reached.

The intersections of horizontal or near horizontal joints and exposed faces of concrete shall appear as straight lines produced by use of a guide strip fixed to the formwork at the top of the concrete lift, or by other means acceptable to the Engineer.

Construction joints formed as free surfaces shall not exceed a slope of 20 per cent from the horizontal. The surface of the fresh concrete in horizontal or near horizontal joints shall be thoroughly cleaned and roughened by means of high pressure water and air jets when the concrete is hard enough to withstand the treatment without the leaching of cement. The surface of vertical or near vertical joints shall be similarly treated if circumstances permit the removal of formwork at a suitable time.

Where concrete has become too hard for the above treatment to be successful, the surface whether formed or free is to be thoroughly scabbled by mechanical means or wet sand blasted and then washed with clean water. The indentations produced by scabbling shall be not less than 10 mm deep and shall not extend closer than 40 mm to a finished face.

If instructed by the Engineer the surface of the concrete shall be thoroughly brushed with a thin layer of mortar complying with Clause 7.17, all as set out in Clause 7.7.2 immediately prior to the deposition of fresh concrete. The mortar shall be kept just ahead of the fresh concrete being placed and the fresh layer of concrete shall be thoroughly and systematically vibrated to full depth to ensure complete bond with the adjacent layer.

No mortar or concrete may be placed in position on or against a construction joint until the joint has been inspected and passed by the Engineer.

7.14 Expansion and Contraction Joints

Expansion and contraction joints are discontinuities in concrete designed to allow for thermal or other movements in the concrete.

Expansion joints are formed with a gap between the concrete faces to permit subsequent expansion of the concrete. Contraction joints are formed to permit initial contraction of the concrete and may include provision for subsequent filling.

Expansion and contraction joints shall be formed in the positions and in accordance with the details shown on the Drawings or elsewhere in the Specification.

7.15 Records of Concrete Placing

Records, in a form agreed by the Engineer, shall be kept by the Contractor of the details of every pour of concrete placed in the Permanent Works. These records shall include class of concrete, location of pour, date of pour, ambient temperature and concrete temperature at time of placing, moisture contents of aggregates, details of mixes, batch numbers, cement batch number, results of all tests undertaken, location of test cube sample points and details of any cores taken.

The Contractor shall supply to the Engineer four copies of these records each week covering work carried out the preceding week. In addition he shall supply to the Engineer monthly histograms of all 28 day cube strengths together with accumulative and monthly standard deviations and any other information which the Engineer may require concerning the concrete placed in the Permanent Works.

7.16 Mortar

This clause covers mortar for use ahead of concrete placing, and other uses not covered elsewhere in the Specification.

Mortar shall be composed of fine aggregate complying with Clause 7.3.3 and the type of cement specified in Section 2.0 of the Specification. The mix proportions shall be as stated on the Drawings or if not stated shall be one part of cement to two parts of fine aggregate by weight.

Small quantities of mortar may be hand mixed but for amounts over 0.5 m³ a mechanical mixer shall be used. The water content of the mortar shall be as low as possible consistent with the use for which it is required but in any case the water/cement ratio shall not be more than 0.5.

Mortar which is specified as 'dry pack' shall be mixed with sufficient water for the mix to become cohesive but not plastic when squeezed in the hand. Dry pack mortar shall be rammed into the cavity it is required to fill, using a hand rammer with sufficient force to ensure full compaction.

7.17 Concrete for Non Structural Purposes

Non-structural concrete (NS concrete) shall be used only for non-structural purposes where shown on the Drawings.

NS concrete shall be composed of aggregates complying with all-in aggregate within the grading limits of Table 3 of BS 882, Clause 7.3.3 and the type of cement specified in Section 2.0 of the Specification or on the Drawings.

The weight of cement mixed with 0.3 cubic metres of combined or all-in aggregate shall not be less than 50 kg. The mix shall be proportioned by weight or by volume. The maximum aggregate size shall be 40 mm nominal.

The concrete shall be mixed by machine or by hand to a uniform colour and consistency before placing. The quantity of water used shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted where required. The concrete shall be compacted by hand or by mechanical vibration.

7.18 Grouting of Pockets and Holes and Underpinning of Baseplates

Pockets and holding-down bolt holes shall be thoroughly cleaned out using compressed air and water jet. Holes drilled by a diamond bit shall be roughened. The pockets and holes shall be filled with grout consisting of cement and clean fresh water mixed in proportion of two parts by weight of cement to one part by weight of water. The pouring of liquid grout shall cease as soon as each hole is filled and any excess grout on the surface of the concrete foundation shall be completely removed and the surface dried off before the next operation proceeds.

The space between the top surface of foundation concrete and the underside of baseplates shall be filled with a special mortar made up in the following proportions:-

Portland cement	50 kg
Fine aggregate	50 kg

An additive acceptable to the Engineer shall be added to counteract shrinkage in proportions recommended by the manufacturer.

The special mortar shall be mixed with the lowest water-cement ratio which will result in a consistency of mix of sufficient workability to enable maximum compaction to be achieved.

The special mortar shall then be well rammed in horizontally below the baseplate and from one edge only until it is extruded from the other three sides. The mortar which has extruded shall then be rammed back to ensure complete support without voids.

7.19 Protection of Concrete

Surfaces of concrete which are to be buried shall be protected by an asphaltic material coat approved by the Engineer and applied in accordance with the manufacturer's instructions.

7.20 Hand Mixed Concrete

Concrete for structural purposes shall not be mixed by hand. Where non-structural concrete is required, hand mixing may be carried out subject to the agreement of the Engineer. The mixing shall be done on a hard impermeable surface. The materials shall be turned over not less than three times dry, water shall then be sprayed on and the materials again turned over not less than three times in a wet condition and worked together until a mixture of uniform consistency is obtained.

For hand mixed concrete not more than 0.5 cubic metre shall be mixed at one time. During windy weather efficient precautions shall be taken to prevent cement from being blown away during the process of gauging and mixing.

8.0 MASONRY

8.1 Blockwork

8.1.1 Concrete Blocks - General

The hollow and/or solid concrete blocks shall comply with BS 6073 Parts 1 and 2 and BS 5628.

8.1.2 Sizes of Concrete Blocks

The blocks shall be to the thicknesses shown on the Drawings and have the specified strength in the following approximate size: 450mm x 200mm, 450mm x 150mm, 450mm x 100 mm in case of normal blocks and where hollow pot slabs are specified, 457 x 210 mm and 457 x 230 mm. Blocks shall be hollow, unless shown otherwise on the Drawings.

8.1.3 Strength of Concrete Blocks

The average compressive strength of blocks shall be in accordance with BS 6073 Parts 1 and 2.

The minimum allowable compressive strength of blocks shall be as specified on the drawings.

8.1.4 Materials for Concrete Blocks

(a) Cement

Cement generally shall conform to the requirements of Section 2 of the Specification.

(b) Aggregates

Coarse aggregate shall conform to the requirements of Section 2 of the Specification, with maximum 10mm nominal size.

Sand shall conform to the requirements of Section 2 of the Specification.

Coarse aggregate and sand shall meet the same requirements for chlorides and sulphates as the sand for mortar as specified in Clause 7.4.2.

(c) Water

Water shall conform to the requirements of Section 2 of the Specification.

8.1.5 Manufacture of Concrete Blocks

Blocks shall be manufactured by the use of vibration machinery and shall be cast on removable pallets. They shall be left on the pallets to cure for ten days during which time they shall be kept damp and shall be protected from direct sunlight, drying winds, heavy

rain and frost. No blocks shall be used in the permanent works until they have attained an age of twenty-eight days.

8.1.6 Handling and Storage of Concrete Blocks

Blocks shall be transported, handled and stacked with care to avoid damage and shall be stacked clear of contact with the ground. In very hot weather blocks shall be protected from direct sunlight for at least four hours before laying. Chipped or damaged blocks shall not be used in the work.

8.1.7 Sampling and Testing of Concrete Blocks

Before work commences samples of blocks of the type to be used shall be submitted to the Engineer for his approval. Certificates shall be produced to confirm that the blocks comply with BS 6073. Blocks failing to meet these standards shall not be used in the Works.

Approved samples shall be left with the Engineer for comparison with blocks manufactured during the course of the Works. Random sample blocks of each type shall be taken from subsequent castings, as required by the Engineer, for acceptance testing.

8.1.8 Sample Panels of Concrete Blockwork

Two sample panels 1.6 m long x 1.0 m high including a corner and a junction with mortar pointing as specified shall be constructed for the Engineer's approval as an example of the standard to be achieved.

8.1.9 Reinforcement in Concrete Blockwork

Vertical Reinforcement

At all corners, junctions and openings in 150mm or 200mm hollow blockwork walls and wherever else indicated on the Drawings, the cavities of the blocks shall be filled with Class C25 concrete reinforced with 12mm diameter high tensile steel bars, (one per cavity in 150mm blocks, two per cavity in 200mm blocks), lapped 500mm and secured with galvanised tying wire to starter bars cast into the foundation concrete and similarly at all other laps. For special structural requirements the vertical reinforcement shall be as shown on the detailed Drawings, complying with BS 5628.

In load bearing blockwork and blockwork designed to resist seismic forces and other special loading conditions as indicated on the Drawings the reinforcement shall be tied into the concrete beams and/or slabs above. Where the latter concrete is cast after construction of the wall as shown on the detailed Drawings and nowhere by less than 75mm to allow for casting into the concrete.

8.1.10 Concrete Block Walling Filled Solid

Where walling is described as concrete block walling filled solid, it shall consist of hollow concrete blocks with the cavities filled solid with Class C25 concrete. Each section of the walling shall be carried up in four course stages and then filled to ensure maximum strength. Reinforcement will be provided in walling where indicated in the Drawings, and the Contractor shall provide to the Engineer the schedules for such reinforcement.

8.2 Workmanship in Blockwork

Blockwork shall be constructed in accordance with BS 5628 and as detailed on the Drawings, or as otherwise directed by the Engineer.

The blocks for general walling shall be properly bonded together and in such manner that no vertical joint in any one course shall be within 110mm of a similar joint in the courses immediately above or below.

Alternate courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining wall. All walling shall be built up entirely solid in blocks without voids between the blocks. All perpend, reveals and angles of walling shall be built strictly true and square.

Mortar shall be as specified in Clause 7.4.

Blockwork shall be positioned, levelled and plumbed in accordance with BS 5606. Blocks shall be laid in true and regular courses to rise 200mm per course inclusive of a 10mm mortar bed in the case of concrete blocks.

Vertical joints shall be filled with mortar. Joints shall be raked out to a depth of 8mm as the work proceeds where blockwork is to be plastered or rendered.

Joints shall be raked out to a depth of 20mm to receive flashings where detailed and where necessary.

Joints shall be struck flush or as otherwise indicated on the Drawings, as the work proceeds, where blockwork is to be fair-faced. All joints shall be kept continuously wet for seven days after laying.

No blockwork shall be built more than 1.0 m above the level of adjoining work. 'Overhand' work will not be permitted without the Engineer's consent.

Blockwork shall generally be built in stretcher bond. Broken blocks shall not be used except for bonding purposes. Junctions and abutments of blockwork walls shall be bonded at every alternate course.

Blockwork walls are to be completed up to the underside of concrete members, with 10 to 15 mm thick expanded polystyrene strips or similar approved.

In normal conditions, blocks shall be laid dry and kept dry after laying. In temperatures of 35°C and above with full sun and drying winds the surface of the blocks shall be lightly wetted before laying in order to prevent too rapid drying of the mortar. On no account shall blockwork be saturated with water. All newly laid blockwork shall be suitably protected from excessively hot sun or drying winds.

Blocks shall not be laid in wet or frosty weather. Newly constructed blockwork shall be protected from rain, and/or frost for a minimum period of twelve hours after laying.

The face of blockwork shall be protected from mortar drops and splashes.

Chases and holes for pipes, conduits, etc., shall not be cut less than forty-eight hours after construction of blockwork and shall be carried out only when approved by the Engineer and in accordance with BS 5628 Part 3.

Chases shall not be cut in hollow blocks. Precautions shall be taken to ensure stability of walls during backfilling and concreting operations.

8.3 Structural Anchorages

Metal anchorages (other than blockwork reinforcement) for tying blockwork to steel or concrete structural members or for tying together walling on either side of movement joints shall be of galvanised steel, stainless steel or non-ferrous metal and shall conform to BS 1243. Ties of different metals shall not be used in contact with one another. Ties to structural steelwork shall be of galvanised mild steel only.

Where blockwork abuts steel columns, it shall be secured to the structural members with L-shaped ties 175mm long x 20mm wide x 3mm thick, with a 75mm long right angle return at one end. The long leg of the tie shall not be fish-tailed or ragged. The ties shall be built into the blockwork at every second course vertically and pinned to the steelwork with washered steel pins applied with a cartridge assisted hand tool or by any other method acceptable to the Engineer.

Cartridge assisted pins shall not be driven into concrete less than 75mm from corners without the consent of the Engineer. Alternatively, ties may be straight, 175mm long, with one end dovetailed to fit into matching dovetail slots cast into the concrete structural members.

Where blockwork abuts insitu reinforced concrete walls or columns, the L-shaped ties shall be 500mm x 20mm x 2mm thick with a 75mm long right angle return at one end. That end shall be embedded about 125mm into the abutting concrete of the wall or column.

Where walls in concrete framed buildings are shown on the Drawings to be constructed of reinforced concrete blockwork, ties as specified above shall be used to fix the blockwork to the slabs and beams above. The ties shall be spaced at maximum 900mm centres and shall coincide with vertical wall reinforcement where this occurs, the long leg of the tie being wired to it before the last two course of blockwork are constructed.

Where movement joints in walling are shown on the drawings, straight (debonding) ties 250mm long, 20mm wide and 3mm thick shall be built into each leaf of the walling at not less than 400mm vertical centres or as otherwise shown on the Drawings.

8.4 Mortar

8.4.1 Cement

Cement shall be Ordinary Portland cement above DPC level and Sulphate Resisting cement below DPC level if the latter is a requirement of the Works. All cement shall comply with Section 2.

8.4.2 Sand

Sand for mortar shall be naturally occurring sand or shall consist of crushed rock or gravel or a combination thereof with naturally occurring sand. It shall comply with BS 1200 and Section 2 of the Specification except as described otherwise below. Where the colour of the mortar is important for reasons of appearance all the sand shall be obtained from the same source.

The following limits of chloride by weight or dried sand for mortars and expressed as equivalent sodium chloride (NaCl) when determined in accordance with the test method given in BS 812, Part A shall not exceed:

Mortars without reinforcement	-	0.10%
Mortars with reinforcement	-	0.05%

The acid soluble sulphate (SO₃) limit of sand for cement mortars shall be restricted to less than 1% of the weight of the dried sand when tested in accordance with Test No. 9 of BS 1377.

8.4.3 Lime

The lime shall be hydrated semi-hydraulic lime complying with BS 890 : 1972. This lime shall be soaked overnight prior to use to achieve maximum plasticity.

Alternatively, the lime shall be a factory-produced ready for use dry hydrated bagged lime complying with BS 890. It shall be obtained from a source approved by the Engineer.

8.4.4 Water

Water for mortar shall conform to the requirements of Clause 2.4 of the Specification.

8.4.5 Additives

Additives to mortar mixes may only be used with the prior agreement of the Engineer and then in strict accordance with the manufacturer's instructions. Plasticisers shall comply with BS 5075.

8.4.6 Mortar Mixes

Mortar mixes generally shall be as follows unless otherwise specified on the drawings.

(a) Cement Mortar

Cement mortar for blockwork below damp-proof course shall consist of a mixture of one part cement and four parts of sand (1:4) by volume (dry). Cement shall be sulphate resisting if this is a requirement for work below ground.

Cement mortar for blockwork or brickwork above damp-proof course shall consist of a mixture of one part Ordinary Portland cement and six parts sand (1:6) by volume (dry).

(b) Lime Mortar

Lime mortar for blockwork or brickwork above damp-proof course shall consist of a mixture of one part Ordinary Portland cement, one part lime and six parts sand (1:1:6) by volume (dry).

8.4.7 Method of Mixing

(a) Cement Mortar

The ingredients for mortars shall be measured dry in proper gauge boxes of the necessary size to give the proportions specified without consolidation of the

contents by ramming or shaking and shall be thoroughly mixed to a uniform consistency by an approved mechanical mixer.

Alternatively, subject to prior agreement by the Engineer, small quantities of mortar may be hand mixed on a clean boarded platform. The ingredients shall be turned over twice dry and twice whilst water is added through a fine sprinkler.

The mortar shall be mixed in such quantities as may be used within one half-hour and any mortar which has been mixed for a longer period or which has started to set shall not be used.

(b) Lime Mortar

The ingredients for lime mortar shall be mechanically weigh-batched, or hand-batched by volume on a clean boarded platform using separate gauge boxes of suitable sizes to allow their contents to be struck off level.

The lime shall be run to a putty and allowed to stand for sixteen hours before mixing with the sand in the proportions 1:6 to form a coarse mix before introducing the cement. Factory produced, bagged lime shall be used in strict accordance with the manufacturer's instructions.

Mixes shall be prepared in batches of a size which can be used within two hours. Any mortar left over after this period shall not be used. Machines for batching or mixing materials for mortar shall be of a type designed for this purpose and shall be thoroughly cleaned before new batches of material are put into them.

8.4.8 Mortar Strength

The strength of all mortars shall comply with the requirements of BS 5628.

8.7 Flashings

Joints raked for flashings, upstands of roof finishes and the like shall be pointed up in cement mortar after insertion of the flashing or other material, including packing in of any wedges by others.

8.8 Air Bricks and Blocks

Air bricks and blocks shall be of the sizes indicated on the Drawings and shall be of clayware in brickwork and of concrete in blockwork, complying with BS 493. They shall be standard units of proprietary manufacture or purpose made to conform to the detailed drawings.

8.9 Joint Fillers

At movement joints and elsewhere as shown on the Drawings, impregnated compressible filler material shall be provided and fixed in strict accordance with the manufacturer's instructions. The filler shall be of the full thickness of the joint and shall fit flush to the

face of the walling in concealed situations or where it is to be protected by a metal cover strip. Where the joint is to be exposed the filler shall finish 10mm back from the wall face to allow for the insertion of mastic sealant, see Clause 7.10.

8.10 Mastic Sealants

Sealants for movement joints, frames, sills and as elsewhere shown on the Drawings and backing strips to sealants, shall be of types particularly formulated for use in the situations and degrees of exposure occurring in the work. Selection of the appropriate sealants shall follow the guidelines in BS 6213.

At the request of the Engineer the Contractor shall produce manufacturers' technical data to demonstrate that this requirement has been met and that backing material, priming and sealant are compatible. Sealants and backing strips shall be applied in strict accordance with the manufacturer's instructions.

9.8 Painting

The tints of undercoats are to be approximate to those of the finishing colour but, in order to indicate the number of coats applied, a difference is to be made in the shade of each succeeding coat. Primed or undercoated work shall not be left in an exposed or otherwise unsuitable situation for too long a period before completing the painting process.

Rubbing down prior to application of the final coat shall be by means of the wet process with waterproof glass paper. Preliminary coats of paint shall be lightly rubbed down with fine sandpaper before the next coat is applied.

Finishing coats shall be applied evenly over the whole surface to give a solid film free from brush marks, sags, runs, orange peeling or other defects. The Contractor shall clean down all paintwork on completion, remove all marks due to spill and leave all painted surfaces to the complete satisfaction of the Engineer.

(b) Samples of Workmanship and Colour

The Contractor shall prepare samples of the different finishes on the appropriate backing material, with the correct priming and undercoats where applicable, for acceptance by the Engineer, including alternatives as directed. These samples shall be prepared at least twenty-eight days before commencement of the actual work.

9.8.3 Preparation of Surfaces

(a) Generally

All surfaces shall be thoroughly prepared and shall be clean, free from loose dirt or other impurity. No paint shall be applied until all surfaces are thoroughly dry. Preparation of the different materials to receive decorative and protective finishes shall be as specified below.

(c) Plaster and Rendering

Surfaces shall be brushed down to remove loose material and dust. The surfaces shall be washed, where directed, with a minimum of warm water and detergent, and allowed to dry. Minor defects, cracks and holes, after cutting out as necessary, shall be made good and rubbed down flush with the surrounding surface. Efflorescence shall be brushed off as it appears and all decoration deferred until it ceases.

(d) Hardwood

All surfaces shall be rubbed down smooth with fine abrasive, and dusted off. No further preparation is required for wood to be stained or clear sealed.

9.8.4 Priming

(a) General

Before priming, painting, varnishing, staining or sealing are started, all possible precautions shall be taken to keep down dust. All metal fittings and fastenings shall be removed before the preparatory processes are started. They shall be cleaned and refixed in position on final completion of the work.

(b) Special Priming

Unless the paint manufacturer recommends otherwise the following materials shall receive special priming: Cement based surfaces, such as concrete, fair face blockwork and brickwork, render and plaster, and asbestos free boards containing cement which are to receive oil based paints, shall be treated with an alkali-resistant primer.

Galvanized iron and steelwork shall be treated with calcium plumbate or a two-pack etching primer. Copper shall be treated with a suitable etching primer. The smooth face of hardboard shall be treated with specially formulated hardboard primer. All uncoated iron and steelwork cleaned or rust, millscale, etc., in preparation for painting shall be primed within twenty-four hours of preparation whether at the works or on site. All primers shall be used in strict accordance with the manufacturers' instructions.

9.8.5 Schedule of Coat Applications

Internal plasterwork, rendering, fairface concrete, blockwork and brickwork.	Three coats internal quality vinyl silk emulsion paint, the first coat thinned in accordance with manufacturer's instructions.
External render, fairface concrete, blockwork and brickwork.	One coat primer, two undercoats and one finishing coat emulsion paint.
Internal iron and steelwork	Two coats red lead primer, two undercoats and one finishing coat interior quality emulsion paint
Internal pipework (i) Plastics (ii) Steel (iii) Copper	Two coats alkyd resin based gloss enamel Paint as internal iron and steelwork Two undercoats and one finishing coat alkyd resin based gloss enamel

External iron and steelwork	Two coats red lead primer, two undercoats and one finishing coat exterior quality alkyd resin based high gloss enamel paint
Painted timber, plywood, asbestos-free building board, chipboard, wood-wool, plaster board, lining paper.	Primer, one undercoat and two finishing coats (exterior) quality alkyd resin based gloss or eggshell enamel
Natural finish timber	Four coats matt polyurethane, the first coat thinned with 25% white spirit. The first two coats shall be rubbed down lightly with abrasive paper Semi-transparent low solids preservative stain in two or three coats as recommended by the manufacturer.

9.12 Steel Balustrading and Handrails

Steel balustrading shall be as detailed and described on the Drawings or in the Schedules.

Stainless steel for balustrading shall be in accordance with BS 6323: Part 8 and BS 1449: Part 2. Other steel for balustrading shall be in accordance with BS 1387, BS 6323: Parts 1 to 7 and BS1449: Part 1 as appropriate.

The Contractor shall provide all necessary performed bends, joints, flanges for standards and rails and incorporate all necessary fittings and fixings. Painting or other decorative and protective finishes shall be as defined in the Finishes Schedule or on the Drawings.

9.12.2 Fencing

Fencing shall be anti-intruder chain link complying with BS 1722 Part 1 and as per drawings and conform to the following requirements:

4. Post and bracings shall be hot dipped galvanised circular hollow sections (CHS) and shall comply to BS EN 10210
5. Line wire, stirrup wire and tying wire shall be galvanised wire complying with BS 1722, Part 1 and BS 443
6. Chain link mesh shall be woven from galvanised wire complying with BS 1722, Part 1 except that wire with an outside diameter of 3.5mm and a core of 2.5mm shall be acceptable. The bottom 0.3m of the fencing shall be buried vertically and ground surface reinstated.

Use of plastic coated chain link fencing shall be according to manufacturer's specifications subject to the Engineer approval. Details of all fencing shall be submitted to the Engineer for approval before manufacture commences.

9.13 Asphaltic Concrete

The different types of bitumen shall conform to the following specifications:-

- | | | | |
|-----|----------------------|---|----------------------|
| (a) | Straight Run Bitumen | : | ADTM D946 |
| (b) | Cut-Back Bitumen | : | ASTM D2027 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 are in accordance with these specifications. Any laboratory testing that he arranges to satisfy this clause shall be carried jointly in an approved laboratory at no extra cost to the Employer.

Before carrying out the resurfacing of any existing surfaces, 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.

The surface shall, if required by the Engineer, be brushed completely free from all loose particles and surplus fines by mechanical brooms or other approved means. The surface shall be sealed with a prime coat of MC 30 cutback bitumen applied at a rate of approximately 1litre/sq.m where bituminous concrete is to be laid. Note that the rate of application may be varied by the Engineer and only the actual quality shall be paid for.

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. A new tack 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 applied shall first 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 R.C 70 or rapid setting, bituminous emulsion applied at the rate of 0.5 litre/sq.m.

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 separated 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 centistokes 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 course 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 an up-hill direction.

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 tonne three wheeled steel roller. Care shall be taken in the selection and use of roller so as not to overcompact the layers.

9.15.7 Shop Drawings

Shop drawings shall be submitted well in advance for approval, for works to be subsequently executed.

Completion of Works:

- **2 months** for completion of design of date of signature of Contract Agreement
 - **Six months** for execution of works after approval of whole design.
-

Section 5. Form of Bid and Appendix to Bid

Section 5. Form of Bid and Appendix to Bid

Notes on Preparing Forms of Bid and Appendix to Bid

The Bidder shall complete and submit the Form of Bid and Appendix to Bid, all in accordance with the requirements of the bidding documents.

Form of Bid

Name of Contract: *Implementation of Beach Management Plan (Phase II) - Design and Build of a Panoramic Viewpoint at La Prairie Public Beach*

Procurement Reference No.: BA/ONB/04/2023-24

To: Beach Authority
7th Floor, Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène

Gentlemen:

(a) We have examined the Conditions of Contract, Employer's Requirements & Specifications, Schedules, Addenda Nos _____ and the matters set out in the Appendix hereto. We have understood and checked these documents and have not found any errors in them. We accordingly offer to design, execute and complete the said Works and remedy any defects fit for purpose in conformity with these documents and the enclosed Proposal, for the fixed lump sum of (in currencies of payment, excluding VAT)

(b) We accept your suggestions for the appointment of the Dispute Adjudication Board, as set out in Schedule ____ *[We have completed the Schedule by adding our suggestions for the other member of this three-person Board, but these suggestions are not conditions of this Bid].**

(c) We agree to abide by this Bid until _____ and it shall remain binding upon us and may be accepted at any time before that date. We acknowledge that the Appendix forms part of our Bid.

(d) We hereby confirm that:

(i) this Bid complies with the Bid Security, if required; and

(ii) we have read and understood the content of the Bid Securing Declaration form contained in section 6 and subscribe fully to the terms and conditions of the Bid Securing Declaration, if required. We further understand that this declaration shall be construed as a signed Bid Securing Declaration which could lead to disqualification on the grounds mentioned in the Instructions to Bidders.

(e) We have no conflict of interest in accordance with ITB Sub-Clause 4.4;

(f) If our Bid is accepted, we will provide the specified performance security, preference security (if applicable), commence the Works as soon as reasonably possible after receiving the Employer's Representative's notice to commence, and complete the Works in accordance with the above-named documents within the time stated in the Appendix to Bid.

(g) Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution if we are awarded the contract, are listed below:

Name and Address of Agent	Amount and Currency	Purpose of Commission or Gratuity
_____	_____	_____
_____	_____	_____
_____	_____	_____

(if none, state "none").

* If the Bidder does not accept, this paragraph may be deleted and replaced by:

We do not accept your suggestions for the appointment of the Dispute Adjudication Board, and propose that we jointly agree upon the appointment after the Effective Date (unless previously agreed) in accordance with Sub-Clause 20.3 of the Conditions of Contract. **[OPTIONAL: Our Proposal includes our suggestions for this appointment, but these suggestions are not conditions of this Bid.]**

- (h) 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.

- (i) Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
- (j) We understand that you are not bound to accept the lowest or any bid you may receive.
- (k) 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.

We are, Gentlemen
Yours faithfully

Signature _____ in the capacity of _____ duly authorized to sign bids for
and on behalf of _____

Address

Date _____

Implementation of Beach Management Plan (Phase II) - Design and Build of a Panoramic Viewpoint at La Prairie Public Beach

Procurement Reference No.: BA/ONB/04/2023-24
Appendix to Bid

[Bidders should fill in the remaining blank spaces in the Appendix. Bidders are required to sign each page of the Appendix to Bid.]

Conditions of Contract Sub-Clause

Parties and Persons	1.1.2.2	Employer is: <u>Beach Authority</u> .
	1.1.2.4	Engineer is: <u>Beach Authority</u>
Dates, Tests, Periods and Completion	1.1.3.3	1. 2 months for completion of design of date of signature of Contract Agreement 2. Six months for execution of works after approval of whole design by the Authority.
Defects Notification Period	1.1.3.7	Defects Notification Period shall be: <u>6 months</u>
Works and Goods	1.1.5.6	Sections of the Works shall be as follows: None
Communications	1.3(a)	Agreed systems of electronic transmission are: Fax and Email.
	1.3(b)	Address of the Employer is: <u>7th floor, Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène</u>
	1.3(b)	Address of the Engineer is: <u>7th floor, Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène</u>
	1.3(b)	Address of the Contractor is: _____:
Law and Language	1.4	Law in force governing the Contract is Laws of Mauritius
	1.4	Ruling language of the Contract is: <u>English.</u>
	1.4	Language for communication is: <u>English.</u>
Right of Access to the Site	2.1	Employer shall give the contractor access to site one day after commencement date and possession of site seven days after submission of all approved program, design drawings, calculations, approvals, bonds and securities, evidence of insurances and other required document at that stage.”
Engineer's Duties and Authority	3.1(ii)	Engineer's authority to instruct a Variation is limited to fifteen <u>percent (15%) of the Contract Price.</u>
	3.1(iii)	Engineer's authority to approve a proposal for Variation submitted by the Contractor is limited to: fifteen percent <u>(15%) of the Contract Price.</u>
Performance Security	4.2	Performance Security will be in a form acceptable to Employer in the amount of: Not Applicable

General Design Obligations	5.1	Contractor's obligation to notify the Employer of errors, faults or defects in the Employer's Requirements is: <u>seven days</u> from the <u>Commencement Date</u> .
Working Hours	6.5	Normal working hours are as per local labour and Mauritian laws
Delay Damages	8.7	Delay damages shall be in the amount of: <u>0.1%</u> of the final Contract Price per day, in the <u>currencies and proportions in which the Contract Price is payable</u> .
	8.7	Maximum amount of delay damages shall be: <u>ten percent (10%)</u> of the final Contract Price.
Provisional Sums	13.5(b)(ii)	Percentage for overhead charges and profits for adjustment of Provisional Sums shall be: [] percent ([]%). – Not Applicable
Adjustments for Changes in Cost	13.8	See Schedule of Adjustment Data below.
Advance Payment	14.2	Total advance payment shall be: [] percent ([]%) of the <u>Accepted Contract Amount</u> – Not Applicable
		Number and timing of installments of the advance payment shall be: Not Applicable
		Currency in which the advance payment shall be paid is: <u>in proportion of the currencies of the Accepted Contract Amount</u> .
	14.2	Repayment of the advance payment shall start after certification of: [] percent ([]%) of the <u>Accepted Contract Amount</u> – Not Applicable
Application for Interim Payment Certificates	14.2	Recovery of the advance payments shall be in the amount of: [] percent ([]%) of the <u>amount of monthly Interim Payment Certificates</u> – Not Applicable
	14.3(c)	Amount to be retained shall be: <u>ten percent (10%)</u> of <u>Interim Payment Certificates</u> .
	14.3 (c)	Limit of retention money shall be: <u>five percent (5%)</u> of the <u>Contract Price</u>
Plant and Materials intended for the Works	14.5(b)(i) 14.5(c)(i)	Not Applicable
Issue of Interim Payment Certificates	14.6	Minimum amount of an Interim Payment Certificates shall be: <u>MUR 1,000,000, with no more than one (1) submission per month</u> .
Delayed Payment	14.8	Financing charges shall be at the prevailing rate of interest at the legal rate for each occurrences in which payments are made.
Payment of Retention	14.9	Payment for each Section shall be as follows:

Money		(i) <u>5% upon issue of Taking Over Certificate</u>
Currencies of Payment	14.15	Currencies of payment shall be: <u>Mauritian Rupees</u> , in the following proportions, as nominated by the Contractor: <u>Hundred percent (100%) – [local currency named above]</u> The basis for conversion shall be: the rate as published by <u>[insert source of exchange rate]</u> in effect on the date <u>twenty-eight (28) days before the Bid submission deadline date.</u>
Plant and Materials intended for the Works	14.5(b)(i) 14.5(c)(i)	See table of Plant and Materials below – Not Applicable
Delayed Payment	14.8	Financing charges shall be at the prevailing rate of interest at the legal rate for each occurrences in which payments are made.
General Requirements for Insurances	18.1	(a) Insurance for design Evidence of insurance and policies to be submitted before the commencement date (b) Other insurance Evidence of insurance to be submitted before the date of possession of site by contractor and policies within 14 days after possession.
Insurance for Works and Contractor's Equipment	18.2(d)	Deductibles per occurrence shall be nil or the minimum possible and at the sole expense of the contractor
Insurance against Injury to Persons and Damage to Property	18.3	Limit of occurrence shall not be less than Rs 5 Million per occurrence, or a series of occurrences arising out of any one event. This cover shall be extended to the Employer and its representatives
Insurance for Design	18.5	Limit for insurance shall not be less than: <u>MUR 500,000</u>
Appointment of the Dispute Adjudication Board	20.2	DAB shall comprise: <u>[] ([])</u> members. – Not Applicable
Failure to Agree Dispute Adjudication Board	20.3	Appointing entity shall be: Not Applicable.
Arbitration	20.6(a)(i)	Not Applicable – Any dispute shall in the first instance be resolved amicably. Should attempt to reach an amicable settlement fail, then the matter should be referred to competent court in Mauritius.

The items below are to be filled in by the Bidder as part of its Bid, as indicated in Conditions of Contract Sub-Clauses 13.8 and 14.5.

Adjustments for Changes in 13.8
Cost

In the Schedule of Adjustment Data immediately below, the Bidder shall (a) indicate the proposed source and base values of indices for the different input elements, including the currencies thereof, (b) derive their proposed weightings, and (c) indicate the currencies of payment.

Implementation of Beach Management Plan (Phase II) - Design and Build of a Panoramic Viewpoint at La Prairie Public Beach

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Schedule of Adjustment Data

<i>Index code</i>	<i>Index description</i>	<i>Source of index</i>	<i>Base value and date</i>	<i>Related source currency in type/amount</i>	<i>Bidders's proposed weighting</i>
	Nonadjustable	—	—	—	A: _____** B: _____ C: _____ D: _____ E: _____
Total					1.00

** In all cases, the Employer shall specify the weighting for the nonadjustable portion.

Plant and Materials intended for the Works 14.5(b)(i) 14.5(c)(i) In the table of Plant and Materials immediately below, Bidders shall indicate the major items of Plant and Materials and the proposed country of origin for each.

Table of Plant and Materials

Item	Country of Origin
For payment when shipped:	
Plant (list all major items)	
Material (list all major items)	
For payment when delivered to Site:	
Plant (list all major items)	
Material (list all major items)	

Initials of signatory of Bid _____

Section 6. Sample Forms

Section 6. Sample Forms

Notes on Sample Forms

Bidders shall complete and provide the Bid Security (where applicable) all in accordance with the requirements of the bidding documents.

Bidders should NOT complete the Form of Agreement at this time. Only the successful Bidder will be required to complete the Form. The Form of Agreement, when it is finalized at time of contract award, should incorporate any corrections or modifications to the accepted bid resulting from arithmetic corrections, acceptable deviations (time for completion, technical deviations, commercial deviations, etc.), spare parts or quantity variations in accordance with the requirements of the bidding documents.

The Form of Performance Security, Form of Advance Payment Security and Form of Domestic Preference Security should NOT be completed by the bidders at the time of bid preparation. Only the successful Bidder will be required to provide these securities in accordance with the forms indicated herein or in another form acceptable to the Employer. Where Advance Payment Security is not required, the form(s) should not be included in the bidding documents.

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Implementation of Beach Management Plan (Phase II) - Design and Build of a Panoramic Viewpoint at La Prairie Public Beach

Procurement Reference No.: BA/ONB/04/2023-24

Form of Bid-Securing Declaration

Date: *[insert date (as day, month and year)]*

Bid No.: *[insert number of bidding process]*

Alternative No.: *[insert identification No if this is an alternative bid]*

To: *Beach Authority*

I/We*, the undersigned, declare that:

I/We* understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

I/We* accept that I/we* may be disqualified from bidding for any contract with any Public Body for the period of time as 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 in Instructions to Bidders; 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 have refused to execute the Contract, if required, or (ii) have failed or have 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 am/we are the successful Bidder, upon receipt of copies of the contract signed by me/us and the issuance of the Performance Security; or (b) in case 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.

Signature:

Name: *[insert complete name of person signing the Bid Securing Declaration]*

In the capacity of: *[Insert the position of the signatory in the company].....*

Duly authorized to sign the bid for and on behalf of: *[insert complete name of Bidder]*

Dated on _____ day of _____, _____ *[insert date of signing]*

Corporate Seal [where appropriate]

[Note: In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid.]

*[*Please delete as appropriate]*

Form of Contract Agreement

This Agreement made this _____ day of _____ 20____ between _____
 of _____
 (hereinafter called "the Employer") of the one part and _____
 of _____ (hereinafter called "the Contractor") of
 the other part

Whereas the Employer desires that the Works known as _____
 should be designed and executed by the Contractor, and has accepted a Bid by the Contractor
 for the design, execution and completion of such 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 Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of
 this Agreement:
 - (a) The Letter of Acceptance dated _____
 - (b) The Employer's Requirements
 - (c) The Addenda nos. _____
 - (d) The Bid dated _____
 - (e) The Conditions of Contract (Parts I and II)
 - (f) The completed Schedules, and
 - (g) The Contractor's Proposal.
3. In consideration of the payments to be made by the Employer to the Contractor as
 hereinafter mentioned, the Contractor hereby covenants with the Employer to design,
 execute and complete the Works and remedy any defects therein in conformity in all
 respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor, in consideration of the design,
 execution and completion of the Works and the remedying of defects therein, the
 Contract Price or such other sum as may become payable under the provisions of the
 Contract at the times and in the manner prescribed by the Contract.

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

Authorized signature of Employer
 SEAL
 (if any)

in the presence of:

Name _____
 Signature _____
 Address _____

Authorized signature of Contractor
 SEAL
 (if any)

in the presence of:

Name _____
 Signature _____
 Address _____

Form of Cost Structure for Value Added per Product

COST STRUCTURE FOR VALUE ADDED CALCULATION PER PRODUCT		
	Rs	Rs
Raw Materials, Accessories & Components		
• Imported (CIF)
• Local (VAT & Excise Duty Fee)
Labour Cost		
• Direct Labour
• Clerical Wages
• Salaries to Management
Utilities		
• Electricity
• Water
• Telephone
Depreciation		
Interest on Loans		
Rent		
Other (please specify)		
•
•
•
TOTAL COST		

Local Value Added = $\frac{\text{Total Cost} - \text{Cost of imported inputs}}{\text{Total Cost}} \times 100$

- The cost structure should be certified by a Certified Accountant

Project: *Design and Build of a
Panoramic Viewpoint at
La Prairie Public Beach*

Procurement Reference No: BA/ONB/04/2023-24

Section 7. Schedules

Section 7. Schedules

Notes on Schedules

The Schedules are intended to provide the Employer with essential supplementary information in an organized format. Examples of more commonly used Schedules are given herein. Others may be devised and added in accordance with the requirements of the Instructions to Bidders.

All the Schedules are essential for bid evaluation and some in contract execution; they should all be incorporated in the Contract, and appropriate changes introduced with the approval of the Employer or its representative.

In Option A, Single Stage Bidding Procedure, all Schedules are to be completed and submitted with the bid.

In Option B, Two Envelope Bidding Procedure, the schedules are to be completed and submitted as part of the Technical Proposal and Price Proposal in accordance with the Instructions to Bidders (Option B) Clause 13, Documents Comprising the Bid.

1. *The Schedules are divided into six separate Schedules as follows:*
 - I. *Design, Drawings and Documentation*
 - II. *Plant and Equipment (including Mandatory Spare parts) supplied from outside the Employer's Country*
 - III. *Plant and Equipment (including Mandatory Spare parts) supplied from within the Employer's Country*
 - IV. *Civil Works, Installation and Other Services*
 - V. *Grand Summary*
 - VI. *Recommended Spare Parts*
2. *The quantities shown in these Schedules are estimates only.*
3. *The Schedules do not generally give a full description of the plant and equipment to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the bidding documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to include for the full scope as aforesaid including overheads and profit.*
4. *Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the bidding documents.*

Notes on Schedules (continued)

For each item, bidder shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in the Employer's Requirements, Drawings or elsewhere in the bidding documents.

5. Items left blank will be deemed to have been included in other items. The TOTAL for each Schedule and TOTAL of the Grand Summary shall be deemed to be the total price for executing the facilities and sections thereof in complete accordance with the Contract.

6. These Schedules are intended primarily to provide information for bid evaluation but not intended to be used for the evaluation of work done for the purpose of interim payment. They may, however, be used as a reference for the adjustment of the Schedule of Payment should the need arise.

7. These Schedules can be used as a basis to value variations of work done under the Provisional Sum.

*Implementation of Beach Management Plan (Phase II)**Design and Build of a Panoramic Viewpoint at
La Prairie Public Beach***Procurement Reference No.: BA/ONB/04/2023-24****SCHEDULES OF PRICES****I. Design, Drawings and Documentation**

Item	Description	Quantity	Rate	Total Price
1.0	Submission of Preliminary Drawings of all elements	Sum		
2.0	Topographical Survey Drawings	Sum		
3.0	Architectural Drawings	Sum		
4.0	Landscaping Drawings	Sum		
5.0	Civil Drawings	Sum		
6.0	Structural Drawings	Sum		
7.0	As-made Drawings	Sum		
	TOTAL (To Grand Summary)			

- a Currencies shall be in accordance with Clause 16 of the Instructions to Bidders.
b Include duties and taxes.

Implementation of Beach Management Plan (Phase II)
Design and Build of a Panoramic Viewpoint at
La Prairie Public Beach

Procurement Reference No.: BA/ONB/04/2023-24

II. Civil works, installation and other services

Item	Description	Quantity	Rate	Total Price
1.0	Clearing of site including felling of trees, trimming of branches and removal of stumps	Sum		
2.0	Construction of Mirador	Sum		
3.0	Construction of steps and terracing	Sum		
4.0	Fixing of handrails	Sum		
5.0	Construction of Pergolas	Sum		
6.0	and selfie point			
7.0	Construction of footbridge	Sum		
8.0	Fixing of directional signage	Sum		
9.0	Fixing of 3D signage	Sum		
10.0	Landscaping works	Sum		
11.0	Construction of Stele	Sum		
12.0	Fixing of notification signboard	Sum		
13.0	Miscellaneous (To detail)	Sum		
	TOTAL (To Grand Summary)			

- a Currencies shall be in accordance with Clause 16 of the Instructions to Bidders.
b Include duties and taxes.

III. Grand Summary

Item	Description	Total Price
1	Schedule 1. Design, Drawings and Documentation	
2	Schedule 2. Civil Works, installation and other services	
	TOTAL (To Grand Summary)	

IV SCHEDULE OF PAYMENT

Implementation of Beach Management Plan (Phase II)
Design and Build of a Panoramic Viewpoint at
La Prairie Public Beach

Procurement Reference No.: BA/ONB/04/2023-24

- (a) If payment is on a periodic basis according to pre-estimated construction progress.

Payment	Month	Percent	Amount	Cumulative%	Milestone ¹
1 st Payment					
2 nd Payment					
3 rd Payment					
Final Payment					
Total					

¹ Where available and applicable.

Note: The Employer and the Contractor may make necessary adjustments to the Schedules if the progress of work is substantially ahead of or behind the program referred to in Sub-Clause 4.14.

- (b) If payment is based on completion by stages.

Stage (insert brief description)	Percent	Amount	Cumulative%
1 st - Submission of Design and Drawings	05%		
2 nd – Construction of Steps	05%		
3 rd - Fixing of Handrails	05%		
4 th – Construction of Mirador	20%		
5 th – Construction of Pergolas and selfie point	10%		
6 th – Construction of Stele	10%		
7 th – Fixing of 3D signage	05%		
8 th – Civil and Ancillary Works	20%		
9 th – Completion	15%		
10 th – Retention Money	05%		
Final			
Total			

V. SCHEDULE OF COEFFICIENT AND INDICES FOR PRICE ADJUSTMENT

Coefficient Scope of Index	Country of Origin; Currency of Index	Source of Index; Title/Definition	Value on stated dates	
			Value	Date
a = _____ b = _____ c = _____ d = _____ e = _____				

VI. SCHEDULE OF MAJOR ITEMS OF CONSTRUCTIONAL PLANT

Description (Type, Model, Make)	No. of Each	Year of Manufacture	New or Used	Owned (O) Or Leased (L)	CIF Value	Est. Power Rating	Capacity t or m ³

The Employer should select appropriate major headings to suit the nature of the Works. The bidder shall enter in this Schedule all major items of Construction Plant which he proposes to bring on site, both owned and leased (rented), and shall indicate the proposed port of entry.

VII. SCHEDULE OF KEY PERSONNEL

	Name		Summary of qualifications
	(i)	Nominee	Experience and
	(ii)	Alternate	Present Occupation
Headquarters			
Partner/Director			
Other Key Staff			
(give designation)			
Site Office			
Site Superintendent			
Deputy			
Superintendent			
Supervising			
Engineers			
Construction			
Supervisors			
Other Key Staff			

The bidder shall list in this Schedule the Key personnel (including first nominee and the second choice alternate) he will employ from headquarters and from Site Office to direct and execute the Work, together with their qualifications, positions held and their nationalities.

VIII. SCHEDULE OF SUBCONTRACTORS

Element of Work	Approximate Value	Name and Address of Subcontractor	Statement of Similar Works Previously Executed
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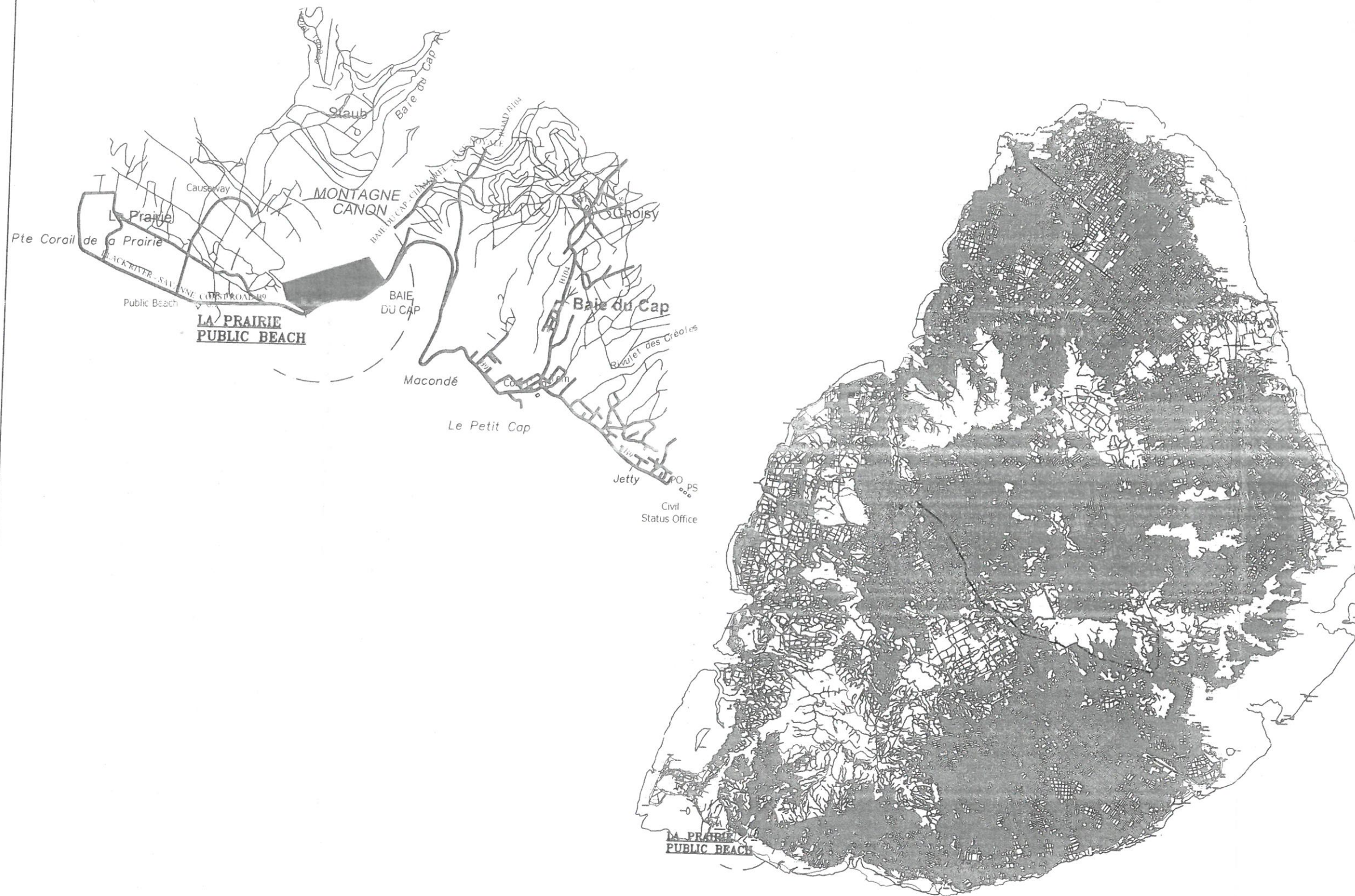
The bidder shall enter in this Schedule a list of the Sections and appropriate value of the work for which he proposes to use subcontractors, together with the names and addresses of the proposed subcontractors. The bidder shall also enter a statement of similar works previously executed by the proposed subcontractors, including description, location and value of work, year completed, and name and address of the Employer/Employer's Representative. Notwithstanding such information, the bidder, if awarded the Contract, shall remain entirely and solely responsible for the satisfactory completion of the Works.

Section 8. Drawings

Section 8. Drawings

Notes on Drawings

In a Design-Build or Turnkey contract no detail drawings would generally be available at the pre-tender stage. It would, however, be useful to include such conceptual drawings as are appropriate to supplement or help explain the text of the Employer's Requirements.



THIS DRAWING IS NOT TO BE USED IN WHOLE OR IN PART OTHER THAN FOR THE INTENDED PURPOSE AND PROJECT. REFER TO THE CONTRACT FOR FULL TERMS AND CONDITIONS.

GENERAL NOTES:
SEE SPECIFICATIONS

REVISIONS				
NO.	DATE	DETAILS	CH.	BY

CLIENT
BEACH AUTHORITY

PROJECT
CONSTRUCTION OF A PANORAMIC VIEWPOINT AT LA PRAIRIE PUBLIC BEACH

STAGE
TENDER

DRAWING TITLE
LOCATION PLAN

SCALE: DATE AUG 2023

DRAWING NO. B.A./P/BMP-2/001 REV

DRAWN	CHECKED	REVIEWED
B.N	P.P	



Pat



BEACH AUTHORITY

THIS DRAWING IS NOT TO BE USED IN WHOLE OR IN PART OTHER THAN FOR THE INTENDED PURPOSE AND PROJECT. REFER TO THE CONTRACT FOR FULL TERMS AND CONDITIONS.

GENERAL NOTES:
SEE SPECIFICATIONS

REVISIONS			
NO	DATE	DETAILS	BY

CLIENT
BEACH AUTHORITY

PROJECT
CONSTRUCTION OF A PANORAMIC VIEWPOINT AT LA PRAIRIE PUBLIC BEACH

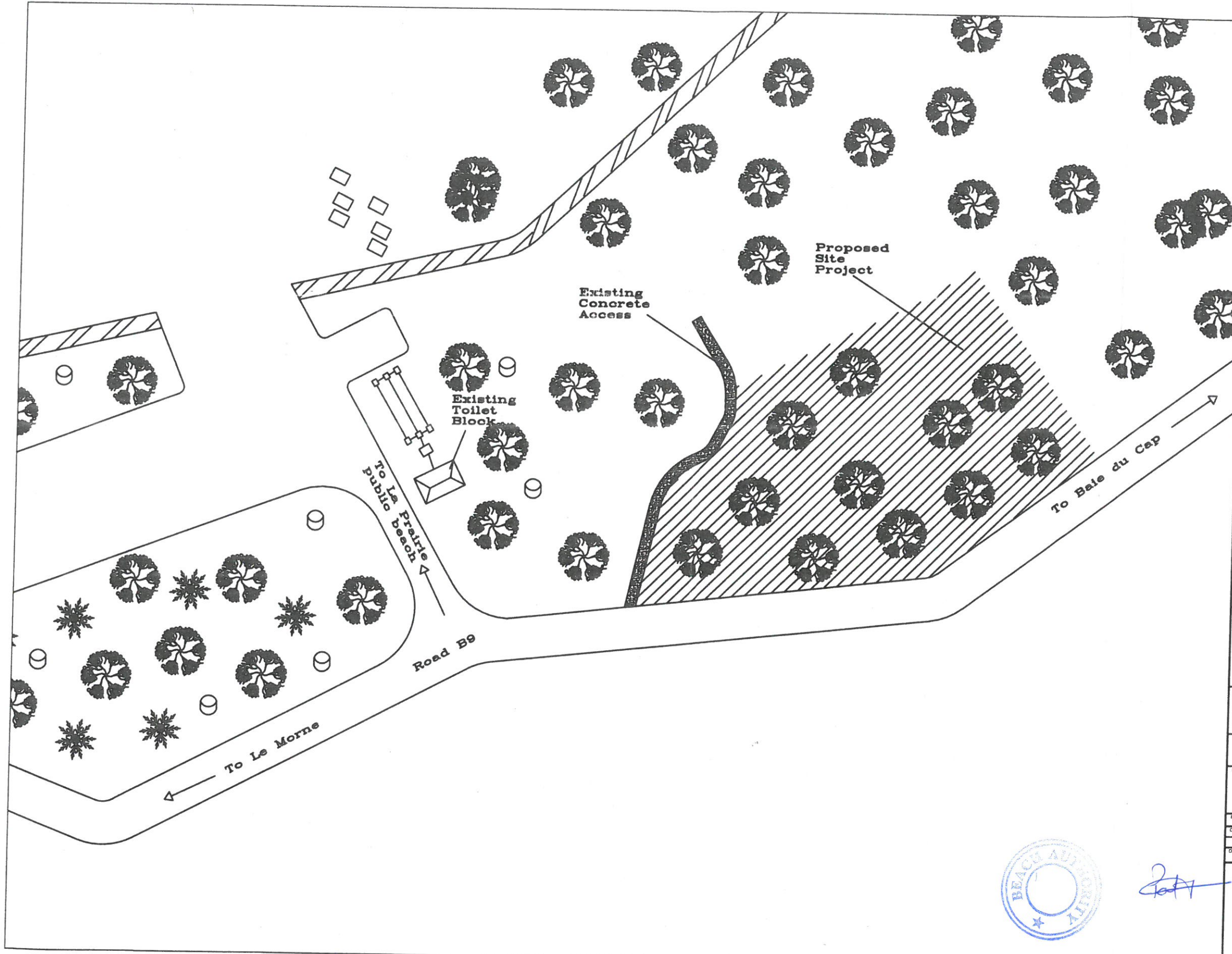
STAGE
TENDER

DRAWING TITLE
SITE PLAN

SCALE: NTS DATE: AUG 2023

DRAWING NO: BA/PIBMP-2/002 REV:

DRAWN: P.P. CHECKED:



Signature

