7TH FLOOR EBÈNE HEIGHTS BUILDING, PLOT 34, EBÈNE CYBERCITY, EBÈNE
TEL: 468 6209/10/11/12 – FAX: 468 6213 – EMAIL: beachauthority@intnet.mu

Procurement for Supply, Installation and commissioning of Solar Lighting System on Public Beaches

Procurement Reference No: BA/ONB/06/2021-22

Beach Authority
***7th* Floor Ebène Heights Building,**
Plot 34, Ebène Cybercity,
Ebène
Email: beachauthority@intnet.mu
Tel No: 468 6209/10/11/12
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Date: 28 March 2022

Foreword

The Standard Bidding Documents in this publication follow the Standard Bidding Documents of the World Bank and have been prepared pursuant to section 7(c) of the Public Procurement Act 2006 for use by public bodies for procurement of works of values up to 50 million rupees under Open National Bidding method. It has been simplified to facilitate participation of Small and Medium Enterprises.

Procurement proceedings for this standard bidding document have to be conducted as per the process specified in the Instructions contained below. Additionally, the principles governing standard clauses as contained in the Standard Bidding Document for Procurement of Works for values up to Rs. 300m shall apply to this SBD as well.
Those wishing to submit comments or suggestions on the Bidding Documents or to obtain additional information on procurement in Mauritius are encouraged to contact:

Procurement Policy Office
Ministry of Finance, Economic Planning and Development
Level 8, Emmanuel Anquetil Building, Port Louis, Mauritius
Tel: No. (+230)201-3760 & Fax: No. (230)201-3758
Email: pposecretariat@govmu.org

Section I: Instruction to Bidders

1. Introduction

The Beach Authority also referred as the Employer, invites eligible local contractors to submit their bid for the works described in detail hereunder. Any resulting contract shall be subject to the terms and conditions referred to in this document.

The Works are Excavation works, construction of reinforced concrete bases and supply, installation & commissioning of Solar Lighting System on Public Beaches.

Participation is limited to citizens of Mauritius or entities incorporated in Mauritius. Joint Ventures should be among entities incorporated in Mauritius

1.1 Clarifications, if any, should be addressed to: **The General Manager, Beach Authority, 7th Floor Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène.**

The Employer will respond in writing to any request for clarification, provided that such request is received **14 days** prior to the deadline for submission of bids.

The Employer shall respond to such request at latest 7 days prior to the deadline set for submission of bids.

1.2 Bidders are advised to carefully read the complete Bidding document, including the Particular Conditions of Contract in Section IV, before preparing their bids. The standard forms in this document may be retyped for completion but the Bidder is responsible for their accurate reproduction.

2. Validity of Bids

The bid validity period shall be **90 days** from the date of bid submission deadline.

3. Works Completion Period

The Intended Completion period is ***150 days*** **from** start date of works.

4. Pre-bid Meeting

Bidders or their designated representatives are invited to attend a pre-bid meeting in the conference room, on 7th floor of the Beach Authority on **18 April 2022 at 10.30 hrs** The purpose of the pre-bid meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

5. Sealing and Marking of Bids

Bids should be sealed in a single envelope, clearly marked with the Procurement Reference Number, addressed to the Public Body with the Bidder's name at the back of the envelope.

6. Submission of Bids

Bids should be deposited in the Bid Box located at **The Beach Authority 7th Floor Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène** not later than **05 May 2022 by 10.30 hrs at latest**. Bids by post or hand delivered should reach the above-mentioned address by

the same date and time at latest. Late bids will be rejected. Bids received by e-mail will not be considered.

7. Bid Opening

Bids will be opened by the Beach Authority at **Beach Authority *7th Floor Ebène Heights Building, Plot 34, Ebène Cybercity, Ebène*** *on* **05 May 2022 by 10.45 hrs at latest**. Bidders or their representatives may attend the Bid Opening if they choose to do so.

8. Evaluation of Bids

The Public Body shall have the right to request for clarification during evaluation. Offers that are substantially responsive shall be compared on the basis of evaluated cost to determine the lowest evaluated bid.

9. Eligibility Criteria

To be eligible to participate in this bidding exercise, Bidder should:

(a) have the legal capacity to enter into a contract to execute the works;
(b) 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. (Note 1)
(c) not be insolvent, in receivership, bankrupt, subject to legal proceedings for any of these circumstances or in the process of being wound up;
(d) not have had your business activities suspended;
(e) not be under a declaration of ineligibility by the Government of Mauritius in accordance with applicable laws at the date of the deadline for bid submission or 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;
(f) not have a conflict of interest in relation to this procurement requirement; and
(g) have a Business Registration Card.

Note 1 Sub-contractors undertaking works are also subject to registration with CIDB as applicable to Contractors.

10. Qualification and Experience Criteria

Bidders should have the following minimum qualifications and experience:

(a) valid registration certificate with the CIDB under the grade that will enable the contractor to perform the works quoted for, under the following class(es): **Electrical Works**

(b) experience in two works of a similar nature over the last 5 years, each of value not less than ***Rs 3 million*;**

(c) One Site supervisor who must be a holder of diploma in Civil Engineering from a recognised Institution or similar acceptable equivalent qualification and having a minimum 5 years' experience in Civil Engineering works and supervising quality control process on site.

(d) One RPEM Civil Engineer having a Degree in Civil Engineering and having at least 5 years post registration experience in civil works.

(e) One RPEM Electrical Engineer having a degree in Electrical Engineering and having at least 5 years post registration experience in electrical works

Signed CVs of the personnel mentioned above should be submitted with registration number of Engineers from CRPE.

(g) minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the Bidder of ***Rs 2 million*** **(MUR).**

(h) Bidder Shall submit signed CV of Technical Personnel at time of bidding.

11. Contents of bid

The Bid shall comprise the following:

(a) duly filled Bid Submission Form;

(b) duly filled Priced Bill of Quantities/Activity Schedule

(c) duly filled Qualification Information Form and attachments required

(d) report on the financial standing of the Bidder for the last three years, such as certified copies of Financial Statements or Audited Accounts as filed at the Registrar of Companies before the deadline set for submission of bids

(e) Valid Registration certificate with the CIDB, as applicable

(f) Signed C.V of Contract Manager;

(g) Documentary evidence of liquid assets and/or credit facilities (Note 1);

(h) Technical Catalogue of proposed model of solar lantern.

(i) Any other documents deemed necessary as per the requirements of this bidding document

Note 1

Bidders to demonstrate access to, or availability of, financial resources such as liquid assets, lines of credit, and other financial means, other than any contractual advance payments to meet the overall cash flow requirements for the contract and its current commitments. Documentary evidence may comprise but not limited to Bank certificate, Certificate from Auditors, Certificate from a Professional Accountant registered with MIPA, Certificate from Insurance companies.

12. Joint Venture

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

i. the Bid shall include all the information required as per the Qualification Information form for each joint venture partner;

ii. the Bid shall be signed so as to be legally binding on all partners;

iii. the Bid shall include a copy of the agreement entered into by the joint venture partners defining the division of assignments to each partner and establishing that all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms; **alternatively**, a Letter of Intent to execute a joint venture agreement in the event of a successful bid shall be signed by all partners and submitted with the bid, together with a copy of the proposed agreement;

iv. one of the partners shall be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of any and all partners of the joint venture; and

v. the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

13. Prices and Currency of Payment

Bidders should quote for the whole works. Prices for the execution of works shall be quoted and fixed in Mauritian Rupees. Items for which no rate or price is entered by Bidders, shall not be paid for by the Public Body when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.

Bids shall cover all costs of labour, materials, equipment, overheads, profits and all associated costs for performing the works, and shall include all duties. The whole cost of performing the works shall be included in the items stated, and the cost of any incidental works shall be deemed to be included in the prices quoted. Bidders are required to submit their bid prices **exclusive of VAT**.

14. Bid Securing Declaration

Bidders are required to subscribe to a Bid Securing Declaration in the Bid Submission Form.

15. Margin of Preference

Margin of Preference shall not apply.

16. Award of Contract

The Bidder having submitted the lowest evaluated responsive bid and qualified to perform the works shall be selected for award of contract. Award of contract shall be by issue of a Letter of Acceptance in accordance with terms and conditions contained in Section IV: General Conditions of Contract and Particular Conditions of Contract.

17. Performance Security and signing of contract (N/A)

Within twenty-eight (28) days of the receipt of the Letter of Acceptance from the Employer, the successful Bidder shall furnish a Performance Security, in the amount equal to 10% of the Bid price (exclusive of VAT), in accordance with the conditions of contract, using for that purpose the Performance Security Form included in Section V Contract Forms.

The contract agreement shall be signed within 28 days after the successful bidder receives the letter of acceptance unless the parties agree otherwise.

Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the contract within the required time may constitute sufficient grounds for the annulment of the award.

18. Notification of Award and Debriefing

Prior to the expiration of the period of bid validity, the Employer shall, for contract amount above Rs 15 million, notify the selected bidder of the proposed award and accordingly notify unsuccessful bidders. Subject to Challenge and Appeal, the Employer shall notify the selected Bidder, in writing, by a Letter of Acceptance for award of contract. Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

The Public Body shall after award of contract, exceeding Rs 1 million and up to Rs 15 million, promptly inform all unsuccessful bidders in writing of the name and address of the successful bidder and the contract amount.

Furthermore, the Public Body shall attend to all requests for debriefing for contract exceeding Rs 1 million, made in writing within 30 days the unsuccessful bidders are informed of the award.

19. Advance Payment (N/A)

The Public Body shall provide an Advance Payment on the Contract Price as stipulated in the General Conditions of Contract. The Advance Payment shall be guaranteed by an Advance Payment Security as per the format contained in Section V.
The Advance Payment shall be limited to 10% percent of the Contract Price, less any provisional and contingencies sums.

20. Integrity Clause

The Public Body commits itself to take all measures necessary to prevent 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.

21. Rights of Public Body

The Beach Authority reserves the right:

(a) to split the contract as per the lowest evaluated cost per lot; and

(b) to accept or reject any bid or to cancel the bidding process and reject all bids at any time prior to contract award without incurring any liability to the Beach Authority.

22. Challenge and Appeal

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.

(a) The address, Tel. & Fax No... & Email address to file Challenges in respect of this procurement is:

The General Manager
Beach Authority
***7th* Floor Ebène Heights Building,**
Plot 34, Ebène Cybercity,
Ebène
Tel No : 468 6209/10/11/12
Fax No: 468 6213/4686214
Email: beachauthority@intnet.mu

(b) The address to file Application for Review is:

The Chairperson
Independent Review Panel,
5th Floor,
Belmont House
Intendence Street
Port Louis

Tel : +230 2602228

Email : irp@govmu.org

Section II: Bidding Forms

Note: Bidders are required to fill all the forms in this section and submit as part of their bid. Non-submission of any form may lead to rejection of the bid

Bid Submission Form

Date: _____
Bid's Reference No.: _____
Procurement Reference No……

To:

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued;

(b) We offer to execute in conformity with the Bidding Documents the following Works: _____;

(c) The total price of our Bid excluding VAT is: _____(MUR):

(d) Our bid shall be valid for a period of **90 days** from the date fixed for the bid submission deadline in accordance with the Bidding Documents or up to ……., whichever is later, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(e) We hereby confirm that we have read and understood the content of the Bid Securing Declaration attached hereto and subscribe fully to the terms and conditions contained therein, if required. We understand that non-compliance to the conditions mentioned may lead to disqualification.

(f) If our bid is accepted, we commit to obtain a Performance Security in accordance with the Bidding Document;

(g) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 8;

(h) We are not participating, as a Bidder in more than one bid in this bidding process;

(i) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible under the laws of Mauritius;

(j) 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.

(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;

(l) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive; and

(m) If awarded the contract, the person named below shall act as Contractor's Representative:

Name: .....

In the capacity of: .....

Signed: .....

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

Date: .....

Seal of Company .....

BID SECURING DECLARATION

By subscribing to the undertaking in the Bid Submission Form:

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

(a) have modified or withdrawn my/our bid after the deadline for submission of bids during the period of bid validity specified by the Bidder in the Bid Submission Form; 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 during the period of bid validity, (i) have failed or refused to execute the Contract, if required, or (ii) have failed or refused to furnish the Performance Security, in accordance with the Instructions to Quote.

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

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

Qualification Information

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

1. Individual Bidders or Individual Members of Joint Ventures

1.1 Constitution or legal status of Bidder: [*attach copy]*

Place of registration: [*insert]*

Principal place of business: [*insert]*

1.2 Bidder shall provide *2* works of a nature and amount similar to the Works performed as Contractor over the last 5 years.

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

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

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

[Bidders have to ascertain that sub-contractors executing works are duly registered with the CIDB in accordance with CIDB Act 2008.

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

2. Additional

2.1 Bidders should provide any additional information Requirements requested in the Bidding Document.

Bill of Quantities

This text hereunder is a guidance for the preparation of the Bill of Quantities and should not form part of the final document.

Objectives

The objectives of the Bill of Quantities are:

(a) to provide sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately; and

(b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

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

Dayworks Schedule

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

(a) A list of the various classes of labour, materials, and Constructional Plant for which basic day work rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor shall be paid for work executed on a day work basis.

(b) Nominal quantities for each item of day work, to be priced by each Bidder at day work rates as Bid. The rate to be entered by the Bidder against each basic day work item should include the Contractor's profit, overheads, supervision, and other charges.

Provisional Sums

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

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors (refer to GCC Clause 8) should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Public Body to select such specialized contractors. To provide an element of competition among the bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.

BILL OF QUANTITIES

Procurement Reference Number: BA/ONB/06//2021-22

Priced Activity Schedule for. *Procurement of Supply, Installation and Commissioning of Solar Lighting System on Public Beaches* (List as per annex)

Item No	Brief Description of Works	Unit	QTY	Unit Price (Rs)	Total Price (Rs)
1	Supply and install LED type luminaire (minimum 50 w/4200 Lm) providing an average illuminance of 26 Lux over an area of 20m x 8m with integrated Battery, solar module and solar charge controller and 4 remote controls for the luminaires (**minimum 5yrs warranty on complete system)** as per specifications. The complete project to be designed & built and commissioned by a professional Electrical and Structural/Civil Engineer, duly registered with the Council of Registered Professional Engineers.	No	84		
2	Excavation and construction of reinforced concrete foundation with blinding for lighting columns as per specifications and drawing. Allow for compaction of formation level. All excess sand shall be laid around the site near depressions or as indicated by the Employer.	No	42		
3	Casting of foundation and stub column with concrete grade 30. Allow for supply, fixing and bending of reinforcement, formwork and cover 75mm to earth and 50mm to blinding layer all as per drawings	No	42		
4	Supply and install hot-dip galvanized octagonal light pole 6m high complete with double cross arm as per specifications and	No	42		

	drawing on reinforced concrete foundation				
5	Supply and fixing of galvanized metal number plate of size 50 mm x 80 mm x 3mm with engraved procurement reference and pole number, on each lighting pole as directed by the Client's representative. Method of fixing should be approved by the Client prior to installation.	No	42		
6	Supply and fixing of notice board in compliance to Drawing	No	11		
7	Maintenance Cost during Year 1 after DLP – Provisional Sum	Sum			
8	Maintenance Cost during Year 2 after DLP – Provisional Sum	Sum			
9	Maintenance Cost during Year 3 after DLP – Provisional Sum	Sum			
10	Maintenance Cost during Year 4 after DLP – Provisional Sum	Sum			
11	Maintenance Cost during Year 5 after DLP – Provisional Sum	Sum			
				Sub Total	
				CONTINGENCIES	25,000.00
				VAT 15%	
				Grand Total (inclusive of VAT)	

Schedule of Daywork Rates

Item no.	*Description*	*Unit*	*Nominal quantity*	*Rate*	*Extended amount*
	Forklift	hour			
	Labourer	hour			
	Bricklayer	hour			
	Crane	hour			
	—etc.—	hour			

a. To be entered by the bidder.

Bill of Quantities Authorised By:

Name:		Signature:	
Position:		Date:	
Authorised for and on behalf of:		Company	

Section III: Statement of Requirements

TEST FOR CONCRETE

1 CONCRETE

1.1 Scope of Section

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

1.2 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 7.4.

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.

1.3 Materials for Concrete

1.3.1 General

The Contractor shall submit to the Employer's Representative full details of all materials which he proposes to use for making concrete. No concrete shall be placed in the Permanent Works until the Employer's Representative 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 Employer's Representative.

1.3.2 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 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 which 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 Employer's Representative. The tests shall be in accordance with Test A1 in Appendix B, and the Contractor shall supply two copies of each test certificate to the Employer's Representative.

Each set of tests carried out by the manufacturer or Contactor 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 Employer's Representative, 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 Employer's Representative 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.

1.3.3 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 normal 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 percentage of the weight of cement in the mix: -

For prestressed concrete, steam cured concrete or concrete containing sulphate resisting or super sulphated 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 SO3 of all 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 40mm aggregate and above, not more than 40
For nominal 20mm aggregate and below, note more than 35.

(i) 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 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.

1.3.4 Aggregates for Mortar

Aggregates for mortar shall conform to BS 1200

1.3.5 Testing Aggregates

(a) Acceptance testing

The Contractor shall deliver to the Employer's Representative 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 Employer's Representative 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 Employer's Representative. If the tested materials fail to comply with the Specification, further tests shall be made in the presence of the Contractor and the Employer's Representative 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 Employer's Representative. 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 Employer's Representative may direct that some or all of the acceptance testing is repeated.

(b) Routine Testing

The Contractor shall carry out routing 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 aggregrate 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 Employer's Representative.

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).

1.3.6 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.

1.3.7 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

1.3.8 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 Employer's Representative 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 mix together without the consent of the Employer's Representative.

(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 authorized by the Employer's Representative, 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 Employer's Representative 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 Employer's Representative 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 Employer's Representative, 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.

1.4 Design of Concrete Mixes for Structural Concrete

1.4.1 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 in Table 7.1

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**
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/m^3 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.

1.4.2 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 7.1 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 7.1 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 7.4.3 shall not be less than the minimum average strength given in Table 7.1 plus 2 N/mm^2

(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 C 15 unless otherwise indicated on the drawings.

The Contractor shall submit full details of all the mixes he proposes to use to the Employer's Representative.

1.4.3 Trial Mixes with 150 mm test cubes

For each mix of concrete, the Contractor shall in the presence of a representative of the Employer's Representative 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/mm^2 shall be greater than the Minimum Average Strength given in Table 7.1 for the class of concrete tested.

If the 28-day strength determined as above is less than the minimum average strength shown in Table 7.1 plus 2 N/mm^2 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 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 days cubes accepted by the Employer's Representative 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 Employer's Representative 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 Employer's Representative.

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 Employer's Representative, including the type and source of each ingredient, the proposed proportions of each mix and the results of the tests on the trial mixes

1.4.4 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 Employer's Representative and in the presence of a representative of the Employer's Representative, 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 m^3 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/mm^2 for the Class of concrete with no single test result (2 cubes) being less than the final average trial mix strength minus 6 N/mm^2

1.4.5 Failure to Comply with Requirements

The Contractor shall take any action instructed by the Employer's Representative 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.

1.5 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 Employer's Representative 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 Employer's Representative 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 Employer's Representative 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.

Unless the Employer's Representative agrees otherwise, each mixing plant shall be tested for mix variability as set out in Test A 8 in Appendix B before it is used to mix concrete for the Permanent Works. 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 slit 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 Employer's Representative.

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 Employer's Representative.

The Contractor shall provide standard test weights at least equivalent to the maximum working load used on the most heavily loaded scale and other auxillary 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 Employer's Representative 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 Employer's Representative 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 Employer's Representative has reason to doubt the adequacy of the mixing, he may order a variability test as set out in Test A8 in Appendix B and the Contractor shall forthwith carry out such tests, the results of which shall comply with the requirements shown in Appendix B.

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 Employer's Representative immediately before mixing begins each day and thereafter as the Employer's Representative 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.

1.6 Transport of Concrete

1.6.1 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 25mm.

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.

1.6.2 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 Employer's Representative 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 Employer's Representative.

(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 tickets
- 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 Employer's Representative.

A copy of each delivery ticket shall be given to the Employer's Representative

1.7 Placing of Concrete

1.7.1 Consent for Placing

Concrete shall not be placed in any part of the Permanent Works until the Employer's Representative's consent has been given in writing, and the Contractor shall give the Employer's Representative at least 18 hours' notice of his intention to place concrete.

If concrete placing is not commenced within 24 hours of the Employer's Representative's consent, the Contractor shall again request written consent as specified above.

1.7.2 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 Employer's Representative 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 Employer's Representative.

If so instructed by the Employer's Representative 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 5mm 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 Employer's Representative.

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.

1.7.3 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 Employer's Representative, 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 compiled 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 chute, 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 Employer's Representative 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.

1.7.4 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 sl oping 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 Employer's Representative 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.

1.7.5 Dimensions of Pours

Unless otherwise agreed by the Employer's Representative, 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 minimized.

1.8 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 Employer's Representative 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 100mm 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.

1.9 Curing of Concrete

1.9.1 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 o 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 form 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 Contrator's proposals for curing concrete shall be submitted to the Employer's Representative before the placing of concrete commences in the Permanent Works.

1.9.2 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 B. 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 Employer's Representative, 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 Employer's Representative, 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.

1.9.3 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 Employer's Representative 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 Employer's Representative;
c. Insulation of exposed concrete surfaces by insulating blankets. Such blankets shall have a thermal conductance C value less than 1.0 $W/m^2\ ^0C$;
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;

1.10 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.

1.11 Concreting in Hot Weather

1.11.1 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.

1.11.2 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. Night work, provided that the Employer's Representative 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 Employer's Representative 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 Employer's Representative 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 Employer's Representative shall not relieve the Contractor of any of his responsibilities.

1.11.3 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.

1.12 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.

1.12.1 U1 Finish

All surfaces on which no higher class of finish is called for on the Drawings or instructed by the Employer's Representative shall be given a U 1 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.

1.12.2 U2 Finish

The surface shall first be treated as a Class U 1 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.

1.12.3 U3 Finish

This is 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.

1.12.4 U4 Finish

The requirement is similar to a U3 finish but the permissible tolerances are smaller

1.12.5 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.

1.12.6 Tolerances

The permissible tolerances are 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.

1.13 Records of Concrete Placing

Records, in a form agreed by the Employer's Representative, 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 Employer's Representative four copies of these records each week covering work carried out the preceding week. In addition, he shall supply to the Employer's Representative monthly histograms of all 28-day cube strengths together with accumulative and monthly standard deviations and any other information which the Employer's Representative may require concerning the concrete placed in the Permanent Works.

1.14 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. 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 hand mixed but for amounts over $0.5m^3$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.

1.15 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 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.

1.16 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 Employer's Representative 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.

1.17 Protection of Concrete

Surfaces of concrete which are to be buried shall be protected by an asphaltic material coat approved by the Employer's Representative and applied in accordance with the manufacturer's instructions.

1.18 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 Employer's Representative. 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.

1.19 Protection of Buried Concrete

1.19.1 Materials

(a) Plastic sheeting where specified shall be polythene sheeting 250 microns minimum thickness to BS 743 to the approval of the Employer's Representative. The Contractor shall provide suitable samples for approval before any concreting works shall begin.

All joints in the plastic sheeting shall be made with an approved polythene based adhesive tape. This tape shall also be used where tailoring of the sheeting to complicated shapes is necessary, e.g gullies, pipe ducts, etc.

(b) Bitumen coating shall consist of one priming coat and one finishing coat of an approved bitumen based high build asbestos filled liquid coating.

1.19.2 Concrete in Contact with Ground

Where directed by the Employer's Representative or shown on the Drawings concrete work which will be placed directly against rock or soil or which will subsequently have backfill placed against it will be protected in the following way from the aggressive action of salts contained in rock, soil or groundwater:

a. Concrete placed directly against cut-face shall be protected by a layer of plastic sheeting laid over the area to be concreted. All laps shall be at least 300mm wide and sufficient surplus sheeting shall be left to enable a margin of at least 300 mm width to project above the ground/concrete interface to be sealed onto the adjacent finished concrete surface with the bitumen coating. Special care shall be taken to avoid damage to the plastic sheeting during concreting.

b. Formed or free concrete surfaces against which backfill will subsequently be placed will be protected by the application of bitumen coating.

No protection will be applied to surfaces against which concrete will subsequently be placed, except as described in the following sub-clause.

A. SCOPE OF WORKS, SPECIFICATIONS AND PERFORMANCE REQUIREMENTS

INTRODUCTION

The Client intends to undertake the Project of Providing Lighting Facilities on Public Beaches through PV Solar Panels and the list of Sites are as hereunder:

SN.	Public Beach	Quantity of poles	Quantity of Solar Lanterns
1.	Pointe Aux Sables (Tilac)	5	10
2.	Wolmar	4	8
3.	Tamarin	3	6
4.	Grand Baie	2	4
5.	Pointe Aux Piments (Debarcadere)	5	10
6.	Pointe Aux Piments (Cemetery)	3	6
7.	Trou aux Biches Aquarium	2	4
8.	Gris Gris	3	6
9.	P.G Embrazure	5	10
10.	La Prairie	2	4
11.	Palmar	8	16
	TOTAL	**42**	**84**

SCOPE OF WORKS

1. The bidder shall provide Photo-voltaic Stand- Alone double bracket LED Lighting System, suitable for the beach. The system shall be easy to install. A minimum of five years warranty on the full system (incl: LED luminaires, columns & bracket & concrete foundation) shall be provided upon commissioning of project.

2. The bidder shall supply, install and commission **84 units** Photo-Voltaic Stand-Alone double bracket LED Lighting System as per specifications.

3. The Works to be carried out under the contract shall include the supply, installation and commissioning of 42 numbers hot dipped galvanized octagonal steel lighting columns (double brackets) inclusive of all accessories to form a complete beach lighting installation on public beaches as per table above.

4. The columns and brackets including anchor bolts and all other connections shall be capable of supporting the two luminaires with integral accessories and shall be able to resist cyclonic gusts of at least 275 km/hr. The system shall be designed to resist the marine environment.

5. The columns shall be octagonal and of nominal height of 6m above ground level. All columns for lighting poles shall be provided with a galvanised flanged base-plate surface mounted on a reinforced concrete stub column using galvanised anchored steel J-bolts (the J-bolts shall be

threaded on the length) of grade 8.8. All steel works shall be hot dip galvanized not less than 85 microns.

6. The galvanized double bracket should fit exactly to the column top and should be safely and properly secured to the galvanized metal column.

7. All columns shall receive 2 coats of epoxy paint white colour after galvanisation.

8. The columns to be located at a minimum setback of 30 metres from High Water Mark and/or as instructed by the client.

9. **Galvanising and fastenings**

   Where manufactured or purpose made of steelwork and all fixings including any welded joint, nuts, brackets, bolts and washers are specified as galvanized, this shall mean hot dipped galvanized. Thickness of galvanizing shall not be less than 85 microns. Test Certificates submitted to be from an accredited laboratory.

10. The bidder shall submit a test certificate duly certified to ensure that the materials including lighting columns and brackets and any other galvanized steel components are in full compliance with the specifications. Galvanisation tests shall be carried out by the contractor at its own cost on the following:

    - 21 steel columns
    - 21 brackets
    - 21 base plates
    - 21 anchor bolts
    - 12 metal number plates

11. **Additional inspections or tests**

    The Engineer/ Employer may request the contractor to carry out additional tests, arrange for or submit additional data, samples or tests where necessary to ensure that the materials are in full compliance with the specification at his own expense.

12. **Signboards**

    The contractor shall erect 1 signboard on each site at the start of construction works and during the construction period at locations to be indicated on site. The board shall be weatherproof and mounted on short posts to withstand strong winds associated with cyclones. The board shall indicate relevant information on the project such as the project name, the client, the contractor with lettering shown in blue on white background and in sizes not less than 50 mm high. The contractor shall reinstate signboards damaged during cyclones or through vandalism at his own expense. The signboards shall be removed after testing and commissioning has been completed to satisfaction.

13. The double brackets shall be securely fixed to the column to prevent rotation. The brackets shall give a maximum outreach to the centre of Lantern as per the Lantern manufacturer's recommendation in order to achieve the best utilisation and uniformity of light.

14. The J-bolt should be fixed when the stub column is being cast. All concrete works to be Grade 30. The base plate including bolts and nuts to be covered neatly with concrete mortar as per Engineer's Approval.

15. Before fixing of base plate, a non-shrink grout of minimum thickness 5mm shall be placed to even the surface of the stub column.

16. After the pole has been plumbed, all the space below the base and bolts is to be grouted with a non-shrink grout.

17. Supply and fixing of galvanized metal identification plate of size 50mm x 80mm x 3mm with engraved procurement reference and pole number. The method of fixing to be approved by the Client.

18. The Contractor has to be responsible to carry out exploratory subsurface inspection to locate any existing underground services at his own cost.

19. The bidder shall cater for any associated civil works for achieving the above-mentioned works.

SPECIFICATIONS FOR LUMINAIRES INCLUDING SOLAR PANEL, CONTROL BOX AND BATTERIES SHALL BE AS FOLLOWS:
The bidder should demonstrate compliance to the technical specifications detailed below as part of bid submission in the form of technical catalogues, pamphlets etc.

1) Country of origin shall be specified.

2) Manufacturer's authorization to be submitted

3) Shall be compliant with European standards

4) Supplied with charge controller and timer

5) Lithium-Ion Battery suitable for solar application or equivalent with a minimum battery life of five years. Three days autonomy with a minimum of 12 hours daily operation.

6) All cables and other accessories such as stainless-steel nuts, connectors shall be provided. Solar charge controller with automatic lighting control functions. Functions to turn on/off the light automatically by detecting the brightness level all through the year. Function to protect the battery from overcharging or over discharging. The controller must have an aluminium shell, for easy heat dissipation. The controller must have an IP 68 water proof rating.

7) All accessories provided shall be resistant to marine environment.

8) The Solar lighting systems shall be fitted with dimming capabilities.

9) European standard with five years warranty

10) High efficiency LED lamps (super bright LED)

11) LED street lantern minimum 50 W or greater

12) Color Temperature 4000 – 6000 K

13) Street lighting fixture to be minimum of IP 66

14) Impact Protection of street lighting casing to be minimum of IK07

15) LED life cycle of 50,000 hours at L70, LM 80

16) Casing material to be of aluminium diecast

17) Rust and Corrosion free

18) Power efficiency>90%

19) Instant start

20) Operates in high humidity and marine environment

21) Viewing angle 120^{o}

22) Working temperature – 30^{o} C to + 60^{o} C.

23) Infrared motion sensor (min range of radius 15m)

24) Surge protector

Programme of work

Prior to commencement of works, the contractor shall submit to the client for his approval a programme showing the order of the procedure in which he proposes to carry out the works. An organization chart describing members of the contractor's staff responsible for the administration and control of the works shall also be furnished for approval by the Client.

SPECIFICATIONS AND PERFORMANCE REQUIREMENTS

1.1 Submission

1. Submit construction drawings upon award of contract and prior to start of works.

    a. Detail design calculations and associated construction drawings.
    b. Show all connections details for lighting pole, including large scale details of members and materials, of brackets and anchoring devices and of connection and jointing details fully dimensioned layouts for positioning on brackets, bolts and anchoring devices structures, dimensions gauges, thickness, description of materials including catalogue members, product and manufacturer's name, alloy, finishes specifications and all other pertinent data.
    c. The manufacturers shall guarantee adherence to this Specification and the performance of their luminaire under all the required design conditions. Independent test reports shall be provided to show the luminaires will operate under these conditions.

1.2 Delivery and Storage

1. Adequately protect lighting poles, accessories and finishes to prevent damages thereto during fabrication, storage shipping handing, transportation and installation.

2. Deliver, handle and store units by methods approved by manufacturer. Protect from damage and staining.
3. Protect stills and stools after installation with suitable protection, secured in place, to prevent staining or scratching.

1.3 Warranty

1. **The contractor shall submit a warranty in writing from the RPEM Civil Engineer certifying that the lighting poles and all associated accessories and connections can resist cyclonic winds of not less than 275 km/hr. (To be submitted prior to implementation on site)**

2. **At time of submission of bid: (i) Complete Test Certificate of the luminaire by an internationally recognized laboratory and IEC approved shall be submitted. (ii) The supplier shall also submit a warranty certificate of five years for the luminaires from the manufacturer.**

3. **Test certificate from accredited laboratory in Mauritius to certify that the thickness of galvanization on steel columns, brackets and any other galvanized steel components is minimum 85 microns. (To be submitted upon award of contract).**

4. **A Bank guarantee of 5% of the contract value to be submitted upon commissioning of project covering a period of five years for the whole solar lighting system after Defects Liability Period. (Incl: Led luminaires, columns, brackets and associated components of the system). Guarantee shall also cover rusting.**

5. **Electrical installation shall be guaranteed against manufacturing defects, bad workmanship and other defects not related to normal wear and tear for a period of at least 1 year from date of successful commissioning in presence of the Client.**

   In the event of a defect, contractor shall make good within 48 hours at his own expenses to the satisfaction of the Client.

6. **Commissioning and testing should be carried out by a professional Electrical Engineer registered with the Council of Registered Professional Engineer for the whole solar lighting systems and test certificate duly certified by the latter for each site**

B. DRAWING BA/SL/01

The actual Drawing is annexed in a separate folder

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Section IV: General Conditions of Contract and Particular Conditions Of Contract

Any resulting contract shall be placed by means of a Letter of Acceptance and shall be subject to the General Conditions of Contract (GCC), **(Ref: W/GCC10/12-21)**[1], for the Procurement of Works (available on website *ppo.govmu*.org) except where modified by the Particular Conditions of Contract below.

Procurement Reference Number**: BA/ONB/06/2021-22**

The clause numbers given in the first column correspond to the relevant clause number of the General Conditions of Contract.

Particular Conditions of Contract

A. General	
GCC 1.1 (r)	The Employer is **The Beach Authority** Street: Plot 34, Ebene Cybercity Floor number*:* 7th Floor, Ebene Heights Building City: Ebene Country: **Mauritius** Telephone: **468 6209/10/11/12** Facsimile number: **468 6213** Electronic mail address*:* beachauthority@intnet.mu
GCC 1.1 (v)	The Intended Completion Date for the whole of the Works shall be ***150 days from start date***
GCC 1.1 (y)	The Project Manager is **Technical Manager of the Beach Authority** Street: Plot 34, Ebene Cybercity Floor number*:* 7th Floor, Ebene Heights Building City: Ebene Country: **Mauritius** Telephone: **468 6209/10/11/12** Facsimile number: **468 6213** Electronic mail address*:* beachauthority@intnet.mu
GCC 1.1 (aa)	The Site is located at:

[1] * Public Body to insert complete reference of the document applicable as at this date by consulting PPO's website.

	1. Pointe Aux Sables (Tilac) 2. Wolmar 3. Tamarin 4. Grand Baie 5. Pointes Aux Piments (Debarcadere) 6. Pointes Aux Piments (Cemetery) 7. Trou Aux Biches Aquarium 8. Gris Gris 9. P.G Embrazure 10. La Prairie 11. Palmar and is defined in drawings No**.** ***BA/SL/01***
GCC 1.1 (dd)	"The Start Date shall be 7 days from the date of signature of Contract Agreement''
GCC 1.1 (hh)	The Works consist of **Excavation works, construction of reinforced concrete bases and supply, install & commissioning of Solar Lighting System on Public Beaches.**
GCC 2.2	Sectional Completions are: **Not Applicable**
GCC 2.3(i)	The following documents also form part of the Contract**: Letter of Acceptance, Contract Agreement, Bank Guarantee.**
GCC 3.1	The language of the contract is English The law that applies to the Contract is the law of Mauritius.
GCC 5.1	The Project manager *may* delegate any of his duties and responsibilities.
GCC 8.1	Schedule of other contractors**: Not applicable**
GCC 13.1	Except for the cover mentioned in (d)(i) hereunder, the other insurance covers shall be in the joint names of the Contractor and the Employer and the minimum insurance amounts shall be: (a) for the Works, Plant and Materials: (for *the full amount of the works including removal of debris, professional fee etc...)* (b) for loss or damage to Equipment: (*for the replacement value of the equipment that the contractor intends to use on site until the taking over by the Employer.*

	(c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract *for an amount representing the value of RS 2M* (d) for personal injury or death: (i) of the Contractor's employees: RS 5M (ii) of other people: *RS 10M* (e) for loss or damage to materials on-site and for which payment have been included in the Interim Payment Certificate, where applicable. The Contractor shall choose to take the insurance covers indicated above as separate covers or a combination of the Contractor's All Risks coupled with the Employer's liability and First Loss Burglary, after approval of the Employer. All insurance covers shall be of nil or the minimum possible deductibles at sole expense of the contractor.
GCC 14.1	Site Data are: ***See1.1(aa)***
GCC 20.1	The Site Possession Date(s) shall be the Start Date
GCC 23.1 & GCC 23.2	Appointing Authority for the Adjudicator: **No Adjudicator shall be appointed for this Contract.**
GCC 24.	In case a dispute of any kind arises between the Employer and the Contractor in connection with, or arising out of, the contract or the execution of works or after completion of works and whether before or after repudiation or other termination of Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Employer's Representative, the matter in dispute shall, in the first place, be referred in writing to the employer's representative, with a copy to the other party. The Employer and the Contractor shall make every effort to resolve the dispute amicably by direct informal negotiation. If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Public Body or the Contractor may give notice to the other party of its intention to refer the matter to the competent courts of Mauritius"
B. Time Control	
GCC 25.1	The Contractor shall submit for approval a Program for the Works within 28 days from the date of the Letter of Acceptance.
GCC 25.3	The period between Program updates is *14* days. The amount to be withheld for late submission of an updated Program is **RS 2000**

C. Quality Control	
GCC 33.1	The Defects Liability Period is: 6 months
GCC 34.1	Delete sub-clause 34.1 and replace by the following: Should any defect arise during the contractual period and up to the end of the Defects Liability Period and the Contractor fails to correct the Defect within the time specified in the Project Manager's notice, this shall constitute a breach of the Contractor's obligations under the contract. The Project Manager shall assess the cost of having the defect corrected and recover the money from the Performance Security.
GCC 39.7	Interim Payment for Plant and Material on site **is not** applicable.
D. Cost Control	
GCC 40.1	Amend clause 40.1 by replacing 21 days by 7 and 42 days by 28 days.
GCC 41.1 (l)	The term "exceptional adverse weather conditions" is hereby defined as any one of the following events: (i) Wind - Cyclone Warning Class 3 or 4 prevailing in Mauritius; (ii)Rainfall - An intensity equal to or exceeding 50 mm rainfall per 24 hours measured; (iii)Rainfall - Continuous rainfall on Site, causing an interruption of work exceeding 4 hours; or (iv) Torrential rainfall warning Extensions of time without costs (if any) will be granted for consequential delays as a result of exceptionally adverse climatic conditions which give rise to situations whereby it would be impossible or impractical for the Contractor to carry out works on site. The Contractor will be required to submit all relevant justifications to substantiate any disruption of works on site and shall provide rainfall records from the closest Meteorological recording station to the Site obtained from the Meteorological Services attesting the date(s) and amount(s) of rainfall for any such particular compensation event. Such justifications shall be provided not later than 14 days from the date of occurrence of the events."
GCC 43.1	The currency of the Employer's country is: **Mauritian Rupees.**
GCC 44.1	The Contract is not subject to price adjustment.
GCC 45.1	GCC Clause 45 is not applicable.

GCC 46.1	The liquidated damages for the whole of the Works are RS **2300** per day exclusive of VAT The maximum amount of liquidated damages for the whole of the Works is 10% of the Contract price.
GCC 47.1	The Bonus for the whole of the Works is not applicable.
GCC 48.1	The Advance Payments shall be: ***NOT APPLICABLE***
GCC 49.1	The Performance Security amount is *[insert amount. Usually between 5-10%of contract sum and inserted at contract signature stage]*. (The Performance Security amount is as specified in the ITB) **NOT APPLICABLE**
E. Finishing the Contract	
GCC 56.1	The date by which "as built" drawings are required **is Not Applicable**
GCC 57.2 (g)	The maximum number of days is: **NOT APPLICABLE**
GCC 59.1	The percentage to apply to the value of the work not completed, representing the Employer's additional cost for completing the Works, is ***10%***

Letter of Acceptance

[on letterhead paper of the Employer***]***

. . . . . ***[date]***. . . . . ..

To: . . . . ***[name and address of the Contractor]*** . . . .

Subject: . . . . ***[Notification of Award Contract No]***. . . . . .

This is to notify you that your Bid dated . . . . ***[insert date] . .*** . . for execution of the . . . . ***.[insert name of the contract and identification number, as given in the Appendix to Bid]*** . . . . for the Accepted Contract Amount of .Rs . . . . . ***.[insert amount in numbers and words and name of currency]***, exclusive of VAT, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by *(insert name of Public Body).*

You are requested to furnish the Performance Security in accordance with the General Conditions of Contract, using for that purpose of the Performance Security Form included in Section V (Contract Forms) of the Bidding Document.

Authorized Signature: .....

Name and Title of Signatory: .....

Name of Agency: .....

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made the . . . . . .day of . . . . . ., ..., between . . . . . ***[name of the*** Employer***]*** . . . . (hereinafter "the Employer"), of the one part, and . . . . . ***[name of the Contractor]***. . . . .(hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works known as . . . . . ***[name of the Contract]***. . . . .should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

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

2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents**.**

(a) the Letter of Acceptance

(b) the Bid

(c) the Addenda Nos . . . . . ***[insert addenda numbers if any]***. . . . .

(d) the Appendix to the General Conditions of Contract

(e) the General Conditions of Contract;

(f) the Specification

(g) the Drawings*;* and

(h) the completed Schedules,

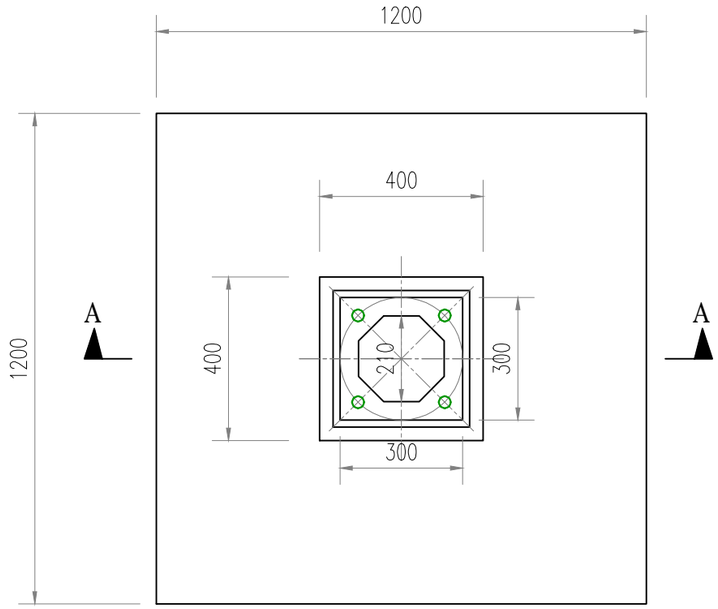
3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

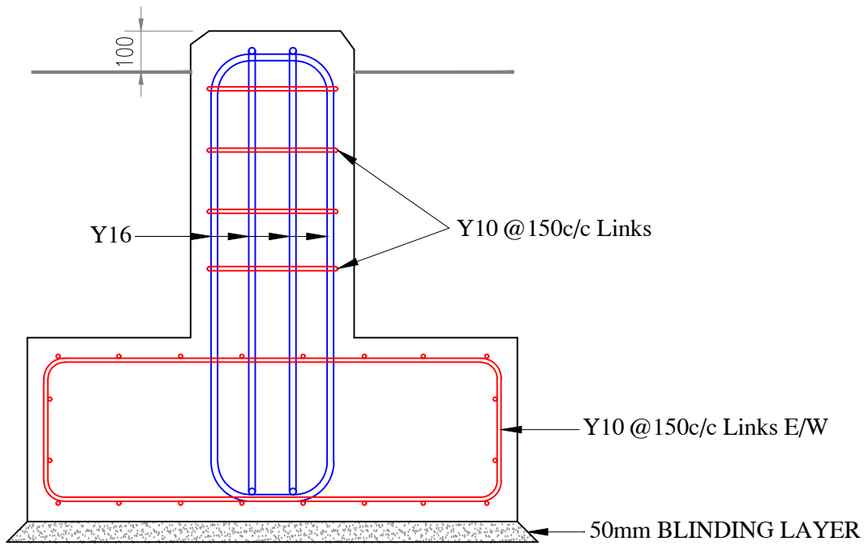
IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Mauritius on the day, month and year indicated above.

Signed by: ..... Signed by: .....
for and on behalf of the Employer for and on behalf the Contractor

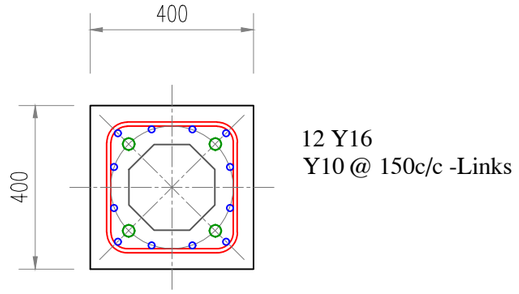
in the presence of: ..... in the presence of: .....
Witness, Name, Signature, Address, Date Witness, Name, Signature, Address, Date



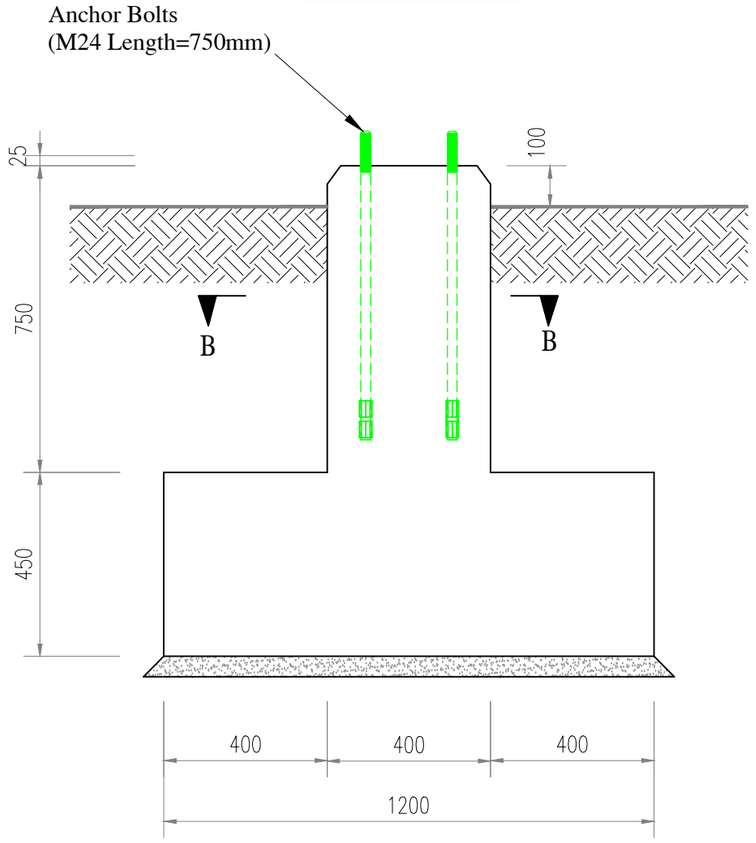
TOP VIEW



SECTION A-A



SECTION B-B



FRONT VIEW

TENDER DRAWING

PROJECT: PROVISION OF SOLAR LIGHTING ON PUBLIC BEACHES			
DRG TITLE: REINFORCED CONCRETE BASE DETAILS			
DRG NO: BA/SL/01		DRWN BY:	SCALE NTS
SERIAL NO: -	REVISION NO: -	CHKD BY:	